CLINICAL PATHWAY RICA

Recovery Intensification for optimal Care in Adult's surgery

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Clinical Pathway

RICA

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DECLARATION OF INTEREST

All members of the Clinical Pathway working group have made the declaration of interests and this can be consulted, upon request, through GERM's Secretary (www.grupogerm.es).

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1. Executive Summary

Fast track surgery, also known as enhanced recovery or enhanced recovery after surgery (ERAS) outside Spain, is a new approach to the management and care of surgical patients that aims to ensure that patients reach the operating room in the best possible condition, receive the best possible treatment during surgery and subsequently experience the best recovery. In this regard, intensified recovery protocols (IRPs) cover the entire surgical process from diagnosis to intervention and until the full incorporation of normal activity. This requires the coordination and teamwork effort of all the healthcare professionals involved as well as the patient.

The original idea was conceived in Denmark at the beginning of the 1990s by Prof. Henrik Kehlet. The first IRPs were used in colon surgery. It was in this field that the reduction of post-operative complications, faster recovery and a decrement in hospital stay were achieved. Since then, numerous studies in almost every surgical area have concluded that IRPs can be applied to most surgical patients, and be implemented in most major surgical procedures, regardless of the patient's age. In fact, their benefits have proven more advantageous in elderly patients because of the implementing features which aim to reduce surgical trauma.

With the above in mind and thanks to the close collaboration of the Grupo Español de Rehabilitación Multimodal (GERM) and the Spanish Ministry of Health, Social Services and Equality, a care plan was developed which aimed to reduce clinical practice variability. In 2015, The Clinical Pathway for Intensified Recovery in Abdominal Surgery (via RICA) was published in close collaboration with other scientific organisations, offering an interdisciplinary consensus document to improve postoperative recovery, maintain patient safety and ensure optimal resource usage.

Over time, the need to update this document with the inclusion of other surgical procedures apart from abdominal surgery became clear. Consequently, a new pathway is proposed as an update for the 2015 RICA, aiming to provide healthcare professionals with recommendations based on scientific evidence in consensus with a wide variety of scientific organisations. Those of us participating in the development of this new clinical pathway have done so with the firm understanding that the use and implementation of scientific evidence by healthcare professionals improves clinical effectiveness and increases the early detection of complications. Furthermore, the agreed IRPs have led to the harmonisation and homogeneity of treatments, facilitating teamwork and improving efficiency.

Therefore, the main aim of this document is to provide professionals with recommendations based on scientific knowledge and the consensus of the different scientific organisations involved in the implantation and evaluation of IRPs in major surgery in adults. The document is divided into a general part, which includes a review of the perioperative steps common to all procedures, and a specific part which covers the particularities of each specialty included in the document.

In preparing this document, reviews were made of those points in which there were no clinical practice guidelines or clear verifiable scientific evidence.

Following the terminology proposed by GRADE, the document includes a list of recommendations with bibliographic references, as well as the level of evidence and grade of recommendation. Likewise, a table of indicators is provided to measure the process and results. To measure perceived quality, a patient satisfaction questionnaire was designed. Finally, an informative text on the general healthcare process for the patient is provided.

2. Introduction

Until recently, perioperative treatment for patients undergoing elective abdominal surgery consisted of a series of habits acquired by practice rather than scientifically proven facts. At the beginning of the 2000s, the average postoperative stay in Spain after colorectal surgery with these treatment guidelines was 11.8 days (95% CI 11.21 to 12.7)[a]. One of the main improvements within the surgical area in recent times has been the introduction of fast-track or intensified recovery protocols (IRPs) These protocols stand on three fundamental pillars: implementing a package of perioperative strategies; interdisciplinarity, understood as the joint effort and organised contribution of the various healthcare professionals involved; and the active participation of the patient throughout the process.

With the above in mind, in 2015 the RICA (Intensified Recovery in Abdominal Surgery) pathway[b] was published in Guía Salud (OPBE). It is a document of clinical practice recommendations that reviews the entire perioperative process (pre-, intra- and postoperative) and constitutes a multimodal care pathway designed to achieve early recovery after surgery.

The Via RICA, supported by the best available scientific evidence, preserves the fundamental ideas of the IRPs and aims to promote four fundamental principles of healthcare quality and safety in decision-making:

1. Patients should be kept informed during the entire process and involved in the course of decision-making.
2. Patient preparation and well-being should be optimised to ensure they are in the best possible condition for surgery.
3. The entire perioperative stage should be based on proactive actions so that recommendations are adaptive and integrated throughout the whole pathway: before, during and after surgery.
4. Patients should play an active role and share the responsibility of improving their recovery.

a. Ruiz P, Alcalde J, Rodriguez E, Landa JI, Jaurrieta E. Proyecto nacional para la gestión clínica de procesos asistenciales. Tratamiento quirúrgico del cáncer colorrectal. I. Aspectos generales. Cir Esp. 2002;71(4):173-80.

b. Grupo de trabajo. Vía Clínica de Recuperación Intensificada en Cirugía Abdominal (RICA). Vía clínica de recuperación intensificada en cirugía abdominal (RICA) Ministerio de Sanidad, Servicios Sociales e Igualdad. Instituto Aragonés de Ciencias de la Salud. 2014 Available from: http://portal.guiasalud.es/contenidos/iframes/documentos/opbe/2015-07/ViaClinica-RICA.pdf

RICA's recommendations represent change, and change is always difficult. However, since its first publication in 2015, a willingness to change has been shown by a significant number of healthcare professionals and with the support of the Spanish Ministry of Health. In just four years, IRPs and protocols have been adopted by a remarkable number of hospitals in Spain, and this number is increasing daily. This trend is turning the RICA pathway into a standard procedure.

Five years on from its publication, the necessity to review and update it is clear. New studies have appeared, and protocols have been extended to almost all surgical specialties with proven benefits. Therefore, not only has an update to the 2015 RICA been proposed, but also an extension to include these new specialties. New RICA pathways offer recommendations for almost every adult patient undergoing scheduled surgery.

2.1. BACKGROUND

IRPs combine a series of elements aiming to optimise recovery and reduce the response to surgical stress. Following preliminary favourable results, they were introduced approximately 15 years ago based on sufficient scientific evidence derived from randomised studies. They begin at the diagnosis stage and aim to acknowledge the patient's individual needs to optimise care before, during and after surgery.

Engagement in the treatment of all of those involved, including the patients and their family, is essential. The adoption of a series of measures that form the protocols is the focus of the existing studies; thus, there is some variability because none adopt all the suggested measures. However, there is sufficient consensus to conclude that the implementation of these protocols is beneficial for the patients, as has been proven in recent metanalyses. The benefit obtained from these protocols is related to the percentage of compliance with them, as was demonstrated in a recent study by the Grupo Español de Rehabilitación Multimodal (GERM).[c]

2.2. JUSTIFICATION AND OBJECTIVES

The growing demand for major surgery in high-risk patients requires further improvements that must include an evidence-based, procedure-specific, updated and multidisciplinary approach within the foundations of the fast-track protocol; the standardisation of these measures is beneficial for patients, professionals and medical centres. It is possible to carry this out in a protocolised manner at state level, as demonstrated by previous projects in other countries with good results.

This document addresses the clinical aspects related to the perioperative management of the patient, the homogenisation of care and improvement of postoperative recovery by reducing surgical complications and improving the patient's perceived quality of life. Changing the manner in which these patients are usually managed in the pre-surgical stage and at intraoperative and postoperative recovery is necessary to achieve this goal.

c. Ripollés-Melchor J, Ramirez-Rodríguez JM, Casans-Francés R et al. Association Between Use of Enhanced Recovery After Surgery Protocol and Postoperative Complications in Colorectal Surgery. The Postoperative Outcomes Within Enhanced Recovery After Surgery Protocol (POWER) Study. JAMA Surgery 2019; 154(8):725-736.

The action range of this approach includes all patients over 18 years of age undergoing major surgery.

IRPs must be standardised, at least for elective surgery, but to achieve this, closer collaboration between surgeons, anaesthesiologists, nutritionists, nurses, etc. is required to ensure compliance with all the steps of the protocol as this has been proven to deliver the best results possible.

Therefore, the main aim of this document is to provide an instrument based on scientific evidence and with the consensus of the various scientific organisations that can be used to standardise the surgical care process based on the principles of IRPs.

Regarding specific objectives, the document aims to establish the clinical recommendations and responsibilities in the following stages:

- Preoperative optimisation
- Immediate preoperative
- Intraoperative
- Postoperative

As well as:

- Defining the indicators used to measure the quality of the healthcare process, including its various dimensions: quality, scientific–technical, clinical effectiveness, quality of life and patient satisfaction
- Providing complete written information to the patient
- Designing a questionnaire to measure patient satisfaction
- Proposing a strategy for the implementation of IRPs for different surgical procedures, including their specific aspects and particularities

2.3. WHO IS IT FOR?

This update maintains the scope of the original and is aimed not only at healthcare professionals directly involved in the care of surgical patient such as surgeons, anaesthetists, and nurses but also at those professionals who are in some manner related to the interdisciplinary treatment of these patients, such as nutritionists, stoma therapists, rehabilitators, physiotherapists, digestive specialists, radiotherapists, oncologists, pathologists, geriatricians and internists. As one of the advantages of IRPs is cost efficiency (reduction of hospital stay, as well as the optimisation of resources), we believe that this clinical pathway can also be useful for administrators, clinical managers and quality coordinators. Finally, and due to the characteristics of IRPs in which patients play an active role, we believe it is also useful for them. We further believe that primary care professionals must also benefit from them and incorporate them into their processes as they are part of the caring team.

3. Inclusion and Exclusion Criteria

Although there is no evidence that other patients could not also benefit from these guidelines, the advised criteria to begin the process are as follows:

INCLUSION CRITERIA

Major surgery procedures, not susceptible to intervention from a certified medical assistant and which meet the following criteria:

- Age: Over 18 years old
- Any ASA
- Process acceptance

EXCLUSION CRITERIA

- Urgent surgery
- Severe cognitive impairment that makes patient collaboration impossible
- Paediatric patients

4. Methodology

To update this document, a central working group of the RICA pathway was formed by a multidisciplinary team of healthcare professionals from the hospital care field of the following specialties: general surgery; nursing; urology; gynaecology; anaesthesia, resuscitation and pain therapy; endocrinology and nutrition; haematology and haemotherapy; preventive medicine; rehabilitation and physical medicine; plastic and reconstructive surgery; thoracic surgery; cardiovascular surgery; otorhinolaryngology; orthopaedic surgery; and traumatology.

Likewise, there were collaborators in the search for and evaluation of recommendations. As a final stage, the document was examined by a select group of experts who acted as external reviewers; among these, in addition to patients, there were specialists in surgery, anaesthesia, primary care, internal medicine, intensive medicine, geriatrics, nursing and preventive medicine.

The scientific organisations involved in the development of the RICA pathway, represented by members of the working group and external reviewers, are as follows: Foro Español de Pacientes (FEP), Plataforma de Organizaciones de Pacientes (POP), Asociación Española de Cirujanos (AEC), Sociedad Española de Anestesiologia, Reanimación y Terapia del Dolor (SEDAR), Sociedad Española de Endocrinología y Nutrición (SEEN), Sociedad Española de Nutrición Parenteral y Enteral (SENPE), Asociación Española de Coloproctología (AECP), Asociación Española de Enfermería Quirúrgica (AEEQ), Sociedad Española de Rehabilitación y Medicina Física (SEMERF), Asociacion Española de Urología (AEU), Sociedad Española de Enfermeria en Cirugia (SEECIR), Sociedad Española de Ginecología y Obstetrica (SEGO), Sociedad Española de Hematología y Hemoterapia (SEHH), Sociedad Española de Transfusión Sanguínea y Terapia Celular (SETS), Sociedad Española de Medicina Preventiva, Salud Pública e Higiene (SEMPSPH), Sociedad Española de Cirugia Cardiovascular y Endovascular (SECCE), Sociedad Española de Cirugía Plástica, Reparadora y Estética (SECPRE), Sociedad Española de Cirugía Torácica (SECT), Asociación Española de Cirugía Mayor Ambulatoria (ASECMA), Federacion de Asociaciones de Enfermería Familiar y Atención Primaria (FAECAP), Sociedad Española de Epidemiología (SEE), Sociedad Española de Geriatría y Gerontología (SEGG), Sociedad Española de Medicina Geriátrica (SEMEG), Sociedad Española de Médicos De Atención Primaria (SEMERGEN), Sociedad Española de Medicina Interna (SEMI), Sociedad Española de Patología Digestiva (SEPD), Sociedad Española de Médicos Generales y de Familia (SEMG), Sociedad Española de Medicina Intensiva, Crítica y Unidades Coronarias (SEMICYUC), Sociedad Española de Calidad Asistencial (SECA), Sociedad Española de Cirugia Oral y Maxilo Facial y de Cabeza y Cuello (SECOMCyC). También participaron miembros de los programas de Cirugía Segura y del Observatorio de Infección en Cirugía (OIC).

Reviews were carried out in PubMed, Embase and the Cochrane Library. The studies which complied with the inclusion criteria (establishing period and patient inclusion criteria) were examined by experts belonging to and proposed by the different participating scientific organisations, who established, according to the terminology proposed by GRADE[d], the level of evidence and the strength of the recommendation. To prepare the recommendations, a summary was made on the subject with bibliographic references, including the definition of the recommendation itself as well as the cataloguing of the level of evidence and its severity. The main criteria considered for the recommendations were the quality of the evidence, the balance of benefits and risks, and feasibility.

Bibliographic reviews were carried out until August 2020. The intention of the authors and the scientific societies that they represent is to carry out a periodic update of this document, for which a permanent reviewing group will be created.

The list of indicators was formulated from those established in the previous edition of the RICA pathway and updated by the consensus of the authors of this edition.

To improve its readability and understandability, the questionnaire for measuring patient satisfaction was also updated, considering the contributions of patients undergoing intensified recovery surgical procedures.

The Intensified Recovery Clinic for Adult Surgery will have the following documentation:

1. Temporary matrix with all the activities and interventions performed on the patient throughout the healthcare process. All actions and the performing professional must be registered and signed.
2. Patient Information Sheet
3. Recommendations at discharge
4. Satisfaction survey
5. Evaluation indicators

The Clinical Pathway is part of the patient's medical history at the time of its application in any institution.

At the end of the document, as annexes, the following documentation of the Clinical Pathway is grouped to facilitate consultation and improve the usefulness of the document: a temporal matrix, algorithms, summary table of recommendations, and abbreviations.

d. Alonso P, Rotaeche R, Rigau D, Etxeberria A, Martinez L. La evaluación de la calidad de la evidencia y la graduación de la fuerza de las recomendaciones: el sistema GRADE. (Sede web) A Coruña: Fisterra.com (Actualizada 10 de Octubre de 2019). Disponible en: https://wwww.fisterra.com

5. Assistance Process

PERIOD	ACTIVITY	RESPONSIBILITY
Before admission (outpatient)	Preoperative assessment. Special attention to the fragile patient. Cardiology, anemia, and comorbidity assessment, if required. Recommendations: stop alcohol and tobacco consumption. Nutritional assessment and trimodal rehabilitation with nutritional optimization. Information to the patient and their family.	Surgeon + Anesthesiologist + Endocrinologist + Nursing
Preoperative (preferably without admission)	Start thromboembolic prophylaxis (if the patient is admitted the previous afternoon, it will be done on admission). Shower the night before. Fasting before anesthetic induction: 6 hours for solids and 2 hours for clear liquids. Avoid long and half-life benzodiazepines and opioids in elder patients.	Anesthesiologist + Nursing + Surgeon
Perioperative	<u>Immediate preoperative</u> Placement of compression stockings or intermittent pneumatic compression, according to thromboembolic risk. Carbohydrate drink supplement 2 hours before intervention. Prophylactic administration of antibiotics when indicated (or in the operating room). Administration of 1 dose of glucocorticoids. Avoid hair removal as much as possible. <u>Intraoperative</u> Follow surgical checklist. Local anesthesia preferred, if possible. Use of epidural catheter in open major abdominal surgery. FiO2 oxygenation 0.6-0.8. Hemodynamic optimization through goal-guided fluid therapy (FGO). Monitoring and maintenance of blood glucose <180mg / dl. Avoid opioids as much as possible. In high-risk hemorrhagic surgery, assess the use of tranexamic acid. If urinary catheter needed, remove it as soon as possible.	Nursing Nursing + Anesthesiologist + Surgeon Nursing + Anesthesiologist

PERIOD	ACTIVITY	RESPONSIBILITY
Perioperative	Avoid NG as much as possible. Active heating with thermal blanket and fluid heater. Prophylaxis of postoperative nausea and vomiting according to the Apfel scale. Avoid drainage as a routine. Infiltration of the laparoscopic ports or block of the transverse plane of the abdomen (TAP) depending on the intervention. Immediate postoperative. Actively maintain temperature. Maintain FIO2 at 0.5 2h after intervention. Scheduled analgesia according to intervention. Keep morphic administration to a minimum. Restrictive fluid therapy. Oral tolerance 6 hours after surgery. Start of mobilization at 8 hours after surgery. Thromboembolism prophylaxis.	Nursing Nursing + Anesthesiologist + Surgeon Nursing + Anesthesiologist
Day 1 postoperative day	Nutritional supplementation in selected cases. Normal diet according to tolerance. Assess drainage removal, if applicable. Active mobilization (bed / chair / wandering). Intravenous analgesia. Avoid morphics. If correct oral tolerance, withdrawal of intravenous fluids. Evaluate removal of urinary catheterization, if applicable. Respiratory physiotherapy. Prophylaxis of thromboembolism.	Nursing + Surgeon
Day 2 postoperative day	Evaluate removal of urinary catheterization, if applicable. Consider removal of the epidural catheter, if applicable. Normal diet Withdrawal of intravenous fluids. Active mobilization (wandering). Prophylaxis of thromboembolism. Assess discharge.	Nursing + Surgeon
During the remainder of the hospitalization	Normal diet Oral analgesia. Active mobilization (wandering). Thromboembolism prophylaxis. Surgical wound revision. Assess discharge.	Nursing + Surgeon
At discharge	Maintenance of thromboprophylaxis according to type of surgery. Telephone check-ups after discharge. General discharge criteria: No surgical complications, no fever, pain can be controlled with oral analgesia, successful wandering, acceptance by the patient. Follow-up on discharge / Primary Care. Home support-Coordination with Primary Care.	Nursing + Surgeon + MAP

6. SUMMARY TABLE OF RECOMMENDATIONS

No.	Recommendation	Level of evidence	Grade of recommendation
PATIENT PREPARATION (OUTPATIENT)			
1	Patients must receive complete verbal and written information of what is required of them to improve their recovery after surgery.	Moderate	Strong
2	To identify patients at higher perioperative risk, preoperative assessment of patient frailty is recommended.	High	Strong
3	Patients with acute or decompensated heart disease must have a multidisciplinary assessment due to anaesthetic and surgical risk.	High	Strong
4	Assessment of the patient's physical status using the American Society of Anaesthesiologists (ASA) classification is recommended in all patients undergoing surgery.	High	Strong
5	To reduce associated complications, it is advisable to stop smoking 4–8 weeks prior to surgery.	High	Strong
6	Alcohol consumption should be stopped one month prior to surgery..	Moderate	Strong
7	Trimodal prehabilitation therapy is recommended to improve functional capacity prior to surgical intervention.	Moderate	Strong
8	Nutritional screening is recommended for all patients undergoing major surgery.	Moderate	Strong
9	When a patient at risk of malnutrition is identified, a complete nutritional assessment must be carried out and a nutritional treatment plan established, with tolerance monitoring and compliance with it.	Moderate	Strong
10	All patients with severe nutritional risk or severe malnutrition must receive nutritional treatment at least 7–10 days before surgery. Whenever possible, the oral / enteral route will be preferred.	Moderate	Strong

No.	Recommendation	Level of evidence	Grade of recommendation
11	Regarding preoperatory stages, the level of evidence to recommend immunonutrition (IM) versus standard oral supplements is insufficient.	Low	Weak
12	It is suggested that as soon as a patient enters the surgical waiting list or when the need for surgical procedure is notified, the appearance of anaemia or any blood deficit should be monitored, studied and properly managed.	Low	Weak
13	The implementation of Patient Blood Management (PBM) Programmes is recommended in all hospitals and health areas. We suggest the integration of the PBM programme within the IRPs.	High	Strong
14	Avoiding scheduling elective surgery that poses a risk of bleeding for patients with anaemia is recommended until proper diagnosis and management.	High	Strong
15	At least one haemoglobin determination is recommended in patients undergoing elective surgery, at least 28 days before surgery or invasive procedure.	Moderate	Strong
16	In surgical oncology, it is recommended to use all the time available between diagnosis and surgery to detect anaemia and correct it or, at least, improve haemoglobin concentration.	Moderate	Strong
17	It is recommended that the preoperative haemoglobin concentration before surgery should be above 13 g / dl, regardless of gender / sex.	Moderate	Strong
18	Detection and treatment of perioperative iron deficiency is recommended.	Moderate	Strong
19	The detection and treatment of preoperative anaemia is recommended, even in cases of urgent surgery.	Moderate	Strong
20	Oral iron treatment is recommended in cases of iron deficiency or mild-moderate iron deficiency anaemia, if there are at least 6 weeks until surgery.	Low	Strong
21	Preoperative treatment with intravenous iron (FEEV) is recommended in potentially bleeding elective surgery patients with iron deficiency anaemia and / or functional iron deficiency, to improve haemoglobin levels and / or reduce the transfusion rate.	Moderate	Strong
22	The administration of intravenous iron is recommended, instead of oral iron, in those cases in which it is contraindicated or where the time available until surgery is insufficient.	Moderate	Strong
23	To reduce the allogeneic transfusion rate, the administration of rHuEPO is recommended in elective orthopaedic surgery patients at risk of moderate-high bleeding and moderate non-deficiency anaemia (Hb between 10 and 13 g/dL).	High	Strong
24	The administration of rHuEPO is suggested to reduce the transfusion rate in anaemic patients undergoing major elective surgery other than elective orthopaedic surgery with a moderate-high risk of bleeding.	Moderate	Weak
25	The use of thromboprophylaxis is recommended in all patients undergoing major surgery or those hospitalised due to an acute medical condition.	Moderate	Strong

No.	Recommendation	Level of evidence	Grade of recommendation
26	In general, it is recommended to maintain antithrombotic prophylaxis for a minimum of 7 days or until the patient is ambulation.	High	Strong
27	In the case of major abdominal surgery, the prophylaxis will be extended up to 4 weeks after surgery. Specific situations: • In general, urological, gynaecological and neurosurgery surgery: 8 days; in the event of the immobilisation of the patient, it should be prolonged until ambulation. • In general, urological and gynaecological surgery in patients with cancer: 4 weeks (28 days). • In hip surgery: 4–6 weeks (28–42 days). • In knee surgery: 3–4 weeks (21–28 days).	Moderate	Strong
28	Early mobilisation and the use of gradual compression elastic stockings are recommended for the duration of the immobilisation period.	High	Strong
29	Compression stockings are effective in preventing thromboembolic disease in surgical patients, reducing the risk even further if combined with pharmacological agents.	High	Strong
30	Intermittent pneumatic compression devices decrease the incidence of deep vein thrombosis. Combining this method with pharmacological measures is more effective, mainly for neurosurgical patients and / or surgeries with a high risk of venous thromboembolism (VTE).	Moderate	Strong
31	Prophylaxis regimens include direct acting oral anticoagulants (dabigatran, apixaban, rivaroxaban) or low molecular weight heparins (enoxaparin, bemiparin, tinzaparin).	High	Strong
32	A full bath is recommended prior to surgery.	Moderate	Strong
33	In most patients undergoing an elective surgical procedure, solid food should be allowed up to 6 hours before induction of anaesthesia, and clear liquids up to 2 hours before anaesthesia.	High	Strong
34	In those patients with delayed gastric emptying and in emergency surgery, it is recommended to fast from midnight or 6–8 hours before surgery.	Moderate	Strong
35	Oral intake of carbohydrate-rich beverages up to 2 hours before surgery is safe and is not associated with an increased risk of aspiration.	Moderate	Strong
36	Oral administration of 200–400 ml of a drink containing 50 g of carbohydrates should be allowed up to two hours before surgery as this treatment improves the patient's feelings of well-being and can reduce hospital stay and insulin resistance.	Moderate	Strong
37	In obese and / or type 2 diabetic patients with good glycaemic control without associated chronic complications, the use of carbohydrate-rich drinks 3 hours before surgery could be considered. This can be given together with the patient's usual antidiabetic medication.	Low	Weak

No.	Recommendation	Level of evidence	Grade of recommendation
38	It is recommended to avoid the use of long half-life benzodiazepines and opioids prior to induction in patients at high risk due to age and comorbidity.	Low	Strong
	PREOPERATIVE		
39	Antibiotic prophylaxis (AP) is recommended if the odds of infection rates are high or if the consequences of a postoperative infection are potentially serious for the patient (endocarditis, endophthalmitis, prosthetic).	Moderate	Strong
40	In clean surgery with risk factors for infection, it is recommended to use antibiotics that cover microorganisms of the skin microbiota (S. aureus and coagulase negative staphylococci) and in clean-contaminated surgery gram-negative bacilli and enterococci should also be used as well as anaerobes.	Moderate	Strong
41	AP is recommended for 120 minutes prior to surgical incision.	High	Strong
42	It is recommended to use the same dose of prophylaxis as that used for the treatment of the infection, although in obese patients the adjusted weight should be used to calculate the dose.	Moderate	Strong
43	An additional dose is recommended in cases of prolonged surgeries or if there is significant blood loss.	Moderate	Weak
44	It is recommended to not prolong the duration of AP beyond the duration of the surgery itself.	High	Strong
45	The administration of a single dose of glucocorticoids is recommended because it has a significant impact on the duration of hospital admission without increasing the rate of complications.	Moderate	Strong
46	Blood glucose will be monitored preoperatively, as intraoperative hyperglycaemia can lead to an increase in postoperative complications, although the use of intensive insulin therapy should be avoided due to the risk of hypoglycaemia.	High	Strong
47	Perioperative blood glucose should be monitored and adequately treated with insulin, avoiding blood glucose levels> 180 mg / dl.	Moderate	Strong
48	More ambitious targets for perioperative blood glucose between 110 and 140 mg / dL (6.1-7.8 mmol / L) may be appropriate in selected patients if they can be achieved without significant hypoglycaemia.	Low	Weak
49	Hair should not be removed preoperatively unless strictly necessary. Conventional shaving should be avoided, both preoperatively and in the operating room.	Low	Strong
50	In the case of hair removal, electric razors can be used as close as possible to the intervention, but always outside the operating room.	Moderate	Strong
	INTRAOPERATIVE		
51	The use of the surgical checklist is recommended for the prevention of adverse events and mortality related to the intervention.	Moderate	Strong
52	The use of 2% alcoholic chlorhexidine is recommended as an antiseptic for intact skin in the surgical field.	High	Strong
53	It is recommended to minimise the use of benzodiazepines prior to induction and to use hypnotic agents with minimal residual effect, which allow for rapid recovery after anaesthesia.	Low	Strong

No.	Recommendation	Level of evidence	Grade of recommendation
54	The use of ventilation is recommended during general anaesthesia protection, which includes a tidal volume of 6–8 ml / kg ideal weight, the use of individualised Positive end-expiratory pressure (PEEP) generally above 5 cm H2O and the application of recruitment manoeuvres.	Moderate	Strong
55	In surgeries that require one-lung ventilation, we recommend the above protective ventilation measures but also decreasing the tidal volume to the lung dependent on 4–6 mL / kg of ideal weight.	Moderate	Strong
56	CO2 monitoring by capnography should be mandatory in all surgery, especially laparoscopic.	High	Strong
57	Temperature monitoring should be central.	High	Strong
58	The anaesthetic depth will be monitored using the bispectral index (BIS).	High	Strong
59	The use of nociception monitoring could decrease intraoperative opioid consumption compared to standard monitoring.	Moderate	Weak
60	When a bladder catheter is placed, it will be done with the appropriate aseptic measures, and, if possible, it will be removed 24 hours after surgery.	Moderate	Weak
61	Removal of the urethral catheter is recommended at 24 hours, except when there is a moderate risk of acute urine retention – e.g. men, epidural anaesthesia and pelvic surgery – in which case it is recommended for 3 days.	High	Strong
62	Invasive hemodynamic monitoring is not routinely indicated, and arterial cannulation is useful in those patients who present severe cardiorespiratory alterations and who may present problems in the postoperative period.	Low	Strong
63	A central venous catheter (CVC) insertion is not routinely indicated and is limited to patients with severe cardiorespiratory diseases with pulmonary hypertension, or those for whom it is anticipated that they may require administration of vasopressors or inotropes in continuous infusion.	Low	Strong
64	The use of quantitative monitoring of the block is necessary provided that neuromuscular blocking (NMB) drugs are used throughout the surgical procedure.	High	Strong
65	The use of deep NBM is recommended (PTC 1-2) to improve the visualisation of the surgical field, both in open and laparoscopic surgery, and to use the lowest possible intra-abdominal pressures in laparoscopy, favouring postoperative recovery.	High	Strong
66	It is recommended to check the reversal of NMB until a train of four (TOF) ratio greater than or equal to 0.9 is obtained in the adductor pollicis muscle during the anaesthetic discharge prior to extubating, to avoid residual NMB and reduce respiratory complications.	High	Strong
67	It is recommended to perform the reversal of NMB with sugammadex instead of neostigmine when rocuronium bromide has been used as it is faster and safer.	High	Strong

No.	Recommendation	Level of evidence	Grade of recommendation
68	It is recommended to prevent and avoid involuntary perioperative hypothermia.	High	Strong
69	Patient temperature should be controlled to guarantee normothermia in the perioperative period.	High	Strong
70	Active warm-up strategies should begin prior to surgery.	High	Strong
71	The ambient temperature in the operating room should be at least 21 ° C for adult patients.	High	Strong
72	During the perioperative period, the largest possible surface area of the body should be thermally insulated.	High	Strong
73	Infusions, cavity fluid infusions and blood transfusions given at doses > 500 mL / h should be warmed first.	High	Strong
74	Intraoperative active warming measures are indicated by the administration of convective or conductive heat to maintain normothermia.	High	Strong
75	The removal of general anaesthesia should take place at normal body temperature.	High	Strong
76	Adequate monitoring (stroke volume [SV] or stroke volume variation [SVV]) should be used to guide intraoperative fluid administration in patients at risk.	High	Strong
77	In cases where there is an SV drop > 10% or an SVV > 10%, fluid resuscitation is recommended (there is no preference between colloids or crystalloids).	High	Strong
78	A moderate continuous fluid infusion is recommended, giving a positive balance at the end of surgery of 1 to 2 L. to avoid postoperative acute kidney damage.	High	Strong
79	In high-risk patients, it is recommended to maintain individualised fluid therapy with a moderately positive balance and continuous monitoring of SV or SVV.	Moderate	Strong
80	Intraoperative hypotension unresponsive to lifting passive legs should be treated with vasopressors (checking for variations in blood pressure, VS and SVV).	Moderate	Strong
81	A mean arterial pressure range greater than or equal to 65 mm Hg should be established.	High	Strong
82	A cardiac index (CI)> 2.5 l / min / m should be maintained[two], using inotropes in cases of non-response to volume.	High	Strong
83	Monitoring by oesophageal Doppler or validated pulse contour analysis-based methods is preferred.	High	Strong
84	The primary maintenance intravenous fluid should be a balanced, isotonic crystalloid solution.	High	Strong
85	For fluid therapy in resuscitation, the use of balanced crystalloids is recommended; 2–3 litres for initial resuscitation in hypovolemic shock and haemodynamic monitoring to guide the additional administration of fluids.	Moderate	Strong
86	It is recommended that all adults who undergo surgery and are expected to have moderate-severe blood loss be offered tranexamic acid.	High	Strong

No.	Recommendation	Level of evidence	Grade of recommendation
87	The supplemental use of inspired oxygen is not recommended in patients undergoing general anaesthesia.	Moderate	Weak
88	Minimally invasive surgery is recommended, provided that the surgical and oncological results do not differ between the surgical techniques.	High	Strong
89	Transverse incision is recommended in laparotomic surgery.	Moderate	Strong
90	It is recommended not to use drains on a routine basis.	High	Strong
91	The routine use of an NG tube is not recommended.	High	Strong
92	Epidural analgesia should be performed within combined anaesthesia in all patients undergoing major open abdominal surgery procedures.	High	Strong
93	Catheterisation of the epidural space for the infusion of local anaesthetics for analgesia in open major abdominal surgery should be performed at the thoracic level.	High	Strong
94	Small doses of opioids should be added to the local anaesthetic doses to be delivered epidurally in major open surgery.	Moderate	Strong
95	When the provision of an epidural catheter is not possible in open major surgery, the analgesic strategy should be individualised, reducing the use of opioids, and favouring the use of locoregional blocks, spinal analgesia or port infiltration with local anaesthetics, especially considering the transverse plane block of the abdomen.	Moderate	Strong
96	Performing a bilateral transverse plane block with local anaesthetics could benefit those patients who require open major abdominal surgery and who cannot benefit from epidural analgesia.	Moderate	Strong
97	Opioid-free anaesthesia in a multimodal setting may be an alternative to the use of intravenous opioids.	Moderate	Weak
98	The use of intraoperative intravenous lidocaine is recommended as an adjunct medication in reducing postoperative pain and improving the recovery of intestinal function in the immediate postoperative period, being an alternative to the use of intravenous opioids.	Moderate	Weak
99	Iv Ketamine should be given to those patients receiving major opioids for analgesia in major abdominal surgery.	Moderate	Weak
100	The use of intraoperative iv magnesium sulphate is recommended as an analgesic adjuvant to improve pain control in patients undergoing abdominal surgery.	Moderate	Weak
101	The use of intraoperative intravenous dexmedetomidine is recommended for contributing to the reduction of the risk of adverse events associated with opioids and improving pain control in the intra and postoperative period.	Moderate	Weak
102	In open major abdominal surgery, a preoperative dose of oral gabapentin or pregabalin should be assessed before the intervention for postoperative analgesic control.	High	Weak

No.	Recommendation	Level of evidence	Grade of recommendation
103	Multimodal management using alternatives to opioids (thoracic epidural catheter, blocks, minimally invasive surgery, avoiding the routine use of an NG tube and avoiding an excess of IV therapy fluid) is recommended to prevent the appearance of postoperative paralytic ileus.	High	Strong
104	The risk of postoperative nausea and vomiting (PONV) should be stratified in all patients using the Apfel scale and prophylaxis carried out that is proportional to the expected risk. Prophylaxis with more combined drugs can be performed in surgeries where PONV poses a significant risk of complications.	High	Strong
105	Regional anaesthesia is recommended over general anaesthesia to decrease the incidence of PONV.	High	Strong
106	The use of propofol is recommended for induction and maintenance of anaesthesia in patients at high risk of PONV.	High	Strong
107	The use of nitrous oxide should be avoided in patients at high risk for PONV or prolonged surgeries.	High	Strong
108	The use of inhalational anaesthetics should be avoided in patients at high risk of PONV.	Moderate	Strong
109	It is recommended to minimise the use of intraoperative opioids and especially postoperative ones.	High	Strong
110	It is recommended to carry out antiemetic prophylaxis in monotherapy in Apfel 0-1 patients if surgery has a higher risk of PONV.	Moderate	Strong
111	Antiemetic prophylaxis should be performed as monotherapy in patients with an Apfel 2-3 assessment and dual therapy if the surgery has a higher risk of PONV.	High	Strong
112	It is recommended to perform antiemetic prophylaxis in double combination therapy in patients with an Apfel 4 assessment and triple therapy if the surgery has a higher risk of PONV.	High	Strong
113	The use of peripheral opioid receptor antagonists is recommended to prevent the appearance of ileus in the postoperative period.	Moderate	Weak
	POSTOPERATIVE		
114	Postoperative hypothermia should be treated by the administration of convective or conductive heat until normothermia is achieved.	High	Strong
115	Non-steroidal anti-inflammatory drugs (NSAIDs) should be used as adjunctive therapy for pain control in patients who have undergone major abdominal surgery.	High	Strong
116	The routine use of gum is not recommended.	Low	Weak
117	In nausea and vomiting, established selective antagonists 5-HT3 (ondansetron) is the treatment of choice, followed by a different antiemetic drug family if unresponsive, except for dexamethasone.	High	Strong
118	Use of laxatives such as bisacodyl (in colorectal surgery), oral magnesium oxide (in hysterectomy), daikenchuto (Japanese herbal infusion, in gastrectomy), coffee (in colorectal surgery) are recommended as elements that could prevent the appearance of ileus.	Low	Weak

No.	Recommendation	Level of evidence	Grade of recommendation
119	IM is recommended in malnourished patients undergoing gastrointestinal surgery for cancer due to the decrease in infectious complications and a possible shortening of hospitalisation.	Low	Strong
120	The use of epidural analgesia is recommended for the first 24–48 hours after surgery and its withdrawal after this initial period of pain control, decreasing the concentrations of local anaesthetics with epidural opioids to reduce motor block and allow ambulation.	High	Strong
121	The use of paracetamol and NSAIDs is recommended for the control of postoperative pain with opioid rescues in the case of severe pain not controlled with epidural analgesia or with other local or regional analgesia techniques.	High	Strong
122	Early postoperative feeding should begin as soon as possible, within hours after surgery in most patients.	Moderate (high in colorectal surgery)	Strong
123	Early mobilisation through patient education and encouragement is recommended to reduce the number of adverse effects.	Moderate	Strong
124	Preoperative and postoperative respiratory physiotherapy is recommended.	High	Strong
125	Oral administration of iron salts is not recommended in the immediate postoperative period to improve the haemoglobin level and decrease the transfusion rate.	Moderate	Strong
126	Postoperative treatment with FEEV is suggested to improve haemoglobin levels and reduce the transfusion rate, especially in patients with low iron stores and / or anaemia moderate–severe post-bleeding.	Moderate	Strong
127	The application of "restrictive" transfusion criteria is recommended of packed red blood cells (CH) (if symptoms or Hb level <70 g / L), in most hospitalised patients (medical, surgical or critical), without active bleeding and who are haemodynamically stable (including septic, upper gastrointestinal bleeding and postpartum anaemia)	High	Strong
128	The application of "restrictive" transfusion criteria is recommended of CH (Hb ≤75 g / L) in cardiac surgery patients.	Moderate	Strong
129	The application of restrictive transfusion criteria is recommended of CH (Hb <80 g / L) in patients with a history of cardiovascular disease who have undergone orthopaedic surgery or hip fracture repair surgery.	Moderate	Strong
130	The surgical wound should be cleaned with sterile isotonic saline, potable water or distilled water.	Moderate	Strong
131	Topical antibiotics can be applied to surgical wounds with primary closure after surgery to prevent surgical site infection.	Low	Weak
132	In wounds with closure by first intention, whenever possible it is recommended not to lift the dressing during the first 24–48 hours.	Low	Weak

No.	Recommendation	Level of evidence	Grade of recommendation
133	The use of total parenteral nutrition can decrease the risk of surgical site infection and shorten healing in open surgical wounds, mainly in abdominal or thoracic surgeries.	Low	Weak
134	Patients and their caregivers should receive, upon discharge, understandable and complete personalised information. Planning discharge and providing adequate information on post-discharge care influences the mean stay and readmissions.	High	Strong
135	Audits of IRPs are advised to assess clinical adequacy and effectiveness.	Moderate	Strong

7. Recommendations and Sources of Evidence.

7.1. GENERAL

7.1.1. PATIENT PREPARATION (OUTPATIENT)

Informing the patient and their environment

INTRODUCTION

The information given to patients and their environment is a key point in the surgical process. Prior advice and information favour early discharge[1] and reduces hospital stay[2,3]. The patient must be aware of the treatment options and have a realistic expectation of the likely risks and benefits. Achieving the maximum collaboration with the patient during the whole treatment is the main goal[4,5,6].

The best measurement instrument to assess the level of preparation that patients have for the intervention is their opinion about how well prepared they feel.[7]

Apart from the participation of the surgical team in this phase, the involvement of the nursing staff who will participate later in the postoperative period is also essential. Information must be given, both verbally and in writing.

The information must be individualised, adapting it to the characteristics of each patient (comprehension capacity, cultural level, etc.). It is known that a large part of verbal information provided to patients in the preoperative period is forgotten; sometimes less than 25% of the information provided is remembered, especially that related to preoperative medication[8-10].

Using informative brochures or flyers is particularly useful to achieve maximum collaboration in IRPs. It has been demonstrated that this information improves patient satisfaction and reduces anxiety and postoperative pain. These brochures should include the main points of postoperative rehabilitation, the benefits that are obtained and how to obtain them, especially those referring to mobilisation, diet and respiratory exercises. If a stoma is to be performed, a visit to a specialist before the intervention greatly improves results[11-14].

1. Patients should receive complete verbal and written information of what is required to improve their recovery after surgery.

   Moderate level of evidence. Strong recommendation.

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Frail patient

INTRODUCTION

The importance of evaluating the frailty and cognitive dysfunctions of the patient should be emphasized, due to the impact they have on postoperative results. The population is getting older, and the prevalence is close to 50% of patients awaiting surgery. Although there is no ideal scale, any screening tool is better than none.[1-5]

2. Preoperative assessment of frailty is recommended to identify patients at higher perioperative risk

High level of evidence. Strong recommendation.

REFERENCES

1. Dalton A, Zafirova Z. Preoperative Management of the Geriatric Patient: Frailty and Cognitive Impairment Assessment. Anesthesiol Clin. 2018 ;36(4):599-614.
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Preoperative heart disease

INTRODUCTION

Patients with recent-onset or decompensated active cardiac disease should be evaluated by a multidisciplinary team involving all physicians related to the management of the perioperative period as the interventions may have implications in surgical and anaesthetic management.[1,2]

3. Patients with acute or decompensated heart disease should be assessed by a multidisciplinary team due to anesthetic and surgical risk.

High level of evidence. Strong recommendation.

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Assessment of anesthetic-surgical risk

INTRODUCTION

In addition to the perioperative risk implied in any surgery, there is an extra risk derived from the physical condition of the patient prior to the intervention. Risk assessment based on the ASA classification continues to be one of the best and simplest scales for assessing a patient's physical condition[1]. However, to assess perioperative risk, the patient's frailty, cognitive dysfunction and surgical risk must be added due to their impact on postoperative outcomes. The population is getting older, and the prevalence of these last two entities is close to 50%. Although there is no ideal scale to measure it, any detection tool is better than none[2,3].

4. Assessment of the patient's physical status using the ASA classification is recommended in all patients undergoing surgery.

High level of evidence. Strong recommendation.

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Recommendations to the patient on toxic habits

INTRODUCTION

Tobacco consumption and alcohol abuse are two habits that negatively affect the patient's recovery after surgery. They are associated with respiratory, wound, metabolic, infectious and haemorrhagic complications[1]. Prior to the operation, excessive alcohol consumption and smoking should be assessed using validated detection tools[2].

Smoking is also associated with a poor postoperative quality of life and fatigue and a reduction in long-term survival in patients undergoing thoracic surgery[3]. In the preoperative stage, counselling by the preadmission nurse, information brochures and nicotine replacement therapy are more likely to be effective for smoking cessation up to 30 days after surgery[4]. Between 4–8 weeks of abstinence is necessary to reduce respiratory complications and wound healing[5].

Consuming more than two units of alcohol per day (20 grams of ethanol) increases intraoperative bleeding and the rate of postoperative infections. Preoperative interventions to stop drinking alcohol can significantly reduce postoperative complication rates[6].

5. It is advisable to stop smoking 4-8 weeks prior to surgery to reduce associated complications.

High level of evidence. Strong recommendation.

6. Alcohol consumption should be stopped one month prior to surgery.

Moderate level of evidence. Strong recommendation.

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Prehabilitation

INTRODUCTION

Surgical prehabilitation uses multimodal actions in the preoperative period aimed at helping the patient overcome the organic repercussions associated with surgical aggression, not only in the immediate postoperative period but also in the long term[1-3]. This model is based on trimodal prehabilitation, being the sum of physical therapy, nutritional supplements rich in proteins and cognitive therapy, with the aim of reducing the depression and anxiety associated with the process[4]. There is no consensus on the type of exercises that patients should perform. Current evidence supports the inclusion of education and physical exercise. The physical exercise programme should include stamina build-up (aerobics), muscular strength (peripheral) and inspiratory muscle exercises[5-6]. Regarding education, respiratory physiotherapy and self-management exercises should be taught in the immediate postoperative period[1-5]. There is a clear consensus that the patient's prehabilitation should not defer surgery beyond 4 weeks, a time that appears adequate to achieve an improvement in functional capacity prior to surgery[6]. There is no consensus on functional assessment tests.

7. Trimodal prehabilitation therapy is recommended to improve functional capacity prior to surgery.

Moderate level of evidence. Strong recommendation.

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Preoperative nutritional evaluation

INTRODUCTION

Preoperative malnutrition is associated with increased postoperative morbidity and mortality and prolongs hospital stay for surgical patients[1]. For this reason, it is essential to carry out an outpatient nutritional screening for all patients undergoing scheduled major surgery. It is recommended to use nutritional screening tools that include body mass index (BMI), involuntary weight loss, reduction of recent food intake and the degree of stress or severity of the disease[2,3]. In patients at risk of malnutrition, a complete nutritional assessment should be carried out to diagnose it and initiate adequate nutritional treatment. Nowadays, the methodology used to diagnose malnutrition is based on the Global Leadership Initiative on Malnutrition criteria, whereby at least one phenotypic criterion must be met (weight loss, BMI, reduction in muscle mass) and one etiological criterion (reduction of nutritional intake / nutrient absorption, inflammatory state)[4]. (See Annex 10.3: Nutritional evaluation algorithm).

Serum albumin and prealbumin or C-Reactive Protein (CRP) reflect the degree of systemic inflammation and are not specific to the nutritional status[3]. Although albumin is a predictor of postoperative morbidity and mortality, it is not useful for determining nutritional status as its levels are inversely altered with the degree of inflammation of the patient and change with hydration status[5].

8. Nutritional screening is recommended for all patients undergoing major surgery.

   Moderate level of evidence. Strong recommendation.

9. When a patient is identified at risk of malnutrition, a complete nutritional assessment should be carried out, establishing a nutritional treatment plan, monitoring tolerance and the response to that plan.

   Moderate level of evidence. Strong recommendation.

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Preoperative nutritional intervention

INTRODUCTION

The benefit of preoperative nutritional treatment has been mainly demonstrated in patients at nutritional risk or severe malnutrition[1]. The administration of nutritional support (oral, enteral, parenteral) in patients with malnutrition or severe nutritional risk for at least 7–10 days before surgery is associated with a reduction in infectious complications and anastomotic dehiscence, as well as a shorter hospital stay[1,2,3].

10. All patients at severe nutritional risk or severe malnutrition should receive nutritional treatment at least 7–10 days before surgery. The oral / enteral route will be preferred, if possible.

Moderate level of evidence. Strong recommendation.

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Inmunonutrition

INTRODUCTION

IM has been a subject of debate since the 1990s, especially in cancer surgery[1]. Some reviews and meta-analysis have shown the beneficial effects of IM by summing the results of randomised controlled trials (RCTs) in all types of patients and examining the entire perioperative period. However, other studies have found no added benefit from the use of IM over standard supplements using similar methods[2].

According to the ESPEN Clinical Guidelines on Clinical Nutrition and Surgery 2017, specific formulas with immunonutrients should be administered in the peri- or at least post-operative stage in malnourished patients undergoing major surgery for cancer, with an intermediate grade of recommendation (SIGN, Scottish Intercollegiate Guidelines Network) [3]. There is no clear evidence for its use compared to standard oral supplements exclusively in the preoperative period.

Meta-analyses continue to be published regarding these findings, with some common positive results, though with evidence that is not always strong[4,5].

11. There is insufficient evidence to recommend immunonutrition versus the use of standard oral supplements exclusively in the preoperative period.

Low level of evidence. Weak recommendation.

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Evaluation and treatment of anemia

INTRODUCTION

Anaemia is the main independent risk factor for morbidity and mortality in both scheduled and urgent surgery. This relationship holds even in mild cases. Low haemoglobin levels are associated with an increased incidence of care-associated or nosocomial infections. The incidence of preoperative anaemia is approximately 20–30%. Haemoglobin levels are inversely related to the risk of receiving allogeneic transfusion[1-5].

Blood transfusion is associated, with a dose-dependent effect, to a higher risk of nosocomial infection, thromboembolic episodes, reinterventions, readmission, longer ICU and hospital stay, and an even higher postoperative mortality rate. Multiple observational studies and international databases – and, recently, various meta-analyses that analyse patients undergoing general surgery but especially different digestive cancer surgeries (colon, rectum, gastric and liver carcinoma), in orthopaedic, vascular and cardiovascular surgery – show a relationship between transfusion and higher morbidity, mortality, reintervention and readmission. In addition, blood transfusion has also been associated with a higher incidence of tumour recurrence or relapse, refractivity to treatment and abdominal neoplastic disease-related mortality.

For these reasons, different national (e.g. SEDAR) and international (e.g. SABM) organisations, as well as the Board of the European Association of Anesthesiology (ESA)[6] and NICE, recommend assessing and treating preoperative anaemia and even delaying or rescheduling surgery for patients with anaemia. All National Consensus Documents (“Sevilla”)[4] or international ones (“Frankfurt”)[5] strongly recommended screening for and treating

preoperative anaemia, with the highest level of evidence. This recommendation has been endorsed by the Ministerio de Sanidad y Bienestar Social since 2013 in the “Protecto de Compromiso de las Sociecades Científicas con la Calidad”.

The State of Western Australia and the Australian National Blood Authority have promoted a campaign to empower patients so that they are aware of the need to be fit before surgery and the importance of their general practitioners’ studying and treating their anaemia and iron deficiency, and that no patient should arrive with anaemia to the operating room[1,7].

12. It is recommended that as soon as a patient enters the surgical waiting list or from the moment the surgical indication is performed, the possible appearance of anaemia or any blood deficit should be monitored, studied and adequately managed.

(This management may be carried out by a general practitioner, family doctor, referral specialist, the surgical team or the case coordinator, depending on the local organisation[1,2,3,7])

Low level of evidence. Weak recommendation.

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Patient Blood Management (PBM) programs for anemia management

INTRODUCTION

In the transfusion section of the fifth edition of the Standards of the Transfusion Accreditation Committee[1] of SEHH and SETS, Point 4.2.5. states that "Transfusion Services must promote and participate in hospital Patient Blood Management (PBM) programs." In its 63rd Assembly in June 2010, the World Health Organization (WHO) urged all countries to launch PBM programmes[2]. This recommendation has been

endorsed by the European Commission since 2013 and ratified by the Guidelines for Good Practice Recommendations in Patient Blood Management published in April 2017[3-4]. We consider it necessary to integrate these PBM programmes into multimodal prehabilitation programmes[5-7].

13. The implementation of PBM programmes is recommended in all hospitals and health areas. We suggest the PBM Programme be integrated with the IRPs.

High level of evidence. Strong recommendation.

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Delay or suspension of surgery in anemic patients

INTRODUCTION

There is a correlation between preoperative anaemia and risk of postoperative mortality, morbidity, postoperative quality and increased risk of transfusion[1]. The Spanish Society of Anesthesiology, Resuscitation and Pain Therapy (SEDAR), [2] among its recommendations DO NOT DO of the Project of the Ministry of Health Commitment to the Quality of Scientific Societies makes this recommendation not to program patients with anemia[3]. Years later, the Board of the European Society of Anesthesia and the Society for the Advancement of Blood Management (SABM) made the same recommendation[4,5].

14. It is recommended not to schedule elective surgery with risk of bleeding in patients with anaemia until proper diagnostic study and treatment are carried out.

High level of evidence. Strong recommendation.

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Determination of hemoglobin level with time frame

INTRODUCTION

A low haemoglobin level is associated with an increase in perioperative morbidity and mortality as well as the risk of receiving allogeneic transfusion[1-6]. The study and treatment of preoperative anaemia is essential to optimise the clinical results of patients scheduled for cardiac[3] and non-cardiac[6] surgery. The detection and treatment of preoperative anaemia is recommended, with sufficient time given for its adequate study and treatment[2-7].

15. At least one haemoglobin (Hb) determination is recommended in patients undergoing elective surgery, at least 28 days before surgery or the invasive process[2,4,5,6,7] (ideally between 6–8 weeks or from the time of surgical indication)".

Moderate level of evidence. Strong recommendation.

16. It is recommended that in cancer surgery cases, the entire time available from diagnosis to the time of surgery should be used to detect anaemia and correct it, or at least improve haemoglobin concentration[5,6].

Moderate level of evidence. Strong recommendation.

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Haemoglobin level 13 g / dL

INTRODUCTION

In 2004 and 2006, Guralnik and Beutler proposed raising the minimum level of haemoglobin (Hb)> 12.2 g / dL in women of childbearing age, from 13.7 to 60 years and then to 13.2 g / dL. in Caucasian males[1]. Other authors propose raising it to 13.5 g / L in men and women after menopause[1]. A recent national epidemiological study in the mobile population shows that the mean Hb levels of women from 50 years of age increase to values close to those of men from 70 years of age[2].

Recent studies have shown that the status of iron metabolism in women with Hb between 12 and 13 g / dL is more like those theoretically anaemic (Hb <12 g / dL) than those with an Hb greater than 133.4.

Epidemiological studies show almost double the risk of transfusion and complications in women without anaemia but with an Hb level between 12 and 13 g / dL3.5. Women with an Hb level below 13 may continue to be discriminated against compared to men.

The different consensus documents recommend raising the haemoglobin value of women to 13 g / dL6.7.

17. It is recommended that the preoperative Hb concentration before surgical intervention is above 13 g / dl, regardless of gender / sex.

Moderate level of evidence. Strong recommendation.

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Screening for iron deficiency

INTRODUCTION

Iron deficiency is the most common aetiology of anemia[1-4]. It is the most common cause of preoperative anemia[1,2]. Up to one third of patients without apparent anaemia have iron deficiency, and another third of patients have sufficient reserves to recover after perioperative bleeding[1,2]. Furthermore, iron deficiency has been associated with a higher risk of transfusion and / or nosocomial infection in repair surgery for hip fracture[5], cardiac or colon cancer resection[6].

NICE, in its quality standards for blood transfusion [QS138], recommends offering iron supplements, before and after surgery, to all patients with iron deficiency anemia[7-8]. It is also necessary to consider the possibility of parenteral treatment in cases of clear oral intolerance.

18. Detection and treatment of perioperative iron deficiency is recommended.

Moderate level of evidence. Strong recommendation.

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Treatment of preoperative anemia

INTRODUCTION

The study of anaemia and specific treatment of any preoperative anaemia should be carried out as soon as possible[1-5].

The immediate perioperative treatment of anaemia in orthopedic[4,5] or cardiac[6,7,8] surgery patients is not only associated with a lower transfusion rate but also with a lower incidence of adverse effects and a reduction in hospital stay, in addition to better post-operative haematological parameters.

19. The detection and treatment of preoperative anaemia is recommended, even in cases of preferential or urgent surgeries.

Moderate level of evidence. Strong recommendation.

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Oral iron treatment

INTRODUCTION

The treatment of choice for iron deficiency and mild anaemia is conventional oral iron if sufficient time is available and there is no contraindication. The administration of low daily doses (40–60 mg) or moderate doses every other day (80–100 mg) is recommended. There is no evidence that higher doses lead to greater absorption while they are also associated with a higher rate of digestive adverse effects[1-7].

20. Oral iron treatment is recommended in cases of iron deficiency or mild-moderate iron deficiency anaemia if there is at least 6 weeks until surgery.

Low level of evidence. Strong recommendation.

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Intravenous iron treatment

INTRODUCTION

If there is little time before surgery, resistance or intolerance to oral iron, contraindication to it, the presence of inflammation or moderate–severe anaemia, or concomitant treatment with erythropoietic agents, the treatment of choice for iron deficiency and anaemia associated with iron deficiency is intravenous iron at high doses[1-7].

21. Preoperative treatment with intravenous iron (FEEV) is recommended in potentially bleeding elective surgery patients with iron deficiency anaemia and / or functional iron deficiency, to improve haemoglobin levels and / or reduce the transfusion rate.

Moderate level of evidence. Strong recommendation.

22. We recommend the administration of intravenous iron, instead of oral iron, in those cases in which this is contraindicated or the time available until surgery is insufficient.

Moderate level of evidence. Strong recommendation.

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Treatment with erythropoietic agents

INTRODUCTION

The administration of alpha-erythropoietin is recommended for the treatment of non-deficiency anaemia preoperatively after orthopaedic surgery[1]. Different studies demonstrate the benefit of short regimens or even single doses in orthopaedic arthroplasty surgery and hip fracture surgery[2,3]. A recent Swiss study demonstrates its benefit, in combination with EV iron and vitamin complexes, in cardiac surgery[4].

Different meta-analyses, consensus documents and guidelines from scientific organisations recommend the administration of erythropoietic agents, together with intravenous iron, in surgical patients with non-iron deficiency anemia[5-8].

23. To reduce allogeneic blood transfusion, the administration of rHuEPO is recommended in elective orthopaedic surgery patients at risk of moderate–high bleeding and moderate non-deficiency anaemia (Hb between 10 and 13 g / dL).

High level of evidence. Strong recommendation.

24. The administration of rHuEPO is suggested to reduce the transfusion rate in anaemic patients undergoing major elective surgery other than elective orthopaedic surgery with a moderate–high risk of bleeding.

Moderate level of evidence. Weak recommendation

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Thromboprophylaxis

INTRODUCTION

Thromboembolic disease is an important complication of major surgical procedures in patients who do not receive prophylaxis, affecting 20% of those undergoing general surgery, 30% for colorectal surgery, between 30–50% in orthopaedic surgery, hip fracture and neurosurgery and between 0–26% in head and neck surgery. The application of different thromboprophylaxis measures has shown a reduction in thrombotic risk, with a different degree of efficiency and safety. Depending on the thrombotic risk, mechanical and pharmacological, subcutaneous, or oral methods may be combined[1,2,3,4,5]. The minimum duration will be 7 days or until the start of walking. In those surgeries of greater risk, it should last between 3 to 6 weeks.

Pharmacological prophylaxis significantly reduces the incidence of thromboembolic disease. Unfractionated heparin (UFH) and low molecular weight heparins (LMWH) are equally effective for the prevention of deep vein thrombosis and pulmonary thromboembolism, although the use of LMWH is preferred over UFH postoperatively in most patients. Most of the surgical indications, due to a similar effect, but greater ease of administration and fewer bleeding complications.

25. The use of thromboprophylaxis is recommended in all patients undergoing major surgery or hospitalised for an acute medical condition.

Moderate level of evidence. Strong recommendation.

26. In general, it is recommended to maintain antithrombotic prophylaxis for a minimum of 7 days or until the patient is ambulatory.

High level of evidence. Strong recommendation.

27. In the case of major abdominal surgery, prophylaxis will be extended up to 4 weeks after surgery.

Moderate level of evidence. Strong recommendation.

Specific situations:

1) In general, urological, gynaecological and neurosurgery surgery: 8 days; if the patient is immobilised, it should be prolonged until ambulation
2) In general, urological and gynaecological surgery in cancer patients: 4 weeks (28 days)
3) In hip surgery: 4–6 weeks (28–42 days)
4) In knee surgery: 3–4 weeks (21–28 days)

28. Early mobilisation and the use of elastic compression stockings are recommended for the duration of the immobilisation period.

High level of evidence. Strong recommendation.

29. Compression stockings are effective in preventing thromboembolic disease in surgical patients, reducing the risk even more when combined with pharmacological agents.

High level of evidence. Strong recommendation.

30. Intermittent pneumatic compression devices reduce the incidence of deep vein thrombosis. The method combined with pharmacological measures is recommended, mainly for neurosurgical patients and / or surgeries with high VTE risk.

Moderate level of evidence. Strong recommendation.

31. Prophylaxis regimens include direct acting oral anticoagulants (dabigatran, apixaban, rivaroxaban) or LMWH (enoxaparin, bemiparin, tinzaparin).

High level of evidence. Strong recommendation.

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Hygiene-Bathe

INTRODUCTION

According to the first edition of the Via RICA, bathing the night before surgery has been shown to be effective in preventing surgical site infection.

The importance of bathing or showering the night before surgery is an accepted fact, as is the reduction in the number of bacterial colonies due to bathing[1-3]. However, according to different clinical practice guidelines, the evidence is moderate[4].

32. A full bath is recommended prior to surgery.

Moderate level of evidence. Strong recommendation.

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Preoperative fasting

INTRODUCTION

There is no scientific evidence to confirm that the administration of clear liquids 2 hours before an elective surgical procedure causes a greater risk of aspiration, regurgitation or morbidity than fasting after midnight as, in most patients, the stomach takes between 60–90 minutes to empty liquids[1,2]. Several randomised controlled studies have shown that the ingestion of clear liquids up to 2 hours and light solids up to 6 hours before anaesthetic induction is safe and improves the patient's feeling of well-being[3]. These studies have shown that there are no significant differences in relation to gastric volume or the pH of gastric content when night fasting compared with the ingestion of clear liquids up to 2 hours before surgery[3].

In patients with documented delayed gastric emptying, gastrointestinal motility disorders, or with urgent surgery, the administration of clear liquids 2 hours before surgery may not be safe. There is evidence that shows that patients with type 2 diabetes mellitus without chronic complications[4] and obese patients[5] present normal gastric emptying, and the administration of clear liquids up to 2–3 hours before anaesthesia may be safe.

33. In most patients who are going to undergo an elective surgical procedure, solid food should be allowed up to 6 hours before anaesthetic induction, and clear liquids up to 2 hours before anaesthesia.

High level of evidence. Strong recommendation.

34. In those patients with delayed gastric emptying and in emergency surgery, it is recommended to fast from midnight or 6–8 hours before surgery.

Moderate level of evidence. Strong recommendation.

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Treatment with hydrocarbon drinks

INTRODUCTION

Preoperative fasting and surgical stress can induce insulin resistance and postoperative hyperglycemia[1]. Oral carbohydrate intake (12.5% maltodextrins) at a dose of 800 ml at midnight and 400 ml 2 hours before surgery can attenuate the catabolic response induced by surgery and fasting and reduce postoperative insulin resistance. In addition, it can improve the patient's feeling of well-being (thirst, hunger and anxiety) [1] without increasing the risk of aspiration[2,3,4].

In patients undergoing major abdominal surgery, a meta-analysis and a systematic review have shown that, compared with fasting or placebo, treatment with more than 45 g of carbohydrates in the 4 hours before surgery is associated with a small reduction in hospital stay without influencing the rate of postoperative complications[2,3]. The same results have been observed in a recent meta-analysis network where fasting was compared with the administration of a low dose (<45 g) or high dose (>45 g) of oral carbohydrates up to 4 hours before surgery, although there were no significant differences in relation to insulin resistance[4]. The administration of 100 g of carbohydrates is associated with a lower need for insulin treatment and a lower blood glucose level> 180 mg / dl, with no differences in the development of postoperative infectious complications[5].

35. Oral intake of carbohydrate-rich beverages up to 2 hours before surgery is safe and is not associated with an increased risk of aspiration.

Moderate level of evidence. Strong recommendation.

36. Oral administration of 200–400 ml of a drink containing 50 g of carbohydrates should be allowed up to two hours before surgery as this treatment improves the patient's feeling of well-being and can reduce hospital stay and insulin resistance.

Moderate level of evidence. Strong recommendation.

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SPECIAL CASES:

Treatment with carbohydrate beverages in patients with diabetes and obesity

INTRODUCTION

Even though diabetes mellitus (DM) affects 15% of surgical patients, there is little published evidence on the benefits of using carbohydrate beverages in obese subjects and / or those with DM. A recent RCT that included patients with morbid obesity who underwent bariatric surgery (20% with DM) showed that treatment with oral carbohydrates is safe, although no differences were observed in relation to the preservation of lean mass, stay hospital or postoperative complications[1]. In patients with type 2 DM with good metabolic control who do not present neuropathic complications and who receive their usual hypoglycaemic treatment, the administration of 50 g of carbohydrates 3 hours before anaesthetic induction is safe, does not delay gastric emptying nor does it increase the risk of hyperglycaemia or aspiration[2,3].

37. In obese and / or type 2 diabetic patients with good glycaemic control without associated chronic complications, the use of carbohydrate-rich beverages 3 hours before surgery could be considered. These can be given together with the patient's usual antidiabetic medication.

Low level of evidence. Weak recommendation.

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PREMEDICATION

Use of sedative and anxiolytic drugs

INTRODUCTION

The use of premedication with long-half-life drugs, such as opioids or benzodiazepines, can prevent early postoperative recovery, causing a delay in the start of mobilisation and oral fluid tolerance, and possibly prolonging hospital stay.[1,2]

The use of anxiolytics with a short half-life in the immediate preoperative period could lengthen the anaesthetic delivery time[3], as well as delaying postoperative recovery and increasing the risk of cognitive impairment, especially in elderly, frail patients and in those with significant comorbidity.[4] There are no conclusive data on its use, but in short-stay surgeries its use at low doses has not shown a delay in discharge from hospital and has presented a decrease in the incidence of postoperative nausea and vomiting.[5]

This recommendation appears in the first edition of the Intensified Recovery Pathway in Abdominal Surgery (RICA) and is based mainly on the consensus of experts.[6]

38. It is recommended to avoid the use of long half-life benzodiazepines and opioids prior to induction in patients at high risk due to age and comorbidity.

Low level of evidence. Strong recommendation.

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7.1.2. PREOPERATIVE

Antibiotic prophylaxis

INTRODUCTION

Surgical site infection (SSI) continues to be the second leading cause of infection related to health care in the field[1,2] having been shown to be clearly related to longer stays, increased morbidity and costs, as well as having a clear impact on patients' quality life span[3]. As indicated in the Zero Surgical Infection project, AP has outstanding efficacy in the prevention of SSIs and continues to be the main SSI prevention measure and the most cost-effective[4]. Among the various actions for the prevention of SSI, AP is one of the most effective measures, although its effectiveness decreases if the rest of the measures are not followed[5].

However, the inappropriate administration of AP not only increases the risk of SSI but is also associated with the increased prevalence of multiresistant germs and episodes of toxicity. In Europe, surgical AP accounts for about 25% of antibiotic prescriptions, being inadequately maintained (more than 24 hours) in more than half of the cases[6]. The latest recommendations from the WHO[1,2] for the prevention of SSI include four which are specific about AP: 1) administer the antibiotic before surgery if recommended; 2) do it within the 120 minutes prior to incision (based on the half-life of the drug); 3) stop administering antibiotics even if the drains persist; 4) do not maintain prophylaxis after completion of surgery.

An addition to these recommendations is that published in 2017 by the Centres for Disease Control and Prevention: a) administer AP only in those surgeries in which it is indicated; b) in caesarean sections, infuse the antibiotic before the incision; and c) do not maintain prophylaxis after wound closure[7]. AP in surgery should obtain serum and tissue antibiotic concentrations above those minimum inhibitory concentrations of the most likely contaminating microorganisms for each procedure at the time of the incision and maintained throughout the procedure surgical[7-9].

Indication and choice of antibiotic

INTRODUCTION

In clean surgeries, the indication depends on the type of intervention, the patient's comorbidity, and the use of prosthetic material. In clean-contaminated and contaminated surgeries it is recommended to always use AP. In dirty surgery, AP is not considered but antibiotic treatment.

First or second generation cephalosporins are the drugs of choice for prophylaxis due to their efficacy, spectrum, few adverse effects, and low cost, as reflected in studies and most of the current guidelines[10-14]. In cases of allergy to beta-lactams, a history of colonisation or infection by methicillin-resistant Staphylococcus aureus, or a high prevalence in the hospital of infection of the surgical wound by this microorganism, a glycopeptide can be used. Finally, in colon or gynaecological surgery, in which the presence of anaerobic microorganisms and enterobacteria is expected, it is advisable to choose an antibiotic or a combination of antibiotics with activity against both groups of microorganisms.

39. AP is recommended if the chances of infection are high or if the consequences of a postoperative infection are potentially serious for the patient (endocarditis, endophthalmitis, prosthetic infection).

Moderate level of evidence. Strong recommendation.

40. In clean surgery with infection risk factors, it is recommended to use antibiotics that cover microorganisms of the cutaneous microbiota (Staphylococcus aureus and coagulase negative staphylococci) and, in clean-contaminated surgery, also gram-negative bacilli and enterococci as well as anaerobes.

Moderate level of evidence. Strong recommendation.

Administration time

INTRODUCTION

One of the fundamental aspects to maintaining the effectiveness of AP is to administer it at the optimal time. In the case of short half-life beta-lactams (e.g. penicillin and cephalosporins such as cefazolin, cefoxitin and cefuroxime) it is advisable to administer them within 60 minutes prior to surgical incision. In the case of vancomycin, aminoglycosides or fluoroquinolones, the intravenous infusion should begin 90 minutes prior to the surgical incision as these antibiotics require long infusion periods. In the case of surgeries that require limb ischemia, AP should be administered first[15,16].

41. It is recommended to administer AP during the 120 minutes prior to the surgical incision.

High level of evidence. Strong recommendation.

Antibiotic dose and duration of prophylaxis

INTRODUCTION

Regarding the dose, for prophylaxis it should be the same as that used for the treatment of the infection. However, and given the current prevalence in the population,[17-19] obese patients may require higher initial doses, although dosages based on total body weight tend to overdose, so surrogate descriptors of total body weight should be used, such as ideal weight or adjusted weight. In the event of the need to maintain a prolonged dose, adjustment according to renal function may be a valid alternative[20,21].

However, if the procedure exceeds more than 2 times the half-life of the antibiotic or in situations in which the half-life is shortened (burns, high glomerular filtration rates), or significant bleeding (> 1,500 mL in adults or 25 mL / kg in children) an additional dose will be administered[22-24]. Prolonging the duration of prophylaxis is contraindicated as in most surgical procedures, a single dose of an antibiotic whose half-life ensures sufficient serum and tissue drug levels during surgery is adequate.

42. It is recommended to use the same dose of prophylaxis as that used to treat the infection, although in obese patients the adjusted weight should be used to calculate the dose.

Moderate level of evidence. Strong recommendation.

43. An additional dose is recommended in cases of prolonged surgeries or if there is significant blood loss.

Moderate recommendation level. Weak recommendation.

44. It is recommended not to prolong the duration of AP beyond the duration of the surgical intervention itself.

High level of evidence. Strong recommendation.

Note.- Adverse effects of AP

It is crucial to remember that the administration of antibiotics in surgical prophylaxis can generate adverse effects such as drug allergy[25] (especially to beta-lactams), diarrhoea associated with antibiotics and / or infection by Clostridioides difficile[26,27], the development of antimicrobial resistance,[28,29] and acute renal failure in major surgical procedures and/or concomitant administration of aminoglycosides and glycopeptides[30,31].

Thus, allergy to beta-lactams should be ruled out both in the anaesthesia consultation and in preoperative care. Similarly, all guidelines (general and local) should consider the use of alternative drugs to beta-lactams in case of allergy.

C. Difficile infection is a serious complication that can appear with some antibiotics used in AP, such as cephalosporins, carbapenems, fluoroquinolones or clindamycin, especially if the duration of prophylaxis is prolonged. The use of single doses also helps to minimise other adverse effects involving antimicrobial resistance.

In relation to the possibility of developing acute renal failure due to the use of antibiotics, serial determinations of serum and urinary creatinine should be made, both preoperatively and ≥24 hours after surgery, in major surgery patients to check the degree of renal function, with special attention paid to patients who have received prophylaxis with aminoglycosides or glycopeptides.

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Glucocorticoids

INTRODUCTION

The preoperative administration of glucocorticoids is associated with an attenuation of the magnitude of the inflammatory response to surgical stress and can reduce the incidence of complications, including those of an infectious nature.[1-3] Its effects include vasoconstriction and decreased capillary permeability.[4] In the postoperative period, they reduce the secretion of acute phase reactants, such as interleukin 6 or CRP.[5]

45. The administration of a single dose of glucocorticoids is recommended because it has a significant impact on the duration of hospital admission without increasing the rate of complications.

Moderate level of evidence. Strong recommendation.

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Perioperative blood glucose monitoring

INTRODUCTION

Controlling normoglycemia is essential for reducing perioperative infections and reducing complications from hyperglycaemia. It is one of the recommendations of the Zero Surgical Infection program of the Ministry of Health of the Government of Spain.[1] The use of intensive insulin therapy must be avoided due to the high risk of hypoglycaemia during the perioperative period which can lead to increased mortality. The consensual range of blood glucose should be between 150 and 180 g / dl. [2-5]

46. Glycemia will be monitored preoperatively as intraoperative hyperglycaemia can lead to increased postoperative complications, although the use of intensive insulin therapy should be avoided due to the risk of hypoglycaemia.

High level of evidence. Strong recommendation.

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Perioperative hyperglycemia

INTRODUCTION

Hyperglycaemia is related to increased morbidity and mortality in operated patients, both diabetic and non-diabetic[1].

Improved glycaemic control reduces the risk of hospital complications after surgery[1]. A widely accepted recommendation is to keep blood glucose between 140 and 180 mg / dl for hospitalised patients. In patients with parenteral nutrition and blood glucose greater than 180 mg / dl, glucose intake can be reduced and / or insulin treatment increased. It is preferable that patients with unstable and high glucose levels are treated in critical units[2].

Insulin therapy for the treatment of persistent hyperglycaemia should be started at a level > 180 mg/dl, with a recommended range of 140–180 mg/dl in most critical and non-critical patients[3].

More stringent levels between 110–140 mg/dl may be appropriate in selected patients if they can be achieved without significant hypoglycaemia. More research is necessary to develop treatment recommendations.

47. Perioperative blood glucose should be monitored and adequately treated with insulin, avoiding blood glucose levels > 180 mg / dl..

Moderate level of evidence. Strong recommendation.

48. More ambitious targets for perioperative blood glucose between 110 and 140 mg / dL (6.1-7.8 mmol / L) may be appropriate in selected patients if they can be achieved without significant hypoglycaemia.

Low level of evidence. Weak recommendation.

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Hair removal

INTRODUCTION

Hair has traditionally been considered associated with a lack of cleaning and increased infection of the surgical wound; in addition, its removal enables a better exposure of the incision area and facilitates the suture and placement of dressings.

Studies show that prior shaving of the incision area has a preventive effectiveness close to 50% for SSIs[1].

Both in a Cochrane review and in more recent meta-analyses, no significant differences were observed in the appearance of wound infection between patients who had their hair removed and those who did not[1-5].

Therefore, current recommendations suggest that the patient's hair should not be removed prior to the intervention unless strictly necessary, and in that case an electric razor should be used to cut the hair, preferably with a disposable head (Project Surgical Infection Zero and Via RICA-2015 edition).

Regarding the moment at which the hair removal is performed, there is no evidence that removal close to the time of the intervention reduces infections, but current recommendations suggest that, in the event of deciding to remove the hair, it is better to do it close to the intervention but always outside the operating room[6-7].

49. Hair should not be removed preoperatively unless strictly necessary. Conventional shaving should be avoided, both preoperatively and in the operating room.

High level of evidence. Strong recommendation.

50. In the case of hair removal, electric razors can be used as close as possible to the intervention but always outside the operating room.

Moderate level of evidence. Strong recommendation.

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7.1.3 INTRAOPERATIVE

Checklist

INTRODUCTION

The results of the systematic review carried out in the Safe Surgery project[1] until April 2015, show a significant improvement in patient safety indicators (decrease in the rates of adverse events, mortality and infection of the surgical wound), after the implementation of the surgical checklists.

Considering publications from 2015, most studies also show a reduction in adverse events related to surgical intervention as well as in hospital mortality, although there is heterogeneity between the different studies (surgeries and specialties, existence of concurrent control groups, coexistence of other improvement measures, etc.)[2-4].

51. The use of the surgical checklist is recommended for the prevention of adverse events and mortality related to the intervention.

Moderate level of evidence. Strong recommendation.

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Skin and surgical field preparation.

INTRODUCTION

For a correct preparation of the operating area, we must consider the importance of cleaning the skin with soap and water before applying the antiseptic solution, followed by rinsing and drying whole skin, with saline solution on mucous membranes and wounds.

The disinfection of the skin prior to the delimitation of the surgical field should be carried out by making forward and backward movements, rubbing and by making friction in horizontal and vertical bands. 2% Alcoholic Chlorhexidine should be used in all incisions made on intact skin; this should be done for 30 seconds. It is important to let the antiseptic dry for 2 minutes to give it time to act[1-2] (Zero Surgical Infection Project).

Alcoholic antiseptics are flammable substances and, therefore, it must be ensured that that the skin is completely dry and that there are no accumulated amounts in the patient's skin folds, or in the gauze and drapes of the surgical field under the patient[3].

In interventions on the eye, middle ear and meninges, and those whose approach is a mucosa (oral, nasal, urethral, vaginal, anal), dilute aqueous chlorhexidine (0.5%) or Povidone Iodine (10%) should be used, depending on the case[4].

52. The use of 2% alcoholic chlorhexidine is recommended as an antiseptic for intact skin in the surgical field.

High level of evidence. Strong recommendation.

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Anesthetic induction and maintenance

INTRODUCTION

A standard anaesthetic protocol is required to allow rapid awakening. The anaesthetist

must monitor fluid therapy, analgesia and hemodynamic stability to reduce the metabolic response to stress.

The use of benzodiazepines prior to induction should only be to reduce anxiety and in the lowest possible dose, to reduce episodes of delirium and postoperative cognitive impairment, especially in high-risk, elderly and multipathological patients.[1]

At present, anaesthetic and analgesic agents are used with minimal residual effect and that allow a rapid recovery after anaesthesia: propofol, combined, if necessary, with a short-acting opioid such as fentanyl, alfentanil, sufentanil or an infusion of remifentanil.[2]

Anaesthesia can be maintained with short-acting inhalational anaesthetics, such as sevoflurane or desflurane (induction and awakening of anaesthetic faster than sevoflurane) or intravenous ones such as propofol. There is no evidence of the superiority of total intravenous anaesthesia (TIVA) with propofol versus inhalation anaesthesia, although TIVA may be beneficial in patients with susceptibility to postoperative nausea and vomiting. There is also no evidence that TIVA improves oncological prognoses in humans over inhalational anesthesia.[3]

This recommendation appears in the first edition of the Intensified Recovery Pathway in Abdominal Surgery (RICA) and is based mainly on the consensus of experts.[4]

53. It is recommended to minimise the use of benzodiazepines prior to induction and to use hypnotic agents with minimal residual effect, which allow rapid recovery after anaesthesia.

Low level of evidence. Strong recommendation.

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Lung protective ventilation

INTRODUCTION

The potential benefits of protective ventilation observed in patients admitted to critical care units with adult respiratory distress syndrome are less evident when patients do not have severe pulmonary disease and are ventilated for a few hours. Protective ventilation has three fundamental pillars that support it: The use of low tidal volumes, the application of recruitment manoeuvres (RM) and the application of PEEP (better individualised). Few studies have investigated the efficacy of the joint use of these manoeuvres on postoperative prognosis in patients undergoing general anaesthesia with mechanical ventilation and without distress. An important study showed a reduction in postoperative pulmonary complications with the use of an intraoperative pulmonary ventilation strategy combined with the application of postoperative continuous positive airway pressure (CPAP) compared to the control group (standard intraoperative ventilation and no postoperative CPAP)[1]. Although other large randomised

controlled studies have failed to demonstrate the benefits of VP,[2,3] a recent meta-analysis has shown that the combination of low V_T and moderately high PEEP (> 5 cm H2O), with or without RM, was superior to conventional mechanical ventilation in reducing the risk of cardiogenic pulmonary oedema. The application of RM to this strategy reduces the risk of atelectases.[4] In addition, in thoracic surgery, during one-lung ventilation, a lung protection strategy has been recommended, using a tidal volume PEEP and MR associated of 4-6mL/kg of ideal weight, although results have not been conclusive in relation to its impact on postoperative outcome.[5,6]

54. During general anaesthesia, the use of protective ventilation is recommended, including a tidal volume of 6–8 ml / kg ideal weight, the use of individualised PEEP generally above 5 cm H2O and the application of RM.

Moderate level of evidence. Strong recommendation.

55. In surgeries that require one-lung ventilation, we recommend the above protective ventilation measures, but reducing the tidal volume to the lung dependent on 4–6mL / kg of ideal weight.

Moderate level of evidence. Strong recommendation.

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Intraoperative Monitoring

INTRODUCTION

Routine monitoring should include 5-lead electrocardiogram (DII and V5 recommended), non-invasive blood pressure, pulse oximetry (% Sat O2), FiO2, capnography (EtCO2), temperature, fluid therapy balance and intraoperative blood glucose story.

CO2 monitoring

INTRODUCTION

CO2 monitoring by capnography is necessary in any intervention with general anaesthesia to ensure the patient's gas exchange and adequate management of the airway and to rule out accidental extubation.[1]

In laparoscopic surgery where CO2 insufflation is performed to create the pneumoperitoneum, it involves the absorption of this gas by the body and it can be a sign of complications due to hypercapnia.[2]

56. CO2 monitoring by capnography should be mandatory in all surgery, especially laparoscopic surgery.

High level of evidence. Strong recommendation.

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Temperature monitoring

INTRODUCTION

Temperature monitoring is mandatory to avoid hypothermia or hyperthermia in the patient during the perioperative period, despite different external measures to maintain normothermia. Temperature control is only reliable if the measurement is performed centrally.[1-3]

57. Temperature monitoring should be central.

High level of evidence. Strong recommendation.

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Hypnosis monitoring

INTRODUCTION

Currently, there are different hypnosis monitoring systems on the market to measure the depth of general anaesthesia, highlighting the scientific evidence for BIS both by the number of publications, number of patients studied and accumulated experience in both adults and children.[1,2]

Induction and maintenance of anaesthesia can be guided by the BIS monitor, thus avoiding levels of excessive depth of hypnosis (BIS <30), especially in the elderly, where there is evidence that too deep anaesthesia may be harmful and may increase the risk of postoperative confusion. The dosage of anaesthetic medication during general anaesthesia should be adjusted to obtain BIS values between 40 and 60.[3,4]

58. The anesthetic depth will be monitored using the bispectral index (BIS).

High level of evidence. Strong recommendation.

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Nociception Monitoring

INTRODUCTION

Currently, different surgical stress monitoring systems exist in the market. There is a great heterogeneity of monitoring systems, highlighting those derived from the autonomic nervous system and those of EEG responses (Composite Variability Index derived from BIS or qCon / qNox). So far, the most specific and sensitive are those derived from the detection of changes in the sympathetic autonomic nervous system: pupillometry with altered pupillary reflex; multiparametric such as the Integrated Nociception Level Index, (plethysmography, temperature, accelerometry and skin impedance) and Surgical Plethysmography Index based on the changes of the plethysmography pulse wave; the Analgesia Nociception Index dependent on the ECG and the influence of the parasympathetic on heart rate.[1-6]

Intraoperative opioid consumption could generally be less guided with nociception monitoring compared to standard monitoring of heart rate and blood pressure variation.[1-2]

At the present time there do not seem to be statistically significant differences with respect to intraoperative adverse events, postoperative opioid or analgesic use, postoperative pain and postoperative adverse events.[2]

59. The use of nociception monitoring could decrease intraoperative opioid consumption compared to standard monitoring.

Moderate level of evidence. Weak recommendation

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Monitoring of urine output and urinary catheter placement

INTRODUCTION

In those surgical interventions in which fluid balance must be monitored or for reasons of the type of surgery, the placement of the bladder catheter is recommended. It is necessary to remove it as soon as possible to reduce urinary infections and facilitate the early mobilisation of patients.[1-3]

60. When a bladder catheter is placed, it will be done with the appropriate aseptic measures, and, if possible, it will be removed 24 hours after surgery.

Moderate level of evidence. Weak recommendation

REFERENCES

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Urinary catheter

INTRODUCTION

In major surgery, urethral catheterisation is common to control diuresis, as well as to avoid prolonged retention of urine in the bladder. The maintenance of the catheter during the postoperative period is related to discomfort for the patient, as well as urinary infections.[1]

61. The removal of the urethral catheter is recommended at 24 hours, except in moderate risk of acute urine retention – men, epidural anaesthesia and pelvic surgery – in which case it is recommended to maintain it for 3 days[2,3].

High level of evidence. Strong recommendation.

REFERENCES

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NON-ROUTINE MONITORING

Invasive blood pressure monitoring

INTRODUCTION

Advances in haemodynamic monitoring have allowed for less invasive monitoring, decrease the channelling of radial or femoral arteries to control continuous blood pressure and cardiac output, as well as other associated indices in a reliable manner.[1-4] Currently, only those patients with high surgical risk and high anaesthetic risk with a history of haemodynamic instability due to age and comorbidity are susceptible to invasive arterial monitoring.[1-3]

This recommendation appears in the first edition of the Intensified Recovery Pathway in Abdominal Surgery (RICA) and is mainly based on the consensus of experts.[5] It is also included in the Zero Surgical Infection Project.[6]

62. Invasive haemodynamic monitoring is not routinely indicated, and arterial cannulation is useful in those patients who present severe cardiorespiratory alterations and who may present postoperative problems.

Low level of evidence. Strong recommendation.

REFERENCES

1. Scheeren TWL, Ramsay MAE. New Developments in Hemodynamic Monitoring. J Cardiothorac Vasc Anesth 2019;33 Suppl 1:S67-s72.
2. Jozwiak M, Monnet X, Teboul JL. Less or more hemodynamic monitoring in critically ill patients. Curr Opin Crit Care 2018;24(4):309-315.
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Central venous pressure monitoring

INTRODUCTION

Advances in non-invasive hemodynamic monitoring systems have reduced the number of patients requiring central venous pressure (CVP) control. Only when surgeries with a high risk of bleeding, a high possibility of transfusion of blood products, with significant hemodynamic alterations associated with high surgical risk with the need for vasopressor and inotropic drugs, and the need for parenteral nutrition could be justified, the need for their canalisation and monitoring PVC.[1-4]

This recommendation appears in the first edition of the Clinical Pathway for Intensified Recovery in Abdominal Surgery (RICA) and is mainly based on the consensus of experts.[5] It is also included in the Zero Surgical Infection Project.[6]

63. CVC insertion is not routinely indicated and is limited to patients with severe cardiorespiratory diseases with pulmonary hypertension or in whom it is anticipated that they may require the administration of vasopressors or inotropes in continuous infusion.

Low level of evidence. Strong recommendation.

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1. De Backer D, Vincent JL. The pulmonary artery catheter: is it still alive? Curr Opin Crit Care 2018;24(3):204-208.
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Neuromuscular Blockade

INTRODUCTION

Quantitative monitoring of the degree of NMB by means of the TOF during the entire anaesthetic process is essential in those patients receiving NMB and is the only monitoring that can determine with certainty the time of extubating. In addition to the TOF, the TOF ratio (TOFr), the simple stimulus and the posttonic count can be measured. Although other muscles of the face can be used, the adductor pollicis accurately reflects the relaxed state of the pharyngeal muscles. Qualitative monitoring of NBM is not reliable.[1-6]

64. The use of quantitative monitoring of NMB is necessary whenever NMB drugs are used throughout the surgical procedure.

High level of evidence. Strong recommendation.

REFERENCES

1. Hristovska AM, Duch P, Allingstrup M, Afshari A. The comparative efficacy and safety of sugammadex and neostigmine in reversing neuromuscular blockade in adults. A Cochrane systematic review with meta-analysis and trial sequential analysis. Anaesthesia. 2018; 73(5):631-641
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Neuromuscular Block Depth

INTRODUCTION

Deep NMB is very appropriate for abdominal surgery (open and laparoscopic) and for the obese patient. It improves the conditions of the surgical space during laparoscopy and facilitates the use of low intra-abdominal pressures (<10–12 cm H2O), which most likely leads to better postoperative results. It is optimised if used throughout the surgery.[1-3] To achieve this, good communication between anaesthesiologists and surgeons is crucial. [4-5]

65. The use of deep NMB (PTC 1-2) is recommended to improve visualisation of the surgical field, both in open and laparoscopic surgery, and to use the lowest possible intra-abdominal pressures in laparoscopy, favouring postoperative recovery.

High level of evidence. Strong recommendation.

REFERENCES

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Reversal of neuromuscular block

INTRODUCTION

Reversal of NMB can be done with sugammadex in any phase of depth of anaesthesia or with neostigmine from a moderate block of at least 3 TOF responses, but extubating of the patient should only be performed after the patient has a TOFr ≥ 0.9. Residual blockage is frequent despite the administration of reversing drugs (especially with neostigmine) and, without quantitative monitoring, much greater in the spontaneous reversion of NMB, and is associated with pulmonary complications during the postoperative period.[1-5]

66. It is recommended to check the reversal of NMB until a TOF ratio greater than or equal to 0.9 is obtained in the adductor pollicis muscle during the anaesthetic discharge prior to extubating to avoid residual neuromuscular block and reduce respiratory complications.

High level of evidence. Strong recommendation.

REFERENCES

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3. Murphy GS. Neuromuscular Monitoring in the Perioperative Period. Anesth Analg. 2018; 126(2):464-468.

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BNM reversal with rocuronium

INTRODUCTION

The rocuronium-sugammadex combination for NMB and its reversal has been shown in different studies; it is much faster, reaching a TOF ratio > 0.9 from intense, deep and moderate blocks, ensuring the recovery of patients and leading to fewer respiratory complications than those reversed with neostigmine.[1-8]

67. It is recommended to perform the reversal of NMB with sugammadex instead of neostigmine when rocuronium bromide has been used as the former is faster and safer.

High level of evidence. Strong recommendation.

REFERENCES

1. Hristovska AM, Duch P, Allingstrup M, Afshari A. The comparative efficacy and safety of sugammadex and neostigmine in reversing neuromuscular blockade in adults. A Cochrane systematic review with meta-analysis and trial sequential analysis. Anaesthesia. 2018;73 (5):631-641.
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Normothermia

INTRODUCTION

Involuntary perioperative hypothermia can negatively affect the outcome of surgery and the postoperative clinical course of the patient, being associated with an increase in postoperative morbidity[1-3], with an increased incidence of poor healing, infection of the surgical wound, cardiovascular complications, tremor and increased blood loss[4,5]. It is also related to a delay in discharge from resuscitation units and from the hospital, and consequently with an increase in the costs of the process[5].

68. It is recommended to prevent and avoid involuntary perioperative hypothermia.

High level of evidence. Strong recommendation.

REFERENCES

1. Torossian A, Bräuer A, Höcker J, Bein B, Wulf H, Horn EP. Preventing inadvertent perioperative hypothermia. Clinical Practice Guideline. Dtsch Arztebl Int. 2015; 112(10): 166-72.

2. Sessler DI. Perioperative thermoregulation and heat balance. Lancet. 2016;387(10038): 2655-2664.

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Temperature monitoring

INTRODUCTION

Temperature should be monitored in all patients undergoing general anaesthesia lasting more than 30 minutes or whose surgery lasts more than 1 hour, regardless of the anaesthetic technique used[1,2]. Temperature control allows the adoption of early measures to avoid hypothermia, which can even be applied preventively[3], as well as the early detection and treatment of fever and / or hyperthermia[4].

69. The temperature of the patients should be controlled to guarantee normothermia in the perioperative period.

High level of evidence. Strong recommendation.

REFERENCES

1. Sessler DI. Perioperative thermoregulation and heat balance. Lancet. 2016;387(10038): 2655-2664.

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Active preoperative warm-up

INTRODUCTION

Active warm-up strategies should be started 20–30 minutes before surgery, also known as warm-up strategies[2,4]. These strategies should be maintained during the intraoperative period to maintain normothermia[1], especially if the duration of anaesthesia is going to be greater than 60 minutes[3] and in those patients with a higher risk of suffering perioperative hypothermia, such as those over 50 years of age or with a high surgical risk. It seems that these warming strategies could be related to the reduction of surgical wound infections compared to the use of non-active methods.

70. Active warm-up strategies should be started prior to surgery.

High level of evidence. Strong recommendation.

REFERENCES

1. Torossian A, Bräuer A, Höcker J, Bein B, Wulf H, Horn EP. Preventing inadvertent perioperative hypothermia. Clinical Practice Guideline. Dtsch Arztebl Int. 2015; 112(10):166-72.
2. Warttig S, Alderson P, Campbell G, Smith AF. Interventions for treating inadvertent postoperative hypothermia. Cochrane Database Syst Rev. 2014 Nov 20;(11):CD009892.
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Operating room ambient temperature

INTRODUCTION

There are passive measures for the prevention of hypothermia, among which is the ambient temperature of the operating room[1]. An increase in the temperature of the operating room protects patients from unintentional hypothermia, both during the intervention and during their admission to the resuscitation unit[2]. The available evidence shows higher central temperatures in those patients operated on in operating rooms with a temperature of at least 21 º C[3], although lower temperatures may be necessary in some types of surgeries.

71. The ambient temperature in the operating room should be at least 21 ° C for adult patients.

High level of evidence. Strong recommendation.

REFERENCES

1. Torossian A, Bräuer A, Höcker J, Bein B, Wulf H, Horn EP. Preventing inadvertent perioperative hypothermia. Clinical Practice Guideline. Dtsch Arztebl Int. 2015 Mar 6; 112(10): 166-72.
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Thermal isolation of the patient during the intraoperative

Despite being a passive measure of temperature control, covering the largest possible body surface area with sheets and one or more blankets or similar materials prevents losses in body temperature, contributing in a simple manner to the thermal insulation of the patient's body in the perioperative period[1,2,3]. This measure should be part of the normal care of the patient.

72. During the perioperative period, the largest possible surface area of the body should be thermally insulated.

High level of evidence. Strong recommendation.

REFERENCES

1. Torossian A, Bräuer A, Höcker J, Bein B, Wulf H, Horn EP. Preventing inadvertent perioperative hypothermia. Clinical Practice Guideline. Dtsch Arztebl Int. 2015; 112(10):166-72.
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Fluid warming during intra-operative

INTRODUCTION

The administration of intravenous fluids or irrigation at low temperatures should be avoided as it increases the risk of hypothermia in the perioperative period. Fluids administered intravenously to the patient should be warmed first, this recommendation being applicable to irrigation fluids[1,2]. Warming intravenous fluids should be considered up to an hour before surgery. Warming of intravenous fluids has proven to be a favourable measure in terms of cost-effectiveness compared to not warming, even in cases of lower surgical risk, lower risk of cardiac complications and short duration of surgery[2,3].

73. Infusions, cavity fluid infusions and blood transfusions given at doses > 500 ml / hr. should be warmed first.

High level of evidence. Strong recommendation.

REFERENCES

1. Torossian A, Bräuer A, Höcker J, Bein B, Wulf H, Horn EP. Preventing inadvertent perioperative hypothermia. Clinical Practice Guideline. Dtsch Arztebl Int. 2015; 112(10): 166-72.
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Active intraoperative warming measures

INTRODUCTION

Active intraoperative warming measures should be performed[1]. These measures must be applied as much in advance as possible[2]. Within active skin heating systems, the most evaluated strategies are convective and conductive hot air, with strategies being cost-effective even in those patients with lower surgical risk and a short duration of surgery.[3]

74. Intraoperative active warming measures are indicated by the administration of convective or conductive heat to maintain normothermia.

High level of evidence. Strong recommendation.

REFERENCES

1. Torossian A, Bräuer A, Höcker J, Bein B, Wulf H, Horn EP. Preventing inadvertent perioperative hypothermia. Clinical Practice Guideline. Dtsch Arztebl Int. 2015 Mar 6; 112(10): 166-72. doi: 10.3238/arztebl.2015.0166. PMID: 25837741.

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Temperature in anaesthetic eduction

INTRODUCTION

A higher temperature must be maintained at 36 º C throughout the surgical process, applying the necessary measures so that the anaesthetic emission is carried out under normothermic conditions. Postoperative hypothermia is related to a longer stay in the postanaesthetic resuscitation unit, in addition to the fact that chills have been described as a cause of intense discomfort after surgery, comparable to postoperative pain [1,2,3].

75. The removal of general anaesthesia should take place at normal body temperature.

High level of evidence. Strong recommendation.

REFERENCES

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Intraoperative fluid therapy

INTRODUCTION

Intraoperative fluid therapy plays an essential role in the treatment of the surgical patient through its important influence on postoperative results. The essential factors to consider are the monitoring and the objectives to be achieved, as well as the choice of the type of solution, the volume and the time of its administration. All have been the subject of research in recent literature.[1]

Goal-guided fluid therapy

INTRODUCTION

The objective of intraoperative fluid therapy is to maintain tissue perfusion with an adequate circulating volume while maintaining electrolyte homeostasis.[1] Hypovolemia may determine a greater risk of hypoperfusion and organ damage whereas hypervolemia may cause interstitial oedema, impaired healing, and coagulation. cardiopulmonary complications, as well as postoperative ileus.[2] Therefore, adjusted, and individualised therapy based on well-defined protocols should be the goal to optimise its efficacy and avoid iatrogenesis.[3]

Stroke Volume (SV) and Stroke Volume Variation (SVV)

INTRODUCTION

There is extensive literature that advocates individualising fluid therapy or goal-directed haemodynamic therapy using advanced haemodynamic monitoring to optimise SV and reduce SVV.[2-4]

76. The use of adequate monitoring (VS or VVS) is recommended to guide intraoperative administration of fluids in patients at risk.

High level of evidence. Strong recommendation.

REFERENCES

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Stroke Volume Variation (SVV) and fluid response

INTRODUCTION

Positive pressure mechanical ventilation induces a cyclical reduction in the left ventricular due to a decrease in venous return and is more pronounced in hypovolemia. Changes in preload during the respiratory cycle lead to variations in SV.[1] These variations are estimated by pulse contour analysis. Fluid responsiveness is generally defined as an increase in SV equal to or greater than 10% .[2]

77. In cases where there is an SV drop > 10% or SVV > 10%, fluid resuscitation is indicated (there is no preference between colloids or crystalloids).

High level of evidence. Strong recommendation.

REFERENCES

1. Kendrick JB, Kaye AD, Tong Y, Belani K, Urman, Hoffman Ch, Liu H. Goal-directed fluid therapy in the perioperative setting. J Anesth Clin Pharm 2019; 35 (Suppl 1): S29-S34.
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Fluid balance

INTRODUCTION

Restrictive policies are associated with a significantly higher risk of acute kidney injury than liberal fluid therapy.[1,2] A goal of 0 balance may be too restrictive, so a moderately liberal fluid regimen may be recommended to achieve a positive balance of 1 to 2 L at the end of major surgery.[3,4]

78. A moderate continuous fluid infusion is recommended, yielding a positive balance at the end of surgery of 1 to 2 l. to avoid postoperative acute kidney damage.

High level of evidence. Strong recommendation.

REFERENCES

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High risk patients

INTRODUCTION

Current evidence recommends the use of goal-directed therapy in high-risk anaesthetic patients and high-risk surgeries. Very restrictive or very liberal therapies in the administration of fluids have serious consequences in patients with higher surgical risk, so these must be individualised according to the haemodynamic parameters of VS and SVV.[1-4]

79. In high-risk patients, it is recommended to maintain individualised fluid therapy with a moderately positive balance and continuous monitoring of SV or SVV.

Moderate level of evidence. Strong recommendation.

REFERENCES

1. Miller TE, and Myles PS. Perioperative Fluid Therapy for Major Surgery. Anesthesiology 2019; 130:825-32.
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No response to volume

INTRODUCTION

The passive leg elevation test accompanied by an increase in blood pressure or SV allows for a simple and immediate prediction of the response to fluids. A negative test has a low probability of response. In this case, therapy should be oriented to the use of vasopressors or inotropes.[1,2]

80. Intraoperative hypotension without response to passive leg raising should be treated with vasopressors (checking for variations in blood pressure, SV and SVV).

Moderate level of evidence. Strong recommendation.

REFERENCES

1. Futier E, Letirant JY, Guinot PG, Godet T, lorne E, Curvillon P et al. Effect of individualized vs standard blood pressure management strategies on postoperative organ dysfunction among high-risk patients undergoing major surgery: A randomized clinical trial. JAMA 2017; 318: 1346-57.

2. Bentzer P, Griesdale DE, Boyd J, MacLean K, Sirounis D, and Ayas NT. Will this the nodynamiclly no dynamically instable patient respond to a bolus of intravenous fluids? Jana 2016; 316:1298-309.

Mean arterial pressure

INTRODUCTION

There is increasing evidence that even short periods of intraoperative hypotension, defined as a mean arterial pressure lower than 65 mmHg, are associated with myocardial and renal damage. Therefore, episodes of intraoperative hypotension should be avoided to reduce the risk of myocardial ischemia or acute renal failure.[1]

81. A range of mean arterial pressure greater than or equal to 65 mm Hg should be established.

High level of evidence. Strong recommendation.

REFERENCES

1. Salmasi V, Maheshwari K, Yang D, Mascha EJ, Singh A, Sessler DI, et al. Relationship between Intraoperative Hypotension, Defined by Either Reduction from Baseline or Absolute Thresholds, and Acute Kidney and Myocardial Injury after Noncardiac Surgery: A Retrospective Cohort Analysis. Anesthesiology. 2017; 126(1):47-65.

Cardiac index

INTRODUCTION

If a patient has an optimised volume (does not respond to fluids) and remains hypotensive with a cardiac index less than 2.5 l / min / m2, inotropes should be considered.[1,2]

82. A CI> 2.5 l / min / m2 should be maintained, using inotropes in cases of non-response to volume.

High level of evidence. Strong recommendation.

REFERENCES

1. Calvo-Vecino JM, Ripolles_melchor J, Mythen MG, Casans-Francés R, Balik A, Artacho JP, et al. Effect of goal-directed haemodynamic therapy on postoperative complications in low-moderate risk surgical patients: A multicenter randomised controlled trial (FEDORA trial). Br J Anaesth 2018; 120:734-44.
2. Ripolles-Melchor J, Chappell D, Espinosa A, Mhyten MG, Abad-Gurumeta A, Bergese SD, et al. Fluid therapy recommendations for major abdominal surgery. Via RICA recommendations revisited. Part III: goal directed hemodinamic therapy. Rationale for maintaining vascular tone and contractility. Rev Esp Anestesiolo Reani 2107; 64: 348-59.

Intraoperative hemodynamic monitoring

INTRODUCTION

Oesophageal Doppler is currently the method most supported by the evidence.[1] However, the introduction of less invasive pulse contour analysis-based monitoring has made it possible to generalise goal-guided therapy and obtain more extensive evidence.[2,3]

83. Monitoring by oesophageal Doppler or methods based on validated pulse contour analysis is preferred.

High level of evidence. Strong recommendation.

REFERENCES

1. Ripollés-Melchor J, Casans-Francés R, Espinosa A, Abad-Gurumeta A, Fedheiser A, Lopez-Timoneda F, et al. Goal directed hemodynamic therapy based in esophageal Doppler Flow parameters: Asystematic review, meta_analysis and trial sequential análisis. Rev Esp Anestesiolo Reani 2016; 63:384-405.
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Solution type

INTRODUCTION

Among crystalloids, evidence suggests that balanced solutions with electrolytes and an acid-base balance close to a plasmatic one is preferable to solutions rich in chloride as the latter can cause hyperchloremia, metabolic acidosis, renal vasoconstriction and acute renal damage.[1-4]

84. The primary maintenance intravenous fluid should be a balanced isotonic crystalloid solution.

High level of evidence. Strong recommendation.

REFERENCES

1. Hammond DA, Lam SW, Rech MA, Smith MN, Westrick J, Trivedi AP, et al. Balanced Crystalloids Versus Saline in Critically Ill Adults: A Systematic Review and Meta-analysis. Ann Pharmacother. 2020;54:5-13.
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Resuscitation fluid therapy

INTRODUCTION

For fluid therapy in resuscitation, the use of balanced crystalloids is recommended: 2-3 litres for initial resuscitation in hypovolemic shock and haemodynamic monitoring to guide the additional administration of fluids. Several clinical trials have shown that the use of balanced crystalloids instead of saline solution prevents the development of hypotension, the need for vasopressors, renal dysfunction, and the need for renal replacement therapy, as well as reducing mortality.[1-6]

85. For fluid therapy in resuscitation, the use of balanced crystalloids is recommended; 2–3 litres for initial resuscitation in hypovolemic shock and haemodynamic monitoring to guide the additional administration of fluids.

Moderate level of evidence. Strong recommendation.

REFERENCES

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Tranexamic Acid

INTRODUCTION

The administration of tranexamic acid (prophylactic or after surgery) is recommended, except if contraindicated due to thrombotic risk or allergy. Its need is indicated in cardiac, orthopaedic (intravenous or topical), maxillofacial, prostatic, and gynaecological surgery. It is not recommended in cases of severe kidney failure or if there is a history of epilepsy. [1-5]

Tranexamic acid can reduce the need for blood transfusion in adults undergoing surgery. This avoids serious risks associated with blood transfusion, such as infection, fluid overload and improper blood transfusions. It can also reduce the length of hospital stays and the cost for the National Health System (*). [6]

86. It is recommended that all adults undergoing surgery and who are expected to have moderate to severe blood loss be offered tranexamic acid.

High level of evidence. Strong recommendation.

REFERENCES.

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Inspired Oxygen Fraction and risk of surgical infection

INTRODUCTION

Until recent years, the evidence-based guidelines of the WHO recommended a high (80%) FiO2 to reduce the incidence of surgical infection in adults under general anaesthesia and tracheal intubation. However, recent clinical trials warn of the absence of benefits in reducing surgical infections

associated with the use of a high FiO2 (80%), as well as this measure itself.[1-5]

87. The supplemental use of inspired oxygen is not recommended in patients undergoing general anaesthesia.

Moderate level of evidence. Weak recommendation

REFERENCES

1. de Jonge S, Egger M, Latif A, Loke YK, Berenholtz S, Boermeester M, et al. Effectiveness of 80% vs 30-35% fraction of inspired oxygen in patients undergoing surgery: an updated systematic review and meta-analysis. Br J Anaesth. 2019;122(3):325-334.
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Surgical approach and MIS incisions (minimally invasive surgery)

INTRODUCTION

The introduction of minimally invasive surgery (MIS; laparoscopic and robotic) has notably improved the well-being of patients: pain, surgical stress[1], opioid consumption[2] and blood loss are reduced and early ambulation is improved, all of which, combined, decrease hospital stay[3,4]. Therefore, if the surgical and oncological results do not differ from the surgical techniques, MIS is recommended.[5,6,7]

88. MIS is recommended, provided that surgical and oncological results do not differ from surgical techniques.

High level of evidence. Strong recommendation.

REFERENCES

1. Gustafsson UO, Scott MJ, Hubner M, Nygren J, Demartines N, Francis N, et al.Guidelines for Perioperative Care in Elective Colorectal Surgery: Enhanced Recovery After Surgery (ERAS). Society Recommendations: 2018. World J Surg. 2019; 43(3):659-695.
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6. Kalogera E, Glaser GE, Kumar A, Dowdy SC, Langstraat CL.Enhanced Recovery after Minimally Invasive Gynecologic Procedures with Bowel Surgery: A Systematic Review. J Minim Invasive Gynecol. 2019; 26(2):288-298.

7. Li K, Lin T, Fan X, Xu K, Bi L, Duan Y, et al: Systematic review and meta-analysis of comparative studies reporting early outcomes after robot-assisted radical cystectomy versus open radical cystectomy. Cancer Treatment Reviews 2012 Oct; 39: pp. 551-560.

INCISIONS

INTRODUCTION

When a laparotomic approach is required, the transverse / oblique incision[1,2,3] appears to reduce pain and pulmonary complications, but there is insufficient evidence, so the choice of surgical access depends on the surgeon and their experience and preference, as well as the patient characteristics.

89. The transverse incision is recommended in laparotomic surgery.

Moderate level of evidence. Strong recommendation.

REFERENCES

1. Santoro A, Boselli C, Renzi C, Gubbiotti F, Grassi V, Di Rocco G, et al. Transverse skin crease versus vertical midline incision versus laparoscopy for right hemicolectomy: a systematic review-current status of right hemicolectomy. Biomed Res Int. 2014;2014: 643685.

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Drains

INTRODUCTION

As a routine, drains have been used, with the belief that by evacuating blood and serious collections, postoperative infections could be prevented. However, multiple studies in this regard[1,2,3] have not demonstrated this belief, so there is no evidence to back up its use on a routine basis[4,5,6].

90. It is recommended to avoid using drains on a routine basis

High level of evidence. Strong recommendation.

REFERENCES

1. Nelson G, Bakkum-Gamez J, Kalogera E, Glaser G, Altman A, Meyer LA, et al. Guidelines for perioperative care in gynecologic/oncology: Enhanced Recovery After Surgery (ERAS) Society recommendations-2019 update. Int J Gynecol Cancer. 2019 May;29(4):651-668.
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Nasogastric tube

INTRODUCTION

The different meta-analyses[1,2,3] have concluded that NG intubation increases the risk of postoperative pneumonia after elective abdominal surgery, does not reduce the risk of suture dehiscence or anastomotic leakage[4,5,6], delays the start of feeding and causes discomfort in patients; therefore, there is no evidence to use it as a routine in abdominal surgery.

91. As a routine, the use of NG tube is not recommended.

High level of evidence. Strong recommendation.

REFERENCES

1. Nelson G, Bakkum-Gamez J, Kalogera E, Glaser G, Altman A, Meyer LA, et al. Guidelines for perioperative care in gynecologic/oncology: Enhanced Recovery After Surgery (ERAS) Society recommendations-2019 update. Int J Gynecol Cancer. 2019 May;29(4):651-668.
2. Gustafsson UO, Scott MJ, Hubner M, Nygren J, Demartines N, Francis N, et al. Guidelines for Perioperative Care in Elective Colorectal Surgery: Enhanced Recovery After Surgery (ERAS®) Society Recommendations: 2018. World J Surg. 2019 Mar;43(3):659-695.
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ANALGESIA

Perioperative analgesia

INTRODUCTION

Since its inception, pain control has been a key point in enhanced recovery strategies.

The search for an analgesic method that confers a high degree of comfort for the patient without interfering in other key points of the IRPs such as early mobilisation, paralytic ileus or postoperative nausea and vomiting, or that could increase the rate complications or average stay, means that many perioperative analgesic strategies have been evaluated as part of IRPs.

Classically, most studies carried out on perioperative analgesia have offered comparisons between the use of intravenous opiates and catheterisation and infiltration of the epidural space at the thoracic level with local anaesthetics, with or without added opiates, offering a clear superiority of the latter over the former, in major abdominal surgery. However, although today thoracic epidural catheterisation continues to be the technique of choice in open major abdominal surgery, the development of minimally invasive surgical techniques, the infiltration of access ports with local anaesthetics and the development of ultrasound-guided peripheral nerve block analgesic techniques make epidurals not the first analgesic choice for laparoscopic surgery.

Finally, we must highlight the importance of adjuvants within enhanced recovery analgesic strategies. Some of them are of more conventional use, such as non-steroidal anti-inflammatory drugs, but others are of more recent or controversial use, such as intravenous lidocaine, ketamine, magnesium sulphate or dexmedetomidine, which should also be considered when implementing an analgesic line of action in IRPs. Based on the use of these, opioid-free anaesthesia (OFA) has been developed, aiming to abolish the use of opioids within the intra-operative stage, replacing them by a combination of drugs and/or techniques capable of maintaining a stable anaesthesia, blocking analgesic stimuli in an efficient manner.

The different analgesic modalities are detailed below.

Epidural analgesia in open laparotomy

INTRODUCTION

There are both meta-analyses and high-quality randomised clinical studies that confirm the superiority of epidural analgesia over intravenous opioid analgesia, in terms of analgesic quality (particularly during the first 24 hours postoperatively and when the patient is wandering), and in the reduction of postoperative complications.[1,2]

Epidural analgesia has shown an improvement in gastrointestinal blood flow, providing a potential benefit in those patients undergoing major abdominal surgery. However, this increased flow is not accompanied by an increase in the patient's oxygen consumption.[1]

Due to the sympathetic blockage produced by epidural catheterisation, it is accompanied by some degree of hemodynamic instability, resulting in an increased risk of hypotension, which can be resolved with vasoconstrictors.[1]

Epidural catheterisation in major abdominal surgery presents better analgesic results than intravenous opiates, both with the patient at rest and in motion, especially during the first 24 hours after surgery. The use of epidural analgesia decreases the time to recover intestinal transit and the incidence of paralytic ileus, suggesting a decrease in hospital stay in open surgery.[2]

92. Epidural analgesia within combined anaesthesia should be performed in all patients undergoing major open abdominal surgery.

High level of evidence. Strong recommendation.

REFERENCES

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Thoracic epidural

INTRODUCTION

Although there are few randomised clinical studies that evaluate the differences between the implementation at the thoracic or lumbar level of the epidural catheter, the existing ones clearly indicate a better analgesic quality and fewer complications and lower extremity block in those patients in which a thoracic epidural catheterisation is performed, with respect to those with a catheterisation at the lumbar level. These data are also supported by prospective observational studies. In addition to all the above, most studies that support the use of epidural catheterisation for analgesia in major abdominal surgery use thoracic puncture points to perform it.[1,2]

93. Catheterisation of the epidural space for infusion of local anaesthetics for analgesia in open major abdominal surgery should be performed at the thoracic level.

High level of evidence. Strong recommendation.

REFERENCES

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Neuraxial opioids

INTRODUCTION

The supply of small amounts of opiates. together with local anaesthetics applied epidurally. improves the analgesic quality of the block to be performed, without causing a significant increase in complications for the patient or affecting the benefits of epidural analgesia in the recovery of intestinal motility. As a potential complication, it is worth mentioning the possible appearance of itching, although the incidence is not high. Regarding the opioid used, morphine, fentanyl or sufentanil seem to be just as effective in terms of analgesic quality. The effect of opioids at the epidural level is independent of the puncture point chosen for the epidural catheterisation.[1]

94. Small doses of opioids should be added to the doses of local anaesthetic to be delivered epidurally in major open surgery.

Moderate level of evidence. Strong recommendation.

REFERENCES

1. Guay J, Nishimori M, Kopp S. Epidural local anaesthetics versus opioid-based analgesic regimens for postoperative gastrointestinal paralysis, vomiting and pain after abdominal surgery. Cochrane Database of Systematic Reviews 2016;7: CD001893.

Analgesia without an epidural catheter arrangement

INTRODUCTION

If epidural analgesia is not used, the analgesic strategy should be individualised, seeking to reduce the use of opiates by applying different types of blockades, either spinal, local, regional, or infiltration of ports with local anaesthetics, etc.[1]

In all other cases, the analgesic strategy should be individualised, trying to avoid the use of opiates, and favouring the use of locoregional blocks, spinal analgesia or infiltration of ports with local anaesthetics, especially considering the block of the transverse plane of the abdomen.[2]

95. When the provision of an epidural catheter is not possible in open major surgery, the analgesic strategy should be individualised, reducing the use of opiates, and favouring the use of locoregional blocks, spinal analgesia, or port infiltration with local anaesthetics, especially considering the blockade of the transverse plane of the abdomen.

Moderate level of evidence. Strong recommendation.

REFERENCES

1. Baeriswyl M, Zeiter F, Piubellini D, Kirkham KR, Albrecht E. The analgesic efficacy of transverse abdominis plane block versus epidural analgesia: a systematic review with meta-analysis. Medicine. 2018;97(26).

2. Shahait M, Lee DI. Application of TAP Block in laparoscopic urological surgery: current status and future directions. Curr Urol Rep. 2019;20:20.

Interfacial blocks: transverse plane block without the possibility of epidural block

INTRODUCTION

Block of the transverse plane of the abdomen can be considered an effective strategy in these cases, with analgesic quality comparable to epidural but with a lower risk profile as it does not produce hemodynamic alterations, preserves motor and sensory function of the lower extremities, and can be used more safely in patients on anticoagulant treatment. However, it has no effect on visceral pain, so it must necessarily be part of a multimodal analgesia protocol that combines different drugs or analgesic techniques with different mechanisms of action. Likewise, due to the duration of the TAP block by single puncture, in those cases where the possibility of intense pain is anticipated after the first 24 hours, catheterisation and the continuous perfusion in space should be considered.[1] However, the blockade of the plane of the transverse has not shown superiority to epidural in any RCT.

96. Performing a bilateral transverse plane block with local anesthetics could benefit those patients who require open major abdominal surgery and who cannot benefit from epidural analgesia.

Moderate level of evidence. Strong recommendation.

REFERENCES

1. Grupo de trabajo de la Guía de Práctica Clínica sobre Cuidados Perioperatorios en Cirugía Mayor Abdominal. Guía de Práctica Clínica sobre Cuidados Perioperatorios en Cirugía Mayor Abdominal. Ministerio de Sanidad, Servicios Sociales e Igualdad. Instituto Aragonés de Ciencias de la Salud (IACS); 2016 Guías de Práctica Clínica en el SNS.
2. Baeriswyl M, Zeiter F, Piubellini D, Kirkham KR, Albrecht E. The analgesic efficacy of transverse abdominis plane block versus epidural analgesia: a systematic review with meta-analysis. Medicine. 2018;97(26).
3. Shahait M, Lee DI. Application of TAP Block in laparoscopic urological surgery: current status and future directions. Curr Urol Rep. 2019;20:20.

Opioid free anesthesia (OFA)

INTRODUCTION

Perioperative opioid administration has long been one of the three pillars of “balanced anaesthesia,” which in practice address perioperative pain relief and preventive analgesia as goals. Pain during anaesthesia has typically been interpreted through the evaluation of surrogate signs, such as the response of the sympathetic nervous system to surgical stimuli. However, the contribution of emotional experience during an unconscious state is questionable, and hemodynamic changes are prone to confounding several physiological processes. Therefore, the assumption that it is necessary to treat these substitutes with opiates during general anaesthesia may be incorrect. Likewise, the use of opioid drugs for pain control is not safe but comes with different complications and side effects.[1]

Based on the above, in the last decade OFA has begun to be an alternative to the classical use of intravenous opioids during the intraoperative period. OFA is based on the idea that the complete abolition of opioid drugs in the intraoperative period has a positive impact on the expected results in the postoperative period, totally replacing them with a

combination of drugs and / or techniques that together can achieve stable anaesthetic maintenance and effectively block analgesic stimuli. Drugs that have been proposed for this purpose include NMDA receptor antagonists (Ketamine, Lidocaine, Magnesium Sulphate), calcium channel blockers (local anaesthetics), anti-inflammatories (steroids, NSAIDs, AL), or alpha 2 agonists (clonidine, dexmedetomidine).[2,3]

At this time, there is no evidence that opioid-free anaesthesia is clearly superior to classical balanced opioid-based anaesthesia, even though it could reduce situations of opioid-induced hyperalgesia. Likewise, opioid-free anaesthesia has shown a reduction in the side effects produced by opioids, such as nausea and vomiting. In bariatric surgery, there are also indications about its usefulness in increasing patient comfort and reducing adverse events such as desaturations or apnoeas in the immediate postoperative period.[4]

97. Opioid-free anaesthesia in IRPs may be an alternative to the use of intravenous opioids.

Moderate level of evidence. Weak recommendation

REFERENCES

1. Mulier JP, Dillemans B. Anaesthetic Factors Affecting Outcome After Bariatric Surgery, a Retrospective Levelled Regression Analysis. OBES SURG. 2019;29:1841-50.

2. Frauenknecht J, Kirkham KR, Jacot-Guillarmod A, Albrecht E. Analgesic impact of intra-operative opioids vs. opioid-free anaesthesia: a systematic review and meta-analysis. Anaesthesia. 2019;74:651-62.

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4. Mulier JP, Dillemans B. Deep Neuromuscular Blockade versus Remifentanil or Sevoflurane to Augment Measurable Laparoscopic Workspaceduring Bariatric Surgery Analysed bya Randomised Controlled Trial. Journal of Clinical Anesthesia and Pain Medicine. 2018;7:2-4.

Intraoperative intravenous lidocaine

INTRODUCTION

Research in other areas of pain, such as neuropathic pain or complex regional pain syndrome, has shown that the administration of lidocaine intravenously produces long-lasting analgesic effects, inhibiting the spontaneous generation of impulses from injured peripheral nerves and the dorsal node root lymph close to the injured fibres, as well as the suppression of polysynaptic reflexes in the dorsal spinal horn.[1] Although pain in the perioperative setting is primarily inflammatory, it can also be neuropathic or based on hyperalgesia. All these entities could be improved by the administration of IV lidocaine at low doses, although its analgesic effect would be limited to the first 24 hours postoperatively.[2,3]. Furthermore, it could help intestinal function recovery and prevent the development of paralytic ileus.

98. The use of intraoperative intravenous lidocaine is recommended as an adjunct medication in the reduction of postoperative pain and to improve the recovery of intestinal function in the immediate postoperative period, being an alternative to the use of intravenous opioids.

Nivel de evidencia moderado. Recomendación débil

REFERENCES

1. Cooke C, Kennedy ED, Foo I, Nimmo S, Speake D, Paterson HM, et al. Meta-analysis of the effect of perioperative intravenous lidocaine on return of gastrointestinal function after colorectal surgery. Tech Coloproctol. 2019;23:15-24.
2. Weibel S, Jelting Y, Pace NL, Helf A, Eberhart LH, Hahnenkamp K, et al. Continuous intravenous perioperative lidocaine infusion for postoperative pain and recovery in adults. Cochrane Database Syst Rev. 2018;6:CD009642.
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4. Weibel S, Jokinen J, Pace NL, Schnabel A, Hollmann MW, Hahnenkamp K, et al. Efficacy and safety of intravenous lidocaine for postoperative analgesia and recovery after surgery: a systematic review with trial sequential analysis. Br J Anaesth. 2016;116:770-83.

Intraoperative ketamine

INTRODUCTION

Ketamine could reduce the inflammatory reaction that occurs after surgery, decreasing IL6levels.[1] Perioperative intravenous ketamine probably reduces the consumption of postoperative analgesics and the intensity of pain without causing a significant increase in side effects at the level of central nervous system and probably reduces postoperative nausea and vomiting to a small extent, of questionable clinical relevance.[2,3]

99. IV ketamine should be given to those patients on major opioids for analgesia in major abdominal surgery.

Moderate level of evidence. Weak recommendation

REFERENCES

1. Brinck EC, Tiippana E, Heesen M, Bell RF, Straube S, Moore RA, et al. Perioperative intravenous ketamine for acute postoperative pain in adults. Cochrane Database Syst Rev. 2018;12:CD012033.
2. Nielsen RV, Fomsgaard JS, Siegel H, Martusevicius R, Nikolajsen L, Dahl JB, et al. Intraoperative ketamine reduces immediate postoperative opioid consumption after spinal fusion surgery in chronic pain patients with opioid dependency: a randomized, blinded trial. Pain. 2017;158:463-70.
3. Wang L, Johnston B, Kaushal A, Cheng D, Zhu F, Martin J. Ketamine added tomorphine or hydromorphone patient-controlled analgesia for acute postoperative pain in adults: a systematic review and meta-analysis of randomized trials. Can J Anaesth. 2016;63:311-25.

Intraoperative magnesium sulfate

INTRODUCTION

Magnesium produces an inhibitory effect on the neuron by blocking glutamate NMDA receptors, which is the main excitatory neurotransmitter in the central nervous system. It has sedative and anticonvulsant properties, inhibits catecholamine secretion and enhances NMB. It may reduce opioid use by modulating nociceptive stimulus.[1-5]

100. The use of intraoperative iv magnesium sulfate is recommended as an analgesic adjunct to improve pain control in patients undergoing abdominal surgery.

Moderate level of evidence. Weak recommendation

REFERENCES

1. Rodríguez-Rubio L, Nava E, Del Pozo JSG, Jordán J. Influence of the perioperative administration of magnesium sulfate on the total dose of anesthetics during general anesthesia. A systematic review and meta-analysis. J Clin Anesth. 2017;39:129-38.
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Intraoperative dexmedetomidine

INTRODUCTION

The analgesic effects of intravenous dexmedetomidine and other alpha-2-agonists such as clonidine are known for their action on the central and peripheral nervous system[1-4]. Recent systematic reviews on the use of intraoperative intravenous dexmedetomidine compared to remifentanil[1] show moderate evidence in the reduction of opioid needs both intraoperatively and during the first 24 postoperative hours, presenting less pain intensity and less need for rescue doses with opioids and with less frequency[1-3]. Likewise, there are fewer adverse effects derived from the lower use of perioperative opioids, presenting a lower incidence of hypotension, chills, nausea and postoperative vomiting[1-4].

101. The use of intraoperative intravenous dexmedetomidine is recommended as it contributes to reducing the risk of adverse events associated with opiates and improves pain control in the intra- and post-operative period.

Moderate level of evidence. Weak recommendation

REFERENCES

1. Grape S, Kirkham KR, Frauenknecht J, Albrecht E. Intra-operative analgesia with remifentanil vs. dexmedetomidine: a systematic review and meta-analysis with trial sequential analysis. Anaesthesia. 2019;74:793-800.
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3. Jin S, Liang DD, Chen C, Zhang M, Wang J. Dexmedetomidine prevent postoperative nausea and vomiting on patients during general anesthesia: A PRISMA-compliant meta analysis of randomized controlled trials. Medicine (Baltimore). 2017;96:e5770.
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Perioperative neuromodulators

INTRODUCTION

The oral administration of neuromodulators such as pregabalin or gabapentin could produce a significant decrease in the use of opioids in the first 24 hours without causing harmful effects in patients[1-3]. Furthermore, it could have a beneficial effect on patients' chronic pain at 6 months after surgery. Patients over 65 years of age have greater side effects derived from the use of pregabalin and it could be a better subsidiary of the use of gabapentin[4,5]. A recently published meta-analysis with more than 280 clinical trials and 24,000 patients found no relevant clinical analgesic effects, although there were statistically significant differences in the first postoperative hours. Less nausea and vomiting and a greater number of visual disturbances and dizziness were found.

102. Open major abdominal surgery could include an assessment of preoperative oral dose of gabapentin or pregabalin before the intervention for postoperative analgesic control.

Nivel de evidencia alto. Recomendación débil.

REFERENCES

1. Rai AS, Khan JS, Dhaliwal J, Busse JW, Choi S, Devereaux PJ, et al. Preoperative pregabalin or gabapentin for acute and chronic postoperative pain among patients undergoing breast cancer surgery: A systematic review and meta-analysis of randomized controlled trials. J Plast Reconstr Aesthet Surg. 2017;70:1317-28.
2. Liu B, Liu R, Wang L. A meta-analysis of the preoperative use of gabapentinoids for the treatment of acute postoperative pain following spinal surgery. Medicine (Baltimore). 2017;96:e8031.
3. Li S, Guo J, Li F, Yang Z, Wang S, Qin C. Pregabalin can decrease acute pain and morphine consumption in laparoscopic cholecystectomy patients: A meta-analysis of randomized controlled trials. Medicine (Baltimore). 2017;96:e6982.
4. Yao Z, Shen C, Zhong Y. Perioperative Pregabalin for Acute Pain After Gynecological Surgery: A Meta-analysis. Clin Ther. 2015;37:1128-35.
5. Eipe N, Penning J, Yazdi F, Mallick R, Turner L, Ahmadzai N, et al. Perioperative use of pregabalin for acute pain-a systematic review and meta-analysis. Pain. 2015;156:1284-300.
6. Verret M, Lauzier F, Zarychanski R, Perron C, Savard X, Pinard AM, et al. Perioperative Use of Gabapentinoids for the Management of Postoperative Acute Pain: A Systematic Review and Meta-analysis. Anesthesiology.2020:133: 265-279.

Prevention of paralytic ileus

INTRODUCTION

Paralytic ileus is one of the complications that produces the greatest discomfort in the patient, as well as prolonging their hospital stay[1].

103. Multimodal management by using alternatives to opioids (thoracic epidural catheter, blockages, minimally invasive surgery, avoiding the routine use of an NG tube and avoiding an excess of IV therapy fluid) is recommended to prevent the appearance of postoperative paralytic ileus[1].

High level of evidence. Strong recommendation.

REFERENCES

1. Gustafsson UO, Scott MJ, Hubner M, Nygren J, Demartines N, Francis N, et al. Guidelines for Perioperative Care in Elective Colorectal Surgery: Enhanced Recovery After Surgery (ERAS) Society Recommendations: 2018. World J Surg 2019; 43(3):659-695.

Nausea and vomiting prophylaxis

INTRODUCTION

PONV is the most important cause of a delayed onset of oral fluid tolerance and can be more uncomfortable for the patient than pain. It affects 25–35% of all surgical patients and is a major cause of discomfort and delay in medical discharge. Prophylaxis should be proportional to the estimated risk.[1-3]

MEASURES FOR PROPHYLAXIS AND TREATMENT

Identification of the patient at risk of PONV

INTRODUCTION

The risk of PONV should be assessed in all patients using a validated risk scale, such as the simplified Apfel scale, which evaluates risk factors for PONV: female sex, history of PONV and / or motion sickness, non-smoker, administration postoperative morphology.[1-2] Patients under 50 years of age and those with a history of chemotherapy-induced nausea and vomiting are at increased risk of PONV. Regarding the type of surgery, an increased risk of PONV has been observed in cholecystectomies, gynaecological surgery and laparoscopic procedures.[3]

104. The risk of PONV must be stratified in all patients using the Apfel scale and prophylaxis must be carried out that is proportional to the expected risk. Prophylaxis with more combined drugs can be performed in surgeries in which PONV poses a significant risk of complications.

High level of evidence. Strong recommendation.

REFERENCES

1. ApfelCC, Läärä E, Koivuranta M, Greim CA, Roewer N. A simplifiedrisk scorefor predicting postoperative nausea and vomiting: conclusions from cross-validations between two centers. Anesthesiology 1999;91(3):693-700.

2. Apfel CC, Philip BK, Cakmakkaya OS, Shilling A, Shi Y-Y, Leslie JB, et al. Who is at risk for postdischarge nausea and vomiting after ambulatory surgery? Anesthesiology 2012;117(3): 475-86.

3. Apfel CC, Heidrich FM, Jukar-Rao S, Jalota L, Hornuss C, Whelan RP, et al. Evidence-based analysis of risk factors for postoperative nausea and vomiting. Br J Anaesth 2012;109(5):742-53.

DECREASE IN BASAL RISK OF PONV:

Regional anesthesia vs general anesthesia

INTRODUCTION

The decrease in baseline risk factors for PONV lowers its incidence[1]. The strategies to minimise it in patients at risk include the choice of regional anaesthesia over general anaesthesia, the use of propofol in induction and in maintenance, avoiding the use of nitrous oxide and volatile anaesthetics, minimising the use of intra- and postoperative opioids, and ensuring adequate hydration.[2]

105. Regional anaesthesia is recommended before general anaesthesia to reduce the incidence of PONV

High level of evidence. Strong recommendation.

REFERENCES

1. Sinclair DR, Chung F, Mezei G. Can postoperative nausea and vomiting be predicted? Anesthesiology 1999;91:109-18.
2. Veiga-Gil L, Pueyo J, López-Olaondo L. Náuseasy vómitospostoperatorios: fisiopatología, factores de riesgo, profilaxis y tratamiento. Rev Esp Anestesiol Reanim 2017;64(4):223-32.

Intravenous anesthesia vs inhaled anesthesia

INTRODUCTION

In patients with a higher risk or history of PONV, it has been shown that TIVA intravenous general anaesthesia with propofol reduces the incidence of nausea and vomiting compared to maintenance with inhaled halogenated anesthetics.[1-3]

106. The use of propofol is recommended for the induction and maintenance of anaesthesia in patients at high risk of PONV.

High level of evidence. Strong recommendation.

REFERENCES.

1. Tramèr M, Moore A, McQuay H. Propofol anaesthesia and postoperative nausea and vomiting: quantitative systematic review of randomized controlled studies. BJA: Br J Anaesth 1997;78(3):247-55.
2. Apfel CC, Korttila K, Abdalla M, Kerger H, Turan A, Vedder I, et al. A factorial trial of six interventions for the prevention of postoperative nausea and vomiting. N Engl J Med 2004;350(24):2441-51.
3. Schraag S, Pradelli L, Alsaleh AJO, Bellone M, Ghetti G, Chung TL, et al. Propofol vs. inhalational agents to maintain general anaesthesia in ambulatory and in-patient surgery: a systematic review and meta-analysis. BMC Anesthesiol. 2018;18(1):162.

Avoid using nitrous oxide

INTRODUCTION.

In surgeries lasting more than one hour and in patients at risk of PONV, the incidence of nausea and vomiting is increased if balanced anaesthesia is used with inhaled halogenated anaesthetics combined with nitrous oxide.[1-6]

107. The use of nitrous oxide should be avoided in patients at high risk of PONV or in long-lasting surgeries.

High level of evidence. Strong recommendation.

REFERENCES

1. Tramèr M, Moore A, McQuay H. Omitting nitrous oxide in general anaesthesia: meta-analysis of intraoperative awareness and postoperative emesis in randomized controlled trials. Br J Anaesth 1996;76(2):186-93.
2. Fernández-Guisasola J, Gómez-Arnau JI, Cabrera Y, del Valle SG. Association between nitrous oxide and the incidence of postoperative nausea and vomiting in adults: a systematic review and meta-analysis. Anaesthesia 2010;65(4):379-87.
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Avoid the use of halogenated agents

INTRODUCTION

The use of halogenated inhalation agents increases the incidence of PONV in patients with a higher risk on the Apfel scale or a history of PONV in previous surgical interventions with general anesthesia.[1-3]

108. The use of inhalation anaesthetics should be avoided in patients at high risk of PONV.

Moderate level of evidence. Strong recommendation.

REFERENCES

1. Sneyd JR, Carr A, Byrom WD, Bilski AJ. A meta-analysis of nausea and vomiting following maintenance of anaesthesia with propofol or inhalational agents. Eur J Anaesthesiol 1998;15(4):433-45.
2. Apfel CC, Kranke P, Katz MH, Goepfert C, Papenfuss T, Rauch S, et al. Volatile anaesthetics may be the main cause of early but not delayed postoperative vomiting: a randomized controlled trial of factorial design. British Journal of Anaesthesia 2002;88(5):659-68.
3. Apfel CC, Korttila K, Abdalla M, Kerger H, Turan A, Vedder I, et al. A factorial trial of six interventions for the prevention of postoperative nausea and vomiting. N Engl J Med 2004;350(24):2441-51.

Reduce the use of opioids

INTRODUCTION

One of the adverse effects of opioids is the increase in PONV, especially in patients at higher risk and in long-term surgeries that require greater analgesia. Therefore, multimodal analgesia with different families of drugs, the use of regional anaesthetic techniques and local anaesthesia are recommended to reduce the total dose of intra- and postoperative opioids.[1,2]

109. It is advisable to minimise the use of intraoperative opioids, especially postoperative ones.

High level of evidence. Strong recommendation.

REFERENCES.

1. Roberts GW, Bekker TB, Carlsen HH, Moffatt CH, Slattery PJ, McClure AF. Postoperative nausea and vomiting are strongly influenced by postoperative opioid use in a dose-related manner. Anesth Analg 2005;101(5):1343-8.
2. Guay J, Nishimori M, Kopp S. Epidural local anaesthetics versus opioid-based analgesic regimens for postoperative gastrointestinal paralysis, vomiting and pain after abdominal surgery. Cochrane Database of Syst Rev 2016 Jul 16;7:CD001893.

TREATMENT AND ANTIEMETIC PROPHYLAXIS ACCORDING TO APFEL RISK SCALE:

Low Apfel risk 0-1

INTRODUCTION

Prophylaxis is not indicated in all Apfel 0-1 patients, except in surgery with a high risk of complication if PONV and in surgery with a higher emetic risk (cholecystectomies, gynaecological or laparoscopic procedures, gastric, oesophageal surgery, neurosurgery, etc.) in which pharmacological prophylaxis with monotherapy is recommended.[1-3] Dexamethasone (4 mg iv at induction of anaesthesia), droperidol (0.625–1.25 mg iv at the end of surgery) and ondansetron (4 mg iv at end of surgery) have a similar efficacy.[4-6] The use of dexamethasone or droperidol has the advantage of reserving ondansetron as a treatment in the case of prophylaxis failure.[6]

110. Monotherapy antiemetic prophylaxis should be performed in patients with Apfel 0-1 but surgery with a higher risk of PONV.

Moderate level of evidence. Strong recommendation.

REFERENCES

1. Wang JJ, Ho ST, Tzeng JI, Tang CS. The effect of timing of dexamethasone administration on its efficacy as a prophylactic antiemetic for postoperative nausea and vomiting. Anesth Analg 2000;91(1):136-9.
2. Henzi I, Sonderegger J, Tramèr MR. Efficacy, dose-response, and adverse effects of droperidol for prevention of postoperative nausea and vomiting. Can J Anesth 2000;47(6):537-51.
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5. Gan TJ, Diemunsch P, Habib AS, Kovac A, Kranke P, Meyer TA, et al. Consensus Guidelines for the Management of Postoperative Nausea and Vomiting. Anesth Analg 2014;118(1):85-113.

6. Veiga-Gil L, Pueyo J, López-Olaondo L. Náuseasy vómitospostoperatorios: fisiopatología, factores de riesgo, profilaxis y tratamiento. Rev Esp Anestesiol Reanim 2017;64(4):223-32.

Moderate risk (Apfel 2-3)

INTRODUCTION

Measures to reduce baseline risks are indicated, as well as pharmacological prophylaxis with monotherapy. Pharmacological prophylaxis with dual therapy (dexamethasone and droperidol or ondansetron) should be performed in surgery with a high risk of complication of PONV and in surgery with a higher emetic risk. The combination of dexamethasone and droperidol has the advantage of reserving ondansetron for treatment in the event of prophylaxis failure.[1-3]

111. Antiemetic prophylaxis should be performed as monotherapy in patients with an Apfel 2–3 assessment and as dual therapy if surgery has a higher risk of PONV.

High level of evidence. Strong recommendation.

REFERENCES

1. Gan, TJ, Belani KG, Bergese S; Chung FM, Diemunsch P, Habib AS, et al. Fourth Consensus Guidelines for the Management of Postoperative Nausea and Vomiting. Anesth Analg 2020;131:411-448.

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3. Veiga-Gil L, Pueyo J, López-Olaondo L. Náuseasy vómitospostoperatorios: fisiopatología, factores de riesgo, profilaxis y tratamiento. Rev Esp Anestesiol Reanim 2017;64(4):223-32.

High risk (Apfel 4)

INTRODUCTION

Measures to reduce baseline risks and drug prophylaxis with dual therapy are indicated. Pharmacological prophylaxis with triple therapy (dexamethasone, droperidol and ondansetron, administering it at the end of surgery) should be performed in surgery with a high risk of complication if PONV and in surgery with a higher emetic risk.[1,2]

112. It is recommended to perform antiemetic prophylaxis in dual therapy in patients with Apfel 4 assessment and triple therapy if surgery has a higher risk of PONV.

High level of evidence. Strong recommendation.

REFERENCES

1. Gan, TJ, Belani KG, Bergese S; Chung FM, Diemunsch P, Habib AS, et al. Fourth Consensus Guidelines for the Management of Postoperative Nausea and Vomiting. Anesth Analg 2020;131:411-448.

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113. The use of peripheral opioid receptor antagonists prevents the appearance of ileus in the postoperative period.

Moderate level of evidence. Weak recommendation.

REFERENCES

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7.1.4 POSTOPERATIVE

Postoperative warming measures

INTRODUCTION

In case of postoperative hypothermia, active skin warming systems should be used versus passive systems[1]. These measures must be applied as far in advance as possible[2]. Within the active skin heating systems, the most evaluated strategies are convective and conductive hot air, being cost-effective strategies even in those patients with lower surgical risk and a short duration of surgery[3].

114. Postoperative hypothermia should be treated by administering convective or conductive heat until normothermia is achieved.

High level of evidence. Strong recommendation.

REFERENCES

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Perioperative NSAIDs

INTRODUCTION

The use of NSAIDs for pain control as adjunctive therapy is associated with a decrease in opioid consumption and an improvement in patient comfort. In addition, the use of NSAIDs could be on an equal footing in terms of analgesic potency with the infiltration of laparoscopic instrument ports with local anaesthetics, and selective cyclooxygenase-2 inhibitors could have some influence on improving postoperative bowel function.[1]

115. NSAIDs should be used as adjunctive therapy for pain control in patients who have undergone major abdominal surgery.

High level of evidence. Strong recommendation.

REFERENCES

1. Martinez V, Beloeil H, Marret E, Fletcher D, Ravaud P, Trinquart L. Non-opioid analgesics in adults after major surgery: systematic review with network meta-analysis of randomized trials. British Journal of Anaesthesia. 2017;118:22-31.

116. The routine use of gum is not recommended

Low level of evidence. Weak recommendation.

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Treatment of PONV in patients with failed prophylaxis

INTRODUCTION

Treatment of established PONV: if prophylaxis has not been administered, low-dose ondansetron (1 mg iv) should used as an option. If prophylaxis has been performed and more than 6 hours have elapsed since its administration, a rescue antiemetic should be used from a different family from that used for prophylaxis (ondansetron 1 mg iv or droperidol 0.625–1.25 mg iv) except for dexamethasone, whose repetition is not recommended.[1,2]

117. In established nausea and vomiting, selective 5-HT3 antagonists (ondansetron) are the treatment of choice, followed by a different antiemetic drug family if unresponsive except for dexamethasone.

High level of evidence. Strong recommendation.

REFERENCES.

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118. Use of laxatives such as bisacodyl (in colorectal surgery), oral magnesium oxide (in hysterectomy), daikenchuto (Japanese herbal infusion, in gastrectomy) and coffee (in colorectal surgery) could prevent the appearance of ileus.

Nivel de evidencia baja. Recomendación débil.

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Inmunonutrition (postoperative)

INTRODUCTION

IM has been a hotly debated topic since the 1990s, especially in the context of cancer surgery[1]. Some reviews and meta-analysis have shown the beneficial effects of IM by summing the results of RCTs in all types of patients and examining the entire perioperative period. However, other studies have found no added benefit with the use of IM over standard supplements using similar methods[2].

According to the 2017 ESPEN clinical guidelines on clinical nutrition and surgery, specific formulas with immunonutrients should be administered in the peri- or at least post-operative to malnourished patients undergoing major surgery for cancer, with a moderate grade of recommendation (SIGN)[3]. There is no clear evidence for its use compared to standard oral supplements exclusively in the preoperative period.

Meta-analyses continue to appear in this sense, with some common positive results, with evidence that is not always high[4,5].

119. Inmunonutrition seems recommendable in malnourished patients undergoing gastrointestinal surgery for cancer, due to the decrease in infectious complications and a possible shortening of hospitalization.

Low level of evidence. Strong recommendation.

REFERENCES

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3. Weimann A, Braga M, Carli F, Higashiguchi T, Hübner M, Klek S, et al. ESPEN guideline: Clinical nutrition in surgery. Clin Nutr 2017; 36: 623-650.

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Postoperative pain

INTRODUCTION

Postoperative pain control allows rapid recovery and multimodal rehabilitation. Analgesia is important in the first 24-48 hours to allow early mobilization, reducing paralytic ileus and hospital stay. For this reason, it is important to reduce the concentrations of local anesthetics through the thoracic epidural route in the postoperative period of open abdominal surgery, to obtain a sensitive block of the involved metameres and with the least possible motor block in the lower limbs.[1, 2] After the first 48 hours, the epidural catheter should be removed to reduce the risk of infection and ensure wandering without motor block. To achieve this, the use of alternative NSAIDs and paracetamol is important, to minimize the use of intravenous opioids, leaving their use for rescues of intense uncontrolled pain.[3] The postoperative use of gabapentin, NMDA blockers such as ketamine, as well as high doses of opioids is not recommended. In some cases, in which epidural analgesic techniques are not available in open surgery, the use of lidocaine in continuous infusion in the first 24 hours or the use of interfacial blocks such as TAP or quadratus lumbar can be considered.[4-7]

120. The use of epidural analgesia is recommended during the first 24–48 h after surgery as is its withdrawal after this initial period of pain control, reducing the concentrations of local anaesthetics with epidural opioids to reduce motor block and allow wandering.

High level of evidence. Strong recommendation.

121. The use of paracetamol and NSAIDs is recommended for postoperative pain control with opioid rescues in severe uncontrolled pain with epidural analgesia or other local or regional analgesia techniques.

High level of evidence. Strong recommendation.

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Early postoperative feeding

INTRODUCTION

Traditionally, it has been common practice to not feed patients postoperatively until they have a bowel movement or gas transit. Early oral feeding does not alter the healing of the sutures in the colon or rectum, and shortens the hospital stay, as reported in a Cochrane systematic review. More recent meta-analyses show apparent benefits in relation to postoperative recovery and the incidence of infections. A meta-analysis of 15 studies (8 of them RCTs), with 2,112 patients undergoing upper gastrointestinal surgery, showed a significantly shorter hospital stay, with no differences in complications[1].

The amount of the initial oral intake must be adapted to the state of gastrointestinal function and individual tolerance[2].

Overall, there is good evidence of the benefits and tolerance of early feeding in the postoperative period of colorectal surgery. The benefits are less clear in older patients with upper gastrointestinal and pancreatic surgery. There are no controlled data in patients with oesophageal resection.

122. Early postoperative feeding should be started as soon as possible, within hours after surgery in most patients.

Moderate level of evidence (in colorectal surgery). Strong recommendation.

REFERENCES

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Early mobilisation

INTRODUCTION

Bed rest decreases muscle strength and increases insulin resistance and the risk of pulmonary and thromboembolic complications. The evidence is limited regarding the benefit of early mobilisation interventions after surgery.[1,2] Although mobilisation is associated with shorter hospital stays, few studies have investigated the impact of specific strategies

to increase mobilisation compared to allowing early wandering[3]. There is great variability in the different protocols to implement early mobilisation, from some mobilisation at 24 hours to 8 hours per day postoperatively[4]. Failure of early mobilisation may be due to factors such as inadequate pain control, intravenous fluid intake, use of tubes and drains, patient motivation and pre-existing comorbidities[5]. Early mobilisation should be encouraged, but the allocation of additional resources to implement it beyond integration into multimodal enhanced recovery protocols has not shown benefits[6].

123. Early mobilisation through education and patient encouragement is recommended to reduce the number of adverse effects

Moderate level of evidence. Strong recommendation.

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Respiratory physiotherapy

INTRODUCTION

Performing respiratory exercises in the preoperative period leads to a reduction in respiratory complications in the postoperative period.[1] Incentive spirometry and training of the respiratory muscles are the most studied techniques. Incentive spirometry in abdominal surgery, although it seems to have a positive impact on lung function and diaphragm excursion during the immediate postoperative period, has not shown any benefits in the prevention of postoperative complications.[2] Selective training of the inspiratory muscles has been shown to reduce the risk of postoperative pulmonary complications and hospital stay.[3,4] Pre-surgery educational sessions and training courses given by a physiotherapist, aimed at instructing the patient in the performance of respiratory physiotherapy techniques and in making them aware of the importance of their link with the postoperative period, have been shown to impact post-operative morbidity in abdominal surgery, with a decrease of post-operative pulmonary complications[5]. It is necessary to combine physiotherapy with other interventions such as exercise and health education as well as habit modification. Interventions must be individualised

124. Preoperative and postoperative respiratory physiotherapy is recommended.

High level of evidence. Strong recommendation.

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Management of postoperative anemia

INTRODUCTION

Despite being common practice, evidence shows that treatment with oral iron in anaemic, non-iron deficient patients prior to surgery is not more effective, nor is it better tolerated, than placebo for the treatment of post-operative anemia[1-4].

125. Oral administration of iron salts is not recommended in the immediate postoperative period to improve the haemoglobin level and decrease the transfusion rate.

Moderate level of evidence. Strong recommendation.

126 Instead, postoperative treatment with FEEV is suggested to improve haemoglobin levels and reduce the transfusion rate, especially in patients with low iron storage and / or moderate–severe post-bleeding anaemia.

Moderate level of evidence. Strong recommendation.

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TRANSFUSION

Application of "restrictive" transfusion criteria

INTRODUCTION

There is a general consensus (both nationally and internationally) in recommending the application of “restrictive” transfusion criteria versus “liberal” criteria in the majority of haemodynamically stable patients: surgical (undergoing orthopaedic and cardiovascular surgery) [1,2,3,4,5,6,7,8,9,10,11,12,13], critical (trauma, septic and paediatric) [1,2,4,5,6,7,8], postpartum[14] and even in patients with gastrointestinal bleeding[15] (after upper gastrointestinal bleeding, stable and with low risk of recurrence).

These “restrictive” criteria consist of the unitary (“one at a time”) administration of concentrated red blood cells, with reassessment after each transfused unit in the event of symptoms or signs of hypoxia or anaemia, or maintaining the haemoglobin concentration above 7 g / dL in critically ill patients[1,2,3,4,5,6,7,8]; above 7.5 g / dL in cardiovascular surgery patients[9,10,11]; or above 8 g / dL in the case of cardiovascular risk factors[2,3,5,6,7,12,13].

SEHH recommends “not to transfuse a greater number of packed red blood cells than needed to relieve symptoms of anaemia or to return a patient to a safe haemoglobin range (7 to 8 g / dl in stable non-cardiac patients).”[3]

SEMICYUC recommends that "red blood cell concentrates should not be transfused in hemodynamically stable, non-bleeding critical patients, without cardiological and / or central nervous system involvement with a haemoglobin concentration greater than 7 g / dl."[4]

127. The application of “restrictive” criteria for the transfusion of packed red blood cells (HC) is recommended (if symptoms or Hb level <70 g / L), in most hospitalised patients (medical, surgical, or critical), without active bleeding and who are haemodynamically stable (including septic, upper gastrointestinal bleeding and postpartum anaemia).

High level of evidence. Strong recommendation.

128. The application of “restrictive” criteria for CH transfusion (Hb ≤75 g / L) is recommended in cardiac surgery patients

Moderate level of evidence. Strong recommendation.

129. The application of restrictive criteria for CH transfusion (Hb <80 g / L) is recommended in patients with a history of cardiovascular disease who underwent orthopaedic surgery or hip fracture repair surgery.

Moderate level of evidence. Strong recommendation.

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Recommendations for postoperative wound management

INTRODUCTION

Whether a primary closure, a delayed closure or a closure by second intention has been carried out, the keys to surgical wound care are adequate cleaning, management of the exudate, and the prevention of associated complications, such as SSI, dehiscence and pain.

There are multiple solutions for washing and cleaning wounds and little evidence of their use. For cleaning, the use of a physiological solution is recommended as it is an isotonic solution and does not interfere with the normal healing process[1]. Drinking water or distilled water can also be used to clean wounds.

130. Clean the surgical wound with sterile isotonic saline, drinking water or distilled water.

Moderate level of evidence. Strong recommendation.

Surgical wounds with primary closure

INTRODUCTION

Some studies indicate that topical antibiotics applied to primary healing surgical wounds probably reduce the risk of SSI relative to no antibiotics and relative to topical antiseptics. Skin adverse effects and pain should be considered.[2]

131. Topical antibiotics can be applied to primary closure surgical wounds after surgery to prevent surgical site infection.

Low level of evidence. Weak recommendation.

In general, it is recommended to manipulate the surgical wound as little as possible. Currently, there are no conclusive studies on the use of dressings which indicate that covering surgical wounds with primary intention healing reduces the risk of SSI or that any wound dressing is more effective than another in reducing SSI rates, or improving scarring or pain [3]. In wounds with closure by primary intention, whenever possible, the dressing should not be lifted for the first 24–48 hours[4].

132. In wounds with closure by primary intention, whenever possible, it is recommended not to lift the dressing during the first 24–48 hours.

Low level of evidence. Weak recommendation.

The application of a dressing connected to a vacuum pump, known as negative pressure wound therapy (NPWT), can reduce the rate of SSI compared to standard wound dressings, according to some low-certainty studies that are predominantly small. There is still greater uncertainty about whether NPWT, compared to standard dressings, reduces most complications associated with surgical incisions, including mortality.[5]

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Open surgical wounds

INTRODUCTION

In these surgical wounds, the extension, depth, volume of exudate and risk of infection pose a challenge in their management.

Although the loss of the skin continuity solution facilitates the access of microorganisms to the body, there is no solid evidence evaluated to date on the relative effectiveness of antiseptics, antibiotics, and antibacterial products for use in open surgical wounds.[6]

NPWT is the most common alternative for secondary intention surgical wound management.[7] Some small studies have shown the beneficial effect of NPWT in reducing post-sternotomy mediastinitis and sternal wound infection.[8] Some small randomised clinical trials indicate a shorter healing time in the use of NPWT versus alginate and silicone dressings, without being conclusive due to the sample size.[9]

133. The use of NPWT can reduce the risk of surgical site infection and shorten healing in open surgical wounds, mainly in abdominal or thoracic surgeries.

Low level of evidence. Weak recommendation.

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Recommendations at discharge

INTRODUCTION

The discharge and follow-up of patients must be planned and agreed upon, considering patients and caregivers, especially in elderly or dependent patients. The instructions to each patient about their care should be personalised. Upon discharge, it must be ensured that the patient has understood the care he should receive and the follow-up to which he will be subjected. The use of standardised information documents improves patients' understanding of the information received at discharge.

The patient must be discharged with the appointments for follow-up including those corresponding to other services.

Personalised discharge recommendations influence the mean stay and readmissions. Adequate, understandable, and complete discharge information improves patient satisfaction.

Support therapy at discharge is recommended: physical therapy or physical exercise, stomata care and diet.

A telephone follow-up is also recommended within the first 24 hours. The extension of the telephone follow-up can be important for some pathologies.

134. Patients and their caregivers should receive personalised, understandable, and complete information upon discharge. Planning discharge and providing adequate information on post-discharge care influences the mean stay and readmissions.

High level of evidence. Strong recommendation.

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Audits

INTRODUCTION

The results of a study in which a visual tool was used with the audit data of the different professionals, improved adherence to intraoperative AP; temperature control; goal-guided intravenous fluid therapy; prophylaxis of postoperative nausea and vomiting and postoperative fluid restriction[1].

135. Audits of intensified recovery procedures are recommended to assess clinical adequacy and effectiveness.

Moderate level of evidence. Strong recommendation.

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7.2 SPECIFIC (BY SPECIALTIES)

7.2.1 ESOPHAGEAL SURGERY

1. Drains

Cervical Drainage

The use of cervical drainage after esophagectomy has not been proved to reduce local complications in the wound, such as hematoma or seroma[1]. Furthermore, there is no evidence that suggests that its use reduces the risk of anastomotic dehiscence[1]; thus, it is not recommended as a routine as it does not provide significant benefits.

1. Cervical drains after esophagectomy have no proven advantages over not using them, so they are not recommended as a routine.

Moderate level of evidence. Strong recommendation.

REFERENCES

1. Choi HK, Law S, Chu KM, Wong J. The value of neck drain in esophageal surgery: a randomized trial. Dis Esophagus. 2017:11:40-2.

Thoracic drains

The currently available evidence to demonstrate the benefit of using chest drains after esophagectomy is extremely limited, and a solid connection cannot be established[1]. This is despite the fact most of the published guidelines and clinical pathways include them amongst their recommendations as they can prevent pulmonary compression and be used as a guide to monitor the presence of bleeding and/or leaks (air, chylous or anastomotic). However, using them causes more pain which results in worse ventilation and mobility[2].

2. The use of thoracic drains after esophagectomy is recommended, although it is advisable to reduce the number of drains and the time they remain (a single drain may be sufficient), if there is no air, anastomotic or chylothorax leak.

Low level of evidence. Strong recommendation.

REFERENCES

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2. De Pasqual CA, Weindelmayer J, Laiti S, La Mendola R, Bencivenga M, Alberti L, et al. Perianastomotic drainage in Ivor-Lewis esophagectomy, does habit affect utility? An 11-year single-center experience. Updates Surg. 2020;72:47-53.

Extrapolated evidence from lung resection surgery supports the use of a single chest drain[1,2], with the same morbidity, but a considerable reduction in postoperative pain, cost and hospital stay compared to the placement of a greater number of drains[3,4]. Furthermore, it appears that the use of passive drains is just as effective as active ones[5].

3. The placement of a single chest drain is recommended over several as it seems just as effective, but cheaper and less painful.

Moderate level of evidence (extrapolated). Strong recommendation.

4. The use of a passive drain (without continuous suction or aspiration) is recommended, as it is just as effective as an active one.

Low level of evidence. Strong recommendation.

REFERENCES

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There are randomised controlled trials demonstrating that early removal of a chest drain, even with outputs of 200–300 ml / 24 hours without any leaks, (air, anastomotic, or chylous), is safe and could improve postoperative comfort and reduce hospital stay[1-4].

5. Removal of the thoracic drain is recommended if the output is less than or equal to 200–300 ml / 24 h and there is no leakage of intestinal material or air or chylous leakage.

Moderate level of evidence. Strong recommendation.

REFERENCES

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Abdominal Drains

The use of abdominal drains after a gastrectomy does not offer benefits compared to not using them[1-3].

6. Following esophagectomy, using abdominal drains as a routine is not recommended.

High level of evidence. Strong recommendation.

REFERENCES

1. Wang Z, Chen J, Su K, Dong Z. Abdominal drainage versus no drainage post-gastrectomy for gastric cancer (Review). Cochrane Database Syst Rev. 2015;5:CD008788.

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2. Route of administration and postoperative initiation of nutrition in esophagectomy.

ENTERAL FEEDING AND USE OF NUTRITION PROBES

The oral and enteral routes should be chosen over parenteral nutrition in patients with oesophageal neoplasms that require nutritional supplements as they are the most physiological routes and are related to a better nutritional intake and fewer complications[1,2]. Despite the recommendation to place a jejunostomy catheter or nasojejunal or nasoduodenal tube to provide nutritional support in patients with limited oral intake, these types of techniques are not exempt from morbidity and mortality and considerable repositioning rates[3]. Currently, there is no evidence in favour of any specific type of catheter to be used for the administration of adequate nutritional preparations in this type of patients[4,5].

Jejunostomy placement is associated with a mortality rate of 0–0.5% and a reoperation rate of 0–2.9%. However, minor complications are more frequent, such as infection at the skin entrance (0.4–16%), leaks (1.4–25%) and gastrointestinal discomfort (10–39%). The use of the nasojejunal tube entails fewer complications but is accompanied by greater discomfort and a dislocation rate that ranges between 20% and 35%.

7. In the preoperative management of patients with dysphagia or aphagia who are undergoing esophagectomy, the use of enteral nutrition through a feeding tube is recommended in those cases with a high risk of malnutrition and an inability to achieve an adequate oral intake to meet nutritional requirements.

Moderate level of evidence. Strong recommendation.

8. After an esophagectomy, it is recommended that the nutritional requirements by oral and / or enteral route are met between the third and sixth postoperative day. The use of enteral nutrition tubes should be carried out selectively in patients at risk or with nutritional requirements that cannot be covered by oral intake.

Moderate level of evidence. Strong recommendation.

9. If necessary, jejunostomy, nasojejunal or nasoduodenal tubes can be used with the same effectiveness as current evidence does not allow a specific route of administration of enteral nutrition to be recommended.

Moderate level of evidence. Strong recommendation.

REFERENCES

1. Liu K, Ji S, Xu Y, Diao Q, Shao C, Luo J, et al. Safety, feasibility, and effect of an enhanced nutritional support pathway including extended preoperative and home enteral nutrition in patients undergoing enhanced recovery after esophagectomy: a pilot randomized clinical trial. Dis Esophagus. 2020;33:doz030.
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6. Zheng T, Zhang Y, Zhu S, Ni Z, You Q, Sun X, et al. A prospective randomized trial comparing jejunostomy and nasogastric feeding in minimally invasive McKeown esophagectomy. J Gastrointest Surg. 2020;24(10):2187-96.

Early postoperative oral / enteral nutrition

The early initiation of enteral feeding during the postoperative period of esophagectomy has been proven to be safe[1,2], favouring functional intestinal recovery and reducing hospital stay[3,4].

10. The early start (in the first 24 hours) of enteral nutrition after esophagectomy is recommended as it is safe and facilitates postoperative recovery.

Moderate level of evidence. Strong recommendation.

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Early initiation of oral feeding after esophagectomy seems safe and feasible. Some randomised controlled trials show that an early oral diet (in the first 24 hours) after esophagectomy does not increase the percentage of postoperative complications[1-5]. However, in the current literature there is controversy about the effectiveness and safety of its use compared to later initiation in relation to the percentage of anastomotic dehiscence.

Other routes of enteral feeding could be considered and used in combination with the oral route to guarantee correct nutritional support during the postoperative period of an esophagectomy.

11. The most appropriate route for administering enteral feeding during the early postoperative period of esophagectomy is not clearly defined. In this regard, the early initiation of tolerance by the oral route appears to be effective and safe without increasing the number of major postoperative complications.

Low level of evidence. Weak recommendation.

REFERENCES

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3. Use of a decompressive NG tube

Traditionally, the use of an NG tube has been considered mandatory after esophagectomy to decompress the plasty, avoid its dilation, reduce anastomotic tension, and avoid vomiting, pain and possible aspirations.

However, there are conflicting data in the literature regarding its use and the risk of anastomotic and respiratory complications. Therefore, some studies do not recommend its use routinely as clear benefits have not been demonstrated in terms of reducing complications and causing a delay in the onset of oral tolerance, lengthening hospital stay[1,2]. A recent meta-analysis concluded that immediate or early removal of the NG tube does not increase the number of anastomotic dehiscence, pulmonary complications or postoperative mortality, thus reducing hospital stay[3]. Early removal after placement seems safe and improves patient comfort, accelerating oral tolerance[4,5].

12. Even though the evidence based on more recent studies questions its use in a systematic manner, the use of an NG tube is currently recommended after esophagectomy.

Low level of evidence. Weak recommendation.

13. If it is placed, its early removal should be considered in the first 48 post-operative hours, which reduces post-operative fasting time and hospital stay, and improves patient comfort.

Moderate level of evidence. Strong recommendation.

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4. Admission to Intensive Care Unit or Resuscitation

Conventional postoperative management after esophagectomy involved admission as a routine in a post-anesthesia recovery unit (PAR) or Intensive Care Unit (ICU). With the availability of better pain control, minimally invasive approaches and early extubating, among other measures, postoperative management of patients undergoing esophagectomy in Intermediate Care Units[1] is possible, without the need for admission in a PAR or ICU, which has been shown to reduce hospital stay, with no differences in morbidity and mortality or in the readmission rate[2,3].

14. Postoperative management of patients undergoing esophagectomy should be individualized and does not routinely require admission to the Intensive Care or Recovery Unit. The availability of an Intermediate Care Unit is a safe alternative for low-risk patients.

Moderate level of evidence. Strong recommendation.

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7.2.2 CARDIOVASCULAR SURGERY

Preoperative measurement of hemoglobin a1c

Hyperglycemia in hospitalised surgical patients is associated with increased morbidity and mortality, so it must be avoided[1].

Elevated haemoglobin A1c (HbA1c) levels correlate with poor glycaemic control; therefore, they increase the risk of the patient presenting hyperglycaemia upon admission. Optimal HbA1c2 levels were defined as <7% in a consensus document of the American and European Diabetes Associations. It has been shown that the higher the HbA1c level, the higher the incidence of deep sternal wound infection, ischemic problems and other complications[3,4].

Known nondiabetic patients with elevated HbA1c levels have also been shown to have a higher risk of postoperative mortality[5].

Therefore, it is advisable to monitor HbA1c levels in all patients who undergo cardiac surgery.

Except in urgent surgery, with values > 9% (which indicates the recurrence of severe hyperglycaemia) or < 5% (which indicates the recurrence of severe hypoglycaemia), the intervention should be delayed[6].

1. A preoperative control of HbA1c levels is recommended in all patients who undergo cardiac surgery to stratify the surgical risk.

Moderate level of evidence. Strong recommendation.

2. When the preoperative HbA1c determination is <5% or > 9%, it is suggested to postpone the intervention, except if urgent surgery is necessary, until adequate glycaemic control is achieved.

Low level of evidence. Weak recommendation.

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Nasal decolonization of staphylococcus aureus

Staphylococcus aureus is the germ responsible for most surgical site and prosthetic infectious complications after cardiac surgery. Between 18 and 30% of patients undergoing this type of surgery have nasal colonization, which implies a risk up to 3 times greater of presenting bacteremia or surgical wound infections by S. aureus.

It is widely established that a decolonization of carriers must be carried out[1,2]. There is the possibility of screening them by culture or PCR techniques and subsequently performing a selective treatment of patients with positive results[3], however, the current evidence points to universal decolonization for practical, logistical or cost-effectiveness reasons, although they warn that it may lead to the appearance of antibiotic resistance[4,5].

Decolonizing treatment should include intranasal mupirocin as a topical antibiotic[6,7], but always within a package of actions together with hygiene education and daily showers with antiseptics such as chlorhexidine. It should be done for 5 days before the intervention.

3. Decolonization of known nasal carriers of Staphylococcus aureus is recommended in the preoperative period of cardiac surgery.

High level of evidence. Strong recommendation.

4. Universal decolonisation is recommended for patients undergoing cardiac surgery.

   Moderate level of evidence. Strong recommendation.

5. It is recommended that the decolonisation treatment be performed with intranasal mupirocin and within a package of measures..

   High level of evidence. Strong recommendation.

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Antifibrinolytic drugs in cardiac surgery

Bleeding during the perioperative period of cardiac surgery is a common complication, and its appearance can worsen the results[1].

Antifibrinolytic drugs, such as tranexamic acid and Ɛ-aminocaproic acid, are of adequate availability, low risk profile, high profitability and easy implantation[2-4], so they are widely used in routine practice. Their use is recommended from the beginning of the intervention to prevent hyperfibrinolysis that occurs during the procedure. The greatest evidence is present in surgeries with extracorporeal circulation (ECC).

Tranexamic acid has been shown to reduce bleeding, the need for reoperation and transfusion requirements[5,6].

The dosage of these drugs is not yet fully established. High doses, without providing benefit, seem to be associated with seizures as a side effect; therefore, the maximum recommended dose is 100 mg / kg and this requires adjustment in patients with renal failure[7].

6. To obtain an antifibrinolytic effect, it is recommended to use tranexamic acid or epsilon aminocaproic acid during cardiac surgery procedures with ECC.

   High level of evidence. Strong recommendation.

7. The use of tranexamic acid is recommended as it is associated with a decrease in bleeding, transfusion and the need for reoperation.

   Moderate level of evidence. Strong recommendation.

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Thoracic drains

After cardiac surgery, it is always necessary to leave some type of drainage that allows for evacuation of bleeding given that it always occurs in a smaller or greater quantity; otherwise, its accumulation could lead to haemothorax or cardiac tamponade, entities with an incidence from 2 to 19% [1,2], and which carry a worse prognosis.

However, drainage tubes tend to coagulate in clinical practice; this occurs 36% of the time with some degree of obstruction due to internal coagulation[3].

8. Maintaining the patency of the thoracic drains is recommended to avoid major complications such as cardiac tamponade or haemothorax.

Moderate level of evidence. Strong recommendation.

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To ensure the permeability of the tubes, there are several techniques to break up the clots and facilitate their exit which can be performed at the bedside by nursing staff, such as milking, creating negative pressure by occlusion near the patient and emptying the tube towards the collector (stripping), or compressing several segments of the tube folded on itself ("fan folding"). None of these manoeuvres have been shown to be useful in multiple studies and reviews, and they could even cause internal damage due to the increase in negative pressure[1-4]; therefore, they should not be performed.

Some also disconnect the tubes and pass a catheter inside to clean them[5], which breaks the sterile field; the inserted probe itself can cause damage to internal structures, so this manoeuvre should not be performed either.

The current recommendation, in the case of using classic or grooved drains, is to leave the tube in a horizontal position on the patient's bed and then vertically to the collecting system, not perform manoeuvres that break the sterile field and, only if essential, perform gentle compressions of the tube ("milking" or "fan folding") [2].

9. Performing manoeuvres that break the sterile field of the drains is not recommended as that may cause negative intrathoracic hyper pressure, both because they have not demonstrated efficacy and because of the possible complications that they may cause.

High level of evidence. Strong recommendation.

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There are three main types of drains: conventional, grooved or Blake® type and active cleaning.

Among the first two types of drainage, results of studies show no differences between them, so that any of them can have the same utility[1,2]. Finally, a type of drainage with active cleaning has been developed. Studies that analyse this new technology provide encouraging results, although these are not fully conclusive[3-6]. Therefore, the use of active cleaning drains can be considered with the intention of reducing the complications of tamponade or haemothorax due to coagulation of the drains.

10. The use of active cleaning drains is suggested to reduce complications such as cardiac tamponade or haemothorax.

Moderate level of evidence. Weak recommendation

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Optimization of sternal closure

Median sternotomy is the most common approach in cardiac surgery. The most usual and widespread closure is by means of cerclage with steel wires due to the ease of use, speed, low cost and a relatively low rate of complications.

The closure of preference is with 6 simple wires, but there is some evidence that at least 8 wires should be used, and if the sternum is osteoporotic, it is better with crossed wires[1-3].

11. If the sternal closure is performed with wires, it is suggested to use at least 8 wires and / or crossed wires.

Low level of evidence. Weak recommendation.

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The use of parasternal longitudinal reinforcing wires (Robicsek) has not shown a clear advantage in high-risk patients[1,2].

The natural extension of principles in bone stabilisation learned elsewhere in the human body leads to the use of rigid fixation systems by means of titanium plates screwed to the sternum and / or ribs. The evidence points to a better and faster healing of the sternum, which entails a reduction in pain, allows the early recovery of the patient and shortens the hospital stay[3-5]. Its use is especially indicated in high-risk patients because it reduces complications and mortality[6].

12. Sternal fixation with titanium plates enables better sternal healing, a reduction in postoperative pain and a shorter hospital stay. Its use is suggested in high-risk patients, in whom mortality and complications are also reduced.

Moderate level of evidence. Weak recommendation

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Prevention of hypothermia in the immediate postoperative period

General anaesthesia produces an alteration in the regulation of body temperature, producing a decrease between 1 and 2 ° C during the first hour, further dropping to 3.5ºC if no measures are taken after the third hour of anesthesia[1]. Furthermore, the skin being

exposed for prolonged periods, the infusion of large volumes of intravenous fluids and the irrigation of the surgical field favours this situation.

We define postoperative hypothermia as the impossibility of maintaining normothermia (≥36 ° C) after 2 to 5 hours of admission to the Critical Unit[1,2].

Complications related to perioperative hypothermia include the appearance of coagulopathy associated with greater transfusion needs, an increase in the surgical wound infection rate, delayed drug metabolism, slower and longer recovery, chills and thermal discomfort, all of which leads to longer hospital stays and increased mortality[3,4].

The prevention of hypothermia should be carried out using warm air blankets, the infusion of warm intravenous fluids at 37 °C[5] and the elevation of the room temperature in the immediate postoperative period[6-8]. Once normothermia has been reached, the previous measures will be withdrawn and the monitoring of body temperature will continue.

13. We recommend the use of warm air blankets, the infusion of warm intravenous fluids and raising the room temperature to avoid sustained hypothermia (<36 ° C) after ECC and in the early postoperative period.

    Moderate level of evidence. Strong recommendation.

14. We recommend monitoring body temperature upon arrival of the patient to the Critical Care Unit.

    High level of evidence. Strong recommendation.

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Biomarkers and Prevention Strategies for Acute Kidney Damage

Acute kidney injury (AKI) associated with cardiac surgery is a complication that appears, depending on the procedure and its definition, in 22–36% of patients[1-4]. Its appearance entails an increase in morbidity and mortality and a significant impact on total healthcare spending[3].

The classic definitions of kidney injury RIFLE (R-renal risk, I-injury, F-failure, L-loss of kidney function, E-end-stage renal disease) [5], AKIN (Acute Kidney Injury Network) [6] and KDIGO (Kidney Disease: Improving Global Outcomes) [7] use increased creatinine, being able to delay its detection between 24 and 72 hours compared to new biomarkers such as tissue inhibitor of metalloprotease-2 (IGFBP7), insulin-like growth factor binding protein 7 (TIMP-2) and lipocalin associated with neutrophil gelatinase (NGAL) [8,9].

15. We suggest the determination of biomarkers for the early identification of AKI in patients at risk to guide an early intervention strategy with the aim of reducing AKI.

Moderate level of evidence. Weak recommendation

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To reduce the incidence of AKI throughout the perioperative period, it is necessary to avoid intravascular volume depletion, optimise cardiac output with strict monitoring, avoid administering nephrotoxic drugs, and

avoid blood glucose levels > 180 mg/dl, and large fluctuations through the control and early administration of insulin[1]. During ECC, ultrafiltration with zero balance should be used in patients with glomerular filtration <60 ml/min[2]; in addition, DO2> 300 ml and O2/min/m2 should be maintained and the administration of vasopressors should be avoided or reduced if the patient has a mean blood pressure >70 mmHg3.

The PREVaki[4] trial describes a series of measures (KDIGO CT surgery bundle) consisting of: avoiding nephrotoxic agents, the interruption of ACE inhibitors and ARBs in the first 48 hours after surgery, the close monitoring of Cr and urinary output, avoiding hyperglycaemia (> 180 mg / dl) during the first 72 hours after surgery, considering alternatives to contrast in radiodiagnosis, and monitoring with a PICCO® catheter or similar with an optimisation of intravascular volume and haemodynamic parameters according to a specific algorithm. This algorithm included a cardiac index >3 ml/min as a hemodynamic objective; consequently, a greater use of dobutamine (9% vs 31%) was observed in the intervention group, with a lower prevalence of AKI. The application of these measures allows, therefore, for the frequency and severity of AKI to be reduced after cardiac surgery.

In the case of a KDIGO stage 2 AKI diagnosis (diuresis <0.5 ml / Kg / h for more than 12 hours or Cr twice the baseline), early initiation (in less than 8 hours) of renal replacement therapy has been shown to improve the results[6].

16. We recommend the application of the package of renal protection measures of the PREVaki protocol to prevent AKI associated with cardiac surgery.

Moderate level of evidence. Strong recommendation.

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Delirium prevention and early detection

Delirium is a clinical syndrome consisting of an alteration of consciousness, associated with a deficit of attention and perception with disorganised thinking, which can lead to a global cognitive disorder. It appears – depending on the age group – in between 11.5 and 80% of patients who undergo cardiac surgery[1-3].

It increases postoperative complications, the duration of mechanical ventilation, morbidity and mortality, and has been associated with long-term cognitive changes[4,5].

It is multifactorial (pain, hypoxemia, low output, sepsis); therefore, it requires an interdisciplinary team approach for prevention, diagnosis, risk stratification and treatment. Early detection is essential to determine the underlying cause and begin appropriate treatment[6].

The most widely used current prediction scales are the "Confusion Assessment Method", or CAM–ICU, and the "Intensive Care Delirium Screening Checklist", or ICDSC7. The ICDSC is validated by the DSM-IV-TR for the evaluation of delirium, and is the scale that currently presents a higher specificality and positive predictive value, making it a useful tool for its correct identification[2].

17. Systematic systematic detection of delirium using validated scales (ICDSC) is recommended in the postoperative period of cardiac surgery at least once per nursing shift for early detection.

Moderate level of evidence. Strong recommendation.

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The prevention of delirium through non-pharmacological strategies such as early mobilisation, pain management, minimisation and targeted titration of sedation, avoiding the use of

benzodiazepines, the reorientation of the patient, cognitive stimulation, the reduction of hearing and / or visual impairment (for example, allowing the use of devices such as hearing aids or glasses), the use of clocks / calendars, and the promotion of the normal circadian sleep-wake pattern have shown promising results[1,2].

Pharmacological prevention with haloperidol or ketamine has not shown clinical benefits in large-scale clinical trials[3,4]. Evidence suggests that the use of atypical antipsychotics, haloperidol or a statin does not affect the duration of delirium or its related morbidity[5]. There are encouraging data on the use of alpha-2 adrenergic agonists, such as dexmedetomidine, to prevent its appearance[1].

18. If there are risk factors for the development of postoperative delirium or if its appearance is detected, it is recommended to administer dexmedetomidine at low doses (0.2 µg / kg / h).

Moderate level of evidence. Strong recommendation.

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Duration of antibiotic prophylaxis

After the intervention, AP should be administered during the first 24–48 hours after surgery. It should not be prolonged more than 48 hours to avoid the risk of antibiotic resistance or infection by Clostridium difficile[1-4]. It is never justified to link the duration of prophylaxis to the remaining of catheters, tubes or chest drains[3].

19. In the immediate postoperative period of cardiac surgery, AP is recommended for the first 24–48 hours.

Moderate level of evidence. Strong recommendation.

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7.2.2 TORATHIC SURGERY

Management of chest drainage tubes and aspiration after major lung resection

INTRODUCTION

The management of pleural drainage tubes (PDT) influences their duration, hospital stay, health costs, intensity of postoperative pain and respiratory function[1]. For this reason, they represent one of the cornerstones on which IRPs in thoracic surgery are based.

Study has shown that when PDTs are removed with a serum-hematic output below 450 mL/day after thoracotomy, readmissions for recurrent pleural effusion are 0.55%, whereas with a threshold of 500mL/day, the incidence is 2.8% [2].

Currently, the use of a single PDT is recommended, instead of two, as it decreases the intensity of pain and shortens the duration of PDT[3] without compromising patient safety if there is no significant risk of bleeding or a residual space problem is anticipated.

The use of digital systems to measure air leakage allows objective decisions to be made of when to remove the PDT; they are also easily transportable by the patient and have their own suction system, which facilitates the mobilisation of the patient in the first post-operative days. The routine implementation of digital systems implies an increase in costs, and there are discrepancies between the studies regarding the improvement of the results (reduction in hospital stay and the duration of postoperative PDT) [4].

1. It is considered safe to remove the pleural drainage with a daily serum-hematic output of up to 450 ml.

   Moderate level of evidence. Strong recommendation.

2. The use of a single pleural drain after a standard regulated lung resection attenuates the intensity of postoperative pain without negatively affecting clinical safety.

   Moderate level of evidence. Strong recommendation.

3. The use of digital systems is suggested to shorten the time of the PDT and the hospital stay.

   Low level of evidence. Weak recommendation.

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Prophylaxis of post-thoracotomy postoperative atrial fibrillation (AF)

Thoracic surgery is associated with a high incidence of this form of arrhythmia, reaching 24% with an OR of 9.2 (95% CI 6.7–13) compared to other non-cardiac surgeries[1]. Furthermore, the risk is increased in major resections (pneumonectomies) compared to lobectomies or wedge lung resections [2].

The preoperative administration of amiodarone, calcium channel blockers, colchicine, statins or magnesium may be effective in reducing the risk of atrial fibrillation (AF) in the postoperative period of thoracic surgery, but at the present time, there is insufficient information to determine in what type of patients the benefits would outweigh the risks of implementing this preoperative prophylactic measure in thoracic surgery[3,4].

Beta adrenergic receptor blocking drugs (beta-blockers) are also effective in preventing AF in thoracic surgery, but there are doubts about this strategy due to the side effects of bronchospasm and hypotension. However, there is a consensus that in patients who were previously under treatment with beta-blockers, they should not be suspended before the intervention as a rebound phenomenon can be triggered, increasing the incidence of arrhythmias and hypertension; therefore, it is recommended to continue administering them during the perioperative period.

4. Prophylactic administration of beta-blockers, magnesium, amiodarone, calcium antagonists, statins or colchicine reduces the probability of developing postoperative AF.

   Moderate level of evidence. Weak recommendation.

5. It is suggested to replace magnesium intravenously when the levels are low.

   Low level of evidence. Weak recommendation.

6. It is recommended to continue administering beta-blockers if the patient is being treated with them previously.

   High level of evidence. Strong recommendation.

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Thoracic cavity approach

Minimally invasive thoracic surgery has significantly reduced the pain and perioperative morbidity associated with conventional thoracotomy surgery[1]. Several meta-analyses have shown that the VATS approach is better than thoracotomy in reducing the intensity of postoperative pain, perioperative complications, hospital stay, duration of chest drains and quality of life[2,3,4].

In cases where VATS is not performed, to minimise aggression, thoracotomy without muscle section – muscle sparing – has been advised and protection of the intercostal nerves, management of the rib separator and rib closure or re-approximation or intracostal sutures has been recommended as these techniques reduce post-thoracotomy pain[5,6,7].

7. The thoracoscopic approach for the treatment of early-stage, non-small cell lung cancer is preferable to the classical thoracotomy.

High level of evidence. Strong recommendation.

4. A thoracotomy without muscle section is recommended in cases where the VATS approach is not feasible.

Moderate level of evidence. Strong recommendation.

8. In these cases, it is recommended to add intercostal nerve preservation techniques including intercostal muscle flaps and intracostal sutures.

Moderate level of evidence. Strong recommendation.

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7.2.3 BURNS

Preoperative and postoperative rehabilitation

INTRODUCTION

Rehabilitation in the burn patient should begin early, progressively and with no interruptions[1]. Its planning and execution must begin simultaneous to the initial assessment of the patient and must be individualised as the objectives of the rehabilitative treatment will vary throughout the evolution of the injuries[2].

In various studies, better functional outcomes have been reported in the groups that received intensive rehabilitation protocols, which included active, passive and postural therapy applied from the onset of the burn in selected cases susceptible to the development of scar contractions (deep burns, involvement of joint areas and face)[1-6].

1. In patients who suffer burns, especially in cases of deep burns that affect joint areas or the face, rehabilitation should begin from the initial moment of the burn, limiting postoperative immobilisation periods.

Moderate level of evidence. Strong recommendation.

REFERENCES

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Management of skin graft donor areas

There is a wide variety of dressings available for use in partial skin graft donor sites[1]. In these areas, spontaneous epithelialisation is expected in most

cases[1]. Dressings that induce a humid environment in the healing bed of these wounds are the most effective as they promote and accelerate the healing of graft donor areas.[1-4]

Within these, hydrocolloid dressings are the first choice for cure, given the low rate of associated infection they present, the rapid epithelialisation and the reduction of pain (measured according to the Visual Analogue Scale)[2-4].

2. Hydrocolloid dressings are the first choice for healing partial skin graft sites, given the expected spontaneous epithelialisation, the low infection rates associated with their use, and the lower patient-referred pain compared to other commonly used dressings.

Moderate level of evidence. Strong recommendation.

REFERENCES

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Nutrition start

Burns are a type of trauma characterised by the early development of a severe hypermetabolic response[1]. This response leads to the massive and accelerated consumption of macro and micronutrients, which promote and maintain the inflammatory response syndrome and the metabolic alterations that cause burns[2]. The resulting acute malnutrition also increases the risk of infection[2]. Infection is the first cause of death in the severely burned patient (one with more than 20% of the burned body surface) and induces a delay in healing[3]. In fact, a relationship has been established between the total caloric and protein deficit and the probability of survival. The surgical interventions required in these patients also increase the risk of malnutrition[1-3].

For this reason, and due to the benefits of the early restart of feeding after surgery (maintenance of the intestinal mucosa, reduction of bacterial translocation, stimulation of intestinal lymphoid tissue ...), it is recommended to restart nutrition as soon as possible, generally no later than 3 hours after surgery[4-5]. In addition, given the clear benefits of enteral nutrition over parenteral nutrition, enteral nutrition is the first choice, except in those cases in which it is contraindicated (e.g. paralytic ileus)[2-6].

3. In patients suffering from burns, the early start of nutrition is recommended after surgery. In these patients, enteral nutrition is the first choice; parenteral nutrition is reserved for cases in which the former is contraindicated.

High level of evidence. Strong recommendation.

REFERENCES

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Operating room temperature

In adult patients, maintaining a room temperature of at least 21 ° C1 is generally recommended. However, burn patients have greater susceptibility for hypothermia due to loss of skin coverage (implicated in body thermoregulation mechanisms)[1-3].

Furthermore, sustained hypothermia in these patients may increase the hypermetabolic response presented by the burn itself. For this reason, the recommended room temperature for burned patients is higher (between 28 ° C and 32 ° C)[1-3].

4. The ambient temperature in the operating room of adult patients suffering from burns (mainly those with extensive affected surfaces) should be between 28 ° C and 32 ° C.

Moderate level of evidence. Strong recommendation.

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7.2.4 COLORECTAL SURGERY

Colon mechanical preparation in colorectal surgery

In the previous RICA guidelines, the non-mechanical preparation of the colon was recommended in colorectal surgery, except for when rectal surgery with a derivative stoma is to be performed, as well as when an intraoperative colonoscopy is to be performed.

In recent years, numerous publications based on the database of the American College of Surgeons National Surgical Quality Improvement Program[1,2]

have again sowed doubts about their use. This information is based on retrospective studies with numerous flaws and raises the possible existence of important bias[3]. In any case, it should not be underestimated given the high number of patients included.

In a recent meta-analysis studying the effect of mechanical preparation vs. no bowel preparation[4] and a Finnish multicentre randomised study[5], both concluded that mechanical bowel preparation does not affect the incidence of postoperative complications or SSI.

1. Mechanical colon prep does not improve results, may cause dehydration and should not be used routinely in colon surgery. It can offer benefits in rectal surgery with anastomosis.

   High level of evidence. Strong recommendation.

REFERENCES

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7.2.5 MAJOR HEAD AND NECK SURGERY

Postoperative antibiotic prophylaxis in head and neck surgery with free flaps

In clean-contaminated head and neck surgery, in which a controlled opening of the aerodigestive tract is performed, prolonging AP for more than 24 hours has not been shown to provide advantages[1]. However, when free flaps are used, the risk of infection is greater and it is recommended to prolong the administration of antibiotics for 48 hours.[2,3]

1. Short-term AP (less than 3 days) is recommended, with broad spectrum antibiotics covering Gram+, Gram- and anaerobes in microsurgical reconstruction procedures

   High level of evidence. Strong recommendation.

REFERENCES

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Routine postoperative admission to Intensive Care Units

The routine post-operative admission of patients who underwent oncological head and neck surgery procedures in ICUs during the first 24–48 hours is unnecessary in most cases[1-3] and increases costs and hospital stay[2].

Most patients can be treated in wards with specialised nursing staff, with subsequent transfer to the ICU being infrequent[3].

2. Transfer patients undergoing head and neck oncological surgery to wards with nursing personnel specialised in otolaryngology is recommended, avoiding admission to the ICU.

Moderate level of evidence. Strong recommendation.

REFERENCES

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Postoperative monitoring of free flaps

The free flaps used in the reconstruction of head and neck surgeries should be monitored every hour during the first 24 hours after surgery[1]. Monitoring should continue throughout the hospital stay, although the frequency decreases progressively[2].

Monitoring should include at least a clinical examination by experienced personnel[3]. The use of other monitoring techniques should be considered, especially in those flaps that are not accessible to direct clinical examination[3,4].

3. Free flaps used in the reconstruction of head and neck cancer surgeries should be closely monitored postoperatively, at least by direct clinical examination

Moderate level of evidence. Strong recommendation.

REFERENCES

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Post-operative wound care

The use of Vacuum Assisted Closure (VAC) therapy is recommended for the treatment of complex surgical wounds after major head and neck surgery[1], especially in patients with salivary fistula, multiple pathologies, previously irradiated or in those with dead spaces that favour development of infection[2,3]. Although its use can be considered in the closure of the free flap donor site, in this case it does not seem to provide appreciable advantages[4].

The use of occlusive dressings, such as polyurethane or hydrocolloid dressings, reduces pain and favours healing in skin graft donor areas[5].

4. The use of VAC therapy is recommended in complex surgical wounds during the postoperative period of major head and neck surgery whenever possible. In general, the use of VAC in free flap donor sites is not considered advantageous.

Moderate level of evidence. Strong recommendation.

REFERENCES

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Tracheostomy management

Given that performing a tracheostomy is associated with a longer hospital stay, it is recommended to avoid it whenever it is safely to do so[1,2]. In some patients, it can be replaced by a 24–48 period of orotracheal intubation[1,2]. When tracheostomy is done,

decannulation should be attempted as soon as possible. Surgical closure of the tracheostomy can accelerate the recovery of the patient[3].

5. It is recommended to perform tracheostomy only when it is essential, and if it is performed, it should be removed as soon as possible.

Moderate level of evidence. Weak recommendation

REFERENCES

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Postoperative pulmonary physical therapy

Pulmonary complications are the most frequent in the postoperative period of major head and neck surgery, with a significant impact on mortality and hospital stay[1,2]. They are mainly associated with dysphagia and secondary aspiration to these interventions[3]. The role of early pulmonary physical therapy in the prevention of these complications after major head and neck surgery has been scarcely studied[4], so the indication to perform it is based on the extrapolation of the results it provides after interventions in other territories[5] and must be viewed from this perspective.

6. Pulmonary physical rehabilitation during the postoperative period of major head and neck surgery has not been shown to play a relevant role in the prevention of the most frequent pulmonary complications after these interventions, and its usefulness is doubtful.

Low level of evidence. Weak recommendation.

REFERENCES

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7.2.6 TRAUMATOLOGY AND ORTHOPEDIC SURGERY

Knee and hip prosthetic surgery[1,2]

Hip and knee arthroplasties are effective surgical procedures that improve the quality of life of patients, increase their functional capacity and reduce pain. According to data from the Spanish Ministry of Health (RAE-CMBD), in 2018 more than 60,000 knee arthroplasties and more than 50,000 hip arthroplasties were performed in Spain[3], which generated almost half a million hospital stays, being the first and fourth most frequent surgical procedure in the National Health System. Therefore, they represent a significant volume of activity and waiting list problems. The aging of the population and the greater demands on active aging make it foreseeable that the indications for this surgery will increase significantly in the coming years. In addition to its high volume, a significant variability in medical practice has been shown[4]. Its key points will be addressed now.

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ERAS programs (Enhanced Recovery After Surgery)

ERAS programmes include interventions in the pre-operative, intraoperative and post-operative stages to facilitate patient recovery, through multimodal or “fast-track” interventions, which globally modulate the systemic response to surgery.

Developed some time ago in abdominal or gynaecological surgery, their ability to reduce the appearance of major complications in scheduled arthroplasties has recently been demonstrated[1-4].

1. The implementation of ERAS or “fast-track” programs is recommended in patients undergoing hip or knee arthroplasty.

Moderate level of evidence. Strong recommendation.

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Decision-making aids

Decision aids can be helpful in making the shared decision to start knee or hip replacement, increasing the efficiency of consultations and patient satisfaction. They can contribute to increasing the degree of knowledge and participation of the patient about their pathology and its treatment. Several studies show a similar surgical indication rate, with no impact on costs but an improvement in patient satisfaction and the efficiency of preoperative visits[1-3].

2. Decision aids can improve patient awareness and participation about their process and help to share the decision to start surgery.

Moderate level of evidence. Weak recommendation

REFERENCES

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Preoperative rehabilitation programs ("patient schools")

Pre-operative rehabilitation programmes are group sessions that take place 2–6 weeks prior to the scheduled surgery, taught by healthcare professionals who participate in the post-operative recovery. They include: information on the planned routes, counselling on strategies to improve recovery, teaching exercises in preparation for surgery; advice on techniques for managing daily living activities; and information on the use of adaptive equipment such as raised toilet seats, dressing aids and walking aids such as walkers or crutches[1-3]..

3. Pre-operative rehabilitation programmes could reduce post-operative stay and improve early post-operative function.

Low level of evidence. Weak recommendation.

REFERENCES

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Anaesthesia and analgesia

The evidence indicates the effectiveness of a combination of neuraxial anaesthesia with or without regional blocks, and a multimodal protocol for postoperative analgesia that does not limit postoperative motor function or prolong hospital stay. Neuraxial anaesthesia appears to reduce post-operative nausea and shorten hospital stay compared to general anesthesia[1,2]. Peripheral blocks can reduce postoperative pain, prevent complications associated with the use of opiates and improve early postoperative function[3-6].

4. Neuraxial anaesthesia is recommended, combined with post-operative regional and/or multimodal anaesthesia protocols.

Moderate level of evidence. Strong recommendation.

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Tranexamic acid to reduce blood loss.

Intravenous or oral tranexamic acid combined with topical (intra-articular) tranexamic acid reduces the number of necessary blood transfusions, being able to reduce the risk of postoperative bruising and infections as well as being cost-efficient[1-5]. Dose adjustment is recommended in patients with impaired renal function.

5. The use of oral or intravenous tranexamic acid is recommended compared to topical to reduce perioperative bleeding.

High level of evidence. Strong recommendation.

REFERENCES

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Use of postoperative drains

Postoperative drains are used to reduce bruising and other complications in the surgical wound. There are postoperative drains that allow the blood drained from the surgical wound to be recovered to reduce the need for transfusions. However, the routine use of drains seems to increase postoperative bleeding, without observing the benefits derived from their use[1-6]. Blood collectors may not be cost-effective in most patients, with adequate perioperative management of anemia[7,8].

6. The routine use of suction or blood recovery drains for hip and knee arthroplasties is unnecessary if adequate control of perioperative bleeding and anaemia is ensured.

High level of evidence. Strong recommendation.

REFERENCES:

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Early post-operative physiotherapy

Early post-operative mobilization may reduce the risk of venous thromboembolic complications, in addition, it might reduce hospital stay and improve early postoperative function. To achieve this, adequate postoperative pain control is necessary[1-4].

7. Mobilisation of the patient is recommended on the same day or the day after surgery.

High level of evidence. Strong recommendation.

REFERENCES

1. Karim A, Pulido L, Incavo S. Does Accelerated Physical Therapy After Elective Primary Hip and Knee Arthroplasty Facilitate Early Discharge? Am J Orthop. 2016 Oct;45(6):E337-42.
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Postoperative outpatient rehabilitation

From the results reported by patients in hand, no significant difference has been demonstrated regarding quality of life, neither functional nor in terms of the rate of complications, when supervised group or individual rehabilitation are compared with self-directed rehabilitation by the patient[1-4]. Outpatient rehabilitation resources should be offered to patients with difficulty in performing the basic activities of daily life, who have a functional impairment that justifies the need for physical therapy, do not progress adequately with self-directed exercises, or present cognitive impairment.

8. It is not possible to make a recommendation for or against postoperative outpatient rehabilitation compared to other rehabilitation modalities.

Low level of evidence. Weak recommendation.

REFERENCES

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2. FRACTURED HIP[1-3]

It is estimated that each year, approximately 50,000 proximal femur fractures occur in older people in Spain, with a growing trend due to population aging; this represents almost 3% of hospital spending in Spain, according to data from the Ministry of Health[4-6]. Patients affected by hip fracture are often fragile patients with comorbidities, with a high risk of complications, functional deterioration, and hospitalisation due to the injury, in addition to presenting a mortality of around 20–30% one year after the fracture.

REFERENCES

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Pre-operative regional analgesia

Administering regional anaesthesia by fascia iliac or femoral block reduces preoperative pain and may reduce the incidence of delirium and the need for opioids[1-3].

9. Regional analgesia is recommended to control preoperative pain in patients with hip fractures.

High level of evidence. Strong recommendation.

REFERENCES

1. Fletcher AK, Rigby AS, Heyes FLP. Three-in-one femoral nerve block as analgesia for fractured neck of femur in the emergency department: a randomized, controlled trial. Ann Emerg Med. 2003 Feb;41(2):227-33.
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Preoperative traction

No differences between groups have been demonstrated when comparing patients with preoperative skin traction versus without traction, in terms of pain reduction and analgesic needs. The application of traction can be painful, especially if it is a skeletal traction. Preoperative traction can make nursing care difficult and lead to the appearance of pressure ulcers[1-3].

10. The routine use of preoperative traction is not recommended in patients with hip fractures.

Moderate level of evidence. Strong recommendation.

REFERENCES

1. Handoll HH, Queally JM, Parker MJ. Pre-operative traction for hip fractures in adults. Cochrane Database Syst Rev. 2011 Dec 7;(12):CD000168.
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Surgical delay

Patients should be operated on within the first 48 hours after admission. Correctable comorbidities will be identified and treated in those cases where necessary,

such as anaemia, anticoagulation, depletion volume disorders, fluid and electrolyte disorders, uncontrolled diabetes, uncontrolled acute heart failure, ischemia or correctable cardiac arrhythmias, acute respiratory tract infections, or exacerbations of chronic lung diseases[1-6]. A weak association has been observed between early surgery and lower postoperative mortality, and a stronger one between early surgery and both a lower rate of complications and shorter hospital stays

11. Surgical management is recommended within the first 48 hours of admission.

Moderate level of evidence. Strong recommendation.

REFERENCES

1. Griffiths R, Alper J, Beckingsale A, Goldhill D, Heyburn G, Holloway J, et al. Management of proximal femoral fractures 2011. Anaesthesia. 2012;67(1):85-98.
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4. Bretherton CP, Parker MJ. Early surgery for patients with a fracture of the hip decreases 30-daymortality. Bone Joint J. 2015 Jan;97-B(1):104-8.
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Anaesthetic technique

Both general and spinal anaesthesia carry risks and benefits which must be considered individually. A clear difference in mortality between the two types of anaesthesia has not been demonstrated, although the studies use different follow-up times[1-2]. Some studies suggest a difference in the rate of postoperative complications such as postoperative delirium in favour of neuraxial anaesthesia, although the level of sedation of the patient and maintenance of cerebral perfusion seems to have a greater influence[1-4]. The most appropriate technique should be used for each case, monitoring sedation and avoiding hypotension.

12. Both general and spinal anesthesia can be offered in patients with hip fracture.

Moderate level of evidence. Strong recommendation.

REFERENCES

1. Van Waesberghe J, Stevanovic A, Rossaint R, Coburn M. General vs. neuraxial anaesthesia in hip fracture patients: a systematic review and meta-analysis. BMC Anesthesiol. 2017 28;17(1):87.
2. Zheng X, Tan Y, Gao Y, Liu Z. Comparative efficacy of Neuraxial and general anesthesia for hip fracture surgery: a meta-analysis of randomized clinical trials. BMC Anesthesiol. 2020 Jun 30;20(1):162.

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Postoperative rehabilitation

Several studies support the benefits of intensive rehabilitation exercises in older patients with hip fractures, with an improvement in functional results, mobility and autonomy in carrying out basic activities of daily life as well as improving quality of life. It is not clear what type of components the rehabilitation protocol should include, although improvements have been demonstrated with both resistance and balance exercises[1-4].

13. Mobilisation should be offered the day after surgery and early rehabilitation to patients operated on for hip fracture.

Nivel de evidencia alto. Grado de recomendación fuerte.

REFERENCES

1. Diong J, Allen N, Sherrington C. Structured exercise improves mobility after hip fracture: a meta-analysis with meta-regression. Br J Sports Med. 2016 Mar;50(6):346-55.

2. Mangione KK, Craik RL, Palombaro KM, Tomlinson SS, Hofmann MT. Home-based leg-strengthening exercise improves function 1 year after hip fracture: a randomized controlled study. J Am Geriatr Soc. 2010 Oct;58(10):1911-7.

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Postoperative load

Given the poor functional reserve of many hip fracture patients, any prescribed limitations of load and mobility management can significantly compromise post-operative care and prolong hospital stay, as well as having the potential to compromise independence, discharge destination and functional recovery. Various studies have been unable to demonstrate a higher rate of postoperative complications in those patients with no restricted post-operative load[1-3].

14. Loading is recommended in patients undergoing hip fracture.

Moderate level of evidence. Strong recommendation.

REFERENCES

1. Warren J, Sundaram K, Anis H, McLaughlin J, Patterson B, Higuera CA, et al. The association between weight-bearing status and early complications in hip fractures. Eur J Orthop Surg Traumatol. 2019Oct;29(7):1419-27.

2. Pfeufer D, Zeller A, Mehaffey S, Böcker W, Kammerlander C, Neuerburg C. Weight-bearing restrictions reduce postoperative mobility in elderly hip fracture patients. Arch Orthop Trauma Surg. 2019 Sep;139(9):1253-9.

3. Ottesen TD, McLynn RP, Galivanche AR, Bagi PS, Zogg CK, Rubin LE, et al. Increased complications in geriatric patients with a fracture of the hip whose postoperative weight-bearing is restricted: an analysis of 4918 patients. Bone Joint J. 2018;100-B(10):1377-84.

Multidisciplinary orthogeriatric management

Multidisciplinary care should be offered to older patients affected by hip fractures, including, in addition to traumatologists, clinical specialists (geriatricians and / or clinicians from other specialties), rehabilitators, anaesthetists, nurses, therapists, etc. It has been shown that orthogeriatric multidisciplinary management has a slight effect on mortality and hospital stay, but a larger effect on functional recovery and autonomy for basic activities of daily life. Its influence on readmission rate or hospitalisation after the fracture is not so clear[1-5].

15. Orthogeriatric care is recommended within a multidisciplinary team for patients with a fragility hip fracture.

Moderate level of evidence. Strong recommendation.

REFERENCES

1. Mukherjee K, Brooks SE, Barraco RD, Como JJ, Hwang F, Robinson BRH, et al. Elderly adults with isolated hip fractures- orthogeriatric care versus standard care: A practice management guideline from the Eastern Association for the Surgery of Trauma. J Trauma Acute Care Surg. 2020 Feb;88(2):266-78.

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3. Moyet J, Deschasse G, Marquant B, Mertl P, Bloch F. Which is the optimal orthogeriatric care model to prevent mortality of elderly subjects post hip fractures? A systematic review and meta-analysis based on current clinical practice. Int Orthop. 2019;43(6):1449-54.

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5. Kammerlander C, Roth T, Friedman SM, Suhm N, Luger TJ, Kammerlander-Knauer U, et al. Ortho-geriatric service-a literature review comparing different models. Osteoporos Int. 2010 Dec;21(Suppl 4):S637-646.

8. Indicator Chart

General indicators for analyzing the quality of the caring process are shown in this chapter. Standards were not included, as there are different surgical procedures within abdominal surgery with different results. Furhtermore, it is not posible to find references for many of the process indicators.

**The definition of specific criteria is needed for these indicators.*

8.1. PROCESS INDICATORS.

COVERAGE QUALITY

$$\frac{\text{Patients that comply with inclusion criteria and have been included in RICA}}{\text{Patients in RICA}} \times 100$$

PROCEDURE QUALITY

$$\frac{\text{Number of patients that comply with RICA's inclusion criteria}}{\text{Patients in RICA}} \times 100$$

PREOPERATORY INFORMATION

$$\frac{\text{Patients in RICA that were given verbal and written information*}}{\text{Patients in RICA}} \times 100$$

PREOPERATORY ASSESMENT

$$\frac{\text{Patients in RICA with adequate preoperatory screening*}}{\text{Patients in RICA}} \times 100$$

NUTRITIONAL RISK SCREENING

$$\frac{\text{Patients in RICA with adequate nutritional screening*}}{\text{Patients in RICA}} \times 100$$

PREOPERATORY ANEMIA ASSESMENT

$$\frac{\text{Patients in RICA with haemoglobin > 13 g/dl}}{\text{Patients included in a RICA protocol}} \times 100$$

PREOPERATORY FASTING AND CARBOHYDRATE DRINK

$$\frac{\text{Patients in RICA with adequate preoperatory fasting time and diet*}}{\text{Patients included in a RICA protocol}} \times 100$$

TROMBOEMBOLISM PROPHYLAXIS

$$\frac{\text{Patients in RICA with adequate thromboembolism prophylaxis*}}{\text{Patients included in a RICA protocol}} \times 100$$

ANTIBIOTIC PROPHYLAXIS

$$\frac{\text{Patients in RICA with an adequate antibiotic prophylaxis prescription*}}{\text{Pacientes included in a RICA protocol}} \times 100$$

SURGICAL APPROACH

$$\frac{\text{Patients in RICA undergoing minimally invasive surgical approach*}}{\text{Patients included in a RICA protocol}} \times 100$$

FLUID MANAGEMENT

$$\frac{\text{Patients in RICA with adequate perioperative fluid therapy*}}{\text{Patients included in a RICA protocol}} \times 100$$

HYPOTHERMIA PREVENTION

$$\frac{\text{Patients in RICA with intraoperatory body temperature monitoring*}}{\text{Patients included in RICA pathway}} \times 100$$

NASOGASTRIC TUBE

$$\frac{\text{Patients in RICA with nasogastric tube}}{\text{Patients included in RICA pathway}} \times 100$$

ANALGESIA

$$\frac{\text{Patients in RICA with adequate analgesia*}}{\text{Patients included in a RICA pathway}} \times 100$$

NUTRITION SUPPORT

$$\frac{\text{Patients in RICA with adequate nutrition support*}}{\text{Patients included in RICA pathway}} \times 100$$

EARLY MOBILISATION

$$\frac{\text{Patients in RICA with adequate postoperative mobilisation*}}{\text{Patients included in RICA pathway}} \times 100$$

8.2. RESULT INDICATORS

CLINIC EFECTIVENESS

$$\frac{\text{Patients in RICA requiring reoperation due to bleeding}}{\text{Patients included in RICA pathway}} \times 100$$

$$\frac{\text{Patients in RICA requiring transfer to ICU}}{\text{Patients included in RICA pathway}} \times 100$$

$$\frac{\text{Patients in RICA requiring unscheduled hospital admission related to surgery within the first 30 postoperative days}}{\text{Patients included in RICA pathway}} \times 100$$

$$\frac{\text{Deceased patients in RICA within the first 30 postoperative days}}{\text{Patients included in RICA pathway}} \times 100$$

$$\frac{\text{Pacientes in RICA developing SSI* within the first 30 postoperative days}}{\text{Patients included in RICA pathway}} \times 100$$

**SSI: Surgical Site Infection*

EFICIENCY

$$\frac{\text{Patients in RICA discharged from hospital according to plan*}}{\text{Patients included in RICA pathway}} \times 100$$

PATIENT SATISFACTION

$$\frac{\text{Patients in RICA answering 'very satisfied' with the care received*}}{\text{Patients included in RICA pathway}} \times 100$$

9. Implementation Srategy

BACKGROUND

Since 2007, a committed group of specialists from our country have proposed to modify unsafe practices to undertake their surgical processes from the perspective of "primun non nocere". This Group is made up of health professionals such as Anaesthesiologists, Surgeons, Nurses, Endocrinologists / Nutritionists, Haematologists, Rehabilitators, Preventivists and Methodologists, whose purpose is to carry out safe perioperative clinical practice supported by medicine which is based on scientific evidence.

As a result of the work carried out, the Enhanced Recovery in Abdominal Surgery (RICA in Spanish) was born; sponsored by the Spanish Ministry of Health, Social Security and Equality and the Aragonese Institute of Health Sciences, and audited by Guía Salud. It was updated in 2020 to incorporate other specialties in an attempt to cover most adult surgical procedures.

However, the obstacles stemming from long-established tradition, as well as resistance to change, make the implementation of clinical protocols or pathways difficult and require a strategic plan. For this reason, it is particularly important to know the barriers and strengthen leadership when implementing them[1,2].

The implementation of a RCIA programme implies the standardisation of care and therapy; it reduces the variability of clinical practice and accustoms professionals to a protocolised practice. This generates greater security as it involves implementing orthodox behaviours that prevent the errors or forgetfulness that can have deleterious effects on our patients. All this translates into better clinical results, better and safer quality of care, and an overall improvement in the well-being of our population in terms of health.

OBJECTIVES

With the goal of achieving a uniform, consensual and multicentre implementation of perioperative medicine programmes/protocols stemming from the clinical pathway for Recovery Intensification for optimal Care in Adults surgery –“RICA” – we believe it is essential to generate strategic alliances between scientific organisations and signatory agencies of this document and develop a homogeneous implantation plan (IMPRICA plan), with the following steps:

1. DIFUSION

Objective: distribution of knowledge and key points of the RICA pathway, so that it reaches the entire clinical environment (by specialties) of our country.

Desirable measures:

- Conducting seminars at the regional and local level
- Participation in Conferences on Patient Safety, Change Management, variability of clinical practice
- Planning of discussion panels and symposia in the outstanding National Congresses of the organisations involved in the document
- Distribution of the appropriate documentation for both the professional and the patients on the Via RICA, information documents on the procedures, demonstrative videos, ...
- Space on digital platforms for information (presentations, podcasts, webinars…).

2. MEETINGS AND SESSIONS IN AUTONOMOUS COMMUNITIES.

To involve the managing agents of the different autonomous communities, it would be desirable to organise meetings where senior managers of health ministries participate, inviting the different "stakeholders" of the area to highlight the directors of management, medical and nursing management, those responsible for quality and training. These sessions should be promoted by the decision-making bodies, preferably the Counselor or Director of Health Planning himself.

3. TRAINING

The possibility of organising appropriately accredited training courses for different clinicians interested not only in the proper implementation of the Via RICA in their centres, but also in achieving the highest levels of quality care should be considered.

4. RICA NATIONAL REGISTRY

The creation of a National RCIA Registry is proposed to assess the degree of implementation in the different hospital centres, as well as to monitor the quality indicators proposed in this manner.

1. Giménez-Júlvez T, Hernández-García I, Aibar-Remón C, Gutiérrez-Cía I, Febrel-Bordejé M.Culture of patient safety in directors and managers of a health service. Sanitary Gazette. 2017. 31: 423-426. DOI: 10.1016 / j.gaceta.2017.01.009).
2. Gramlich L, Nelson G, Nelson A, Lagendyk L, Gilmour LE, Wasylak T. Moving enhanced recovery after surgery from implementation to sustainability across a health system: a qualitative assessment of leadership perspectives. BMC Health Serv Res. 2020 Apr 26; 20 (1): 361. doi: 10.1186 / s12913-020-05227-0. PMID: 32336268).

10. Anexes

10.1. POSTOPERATIVE NAUSA AND VOMITING PROPHYLAXIS – APFEL SCALE

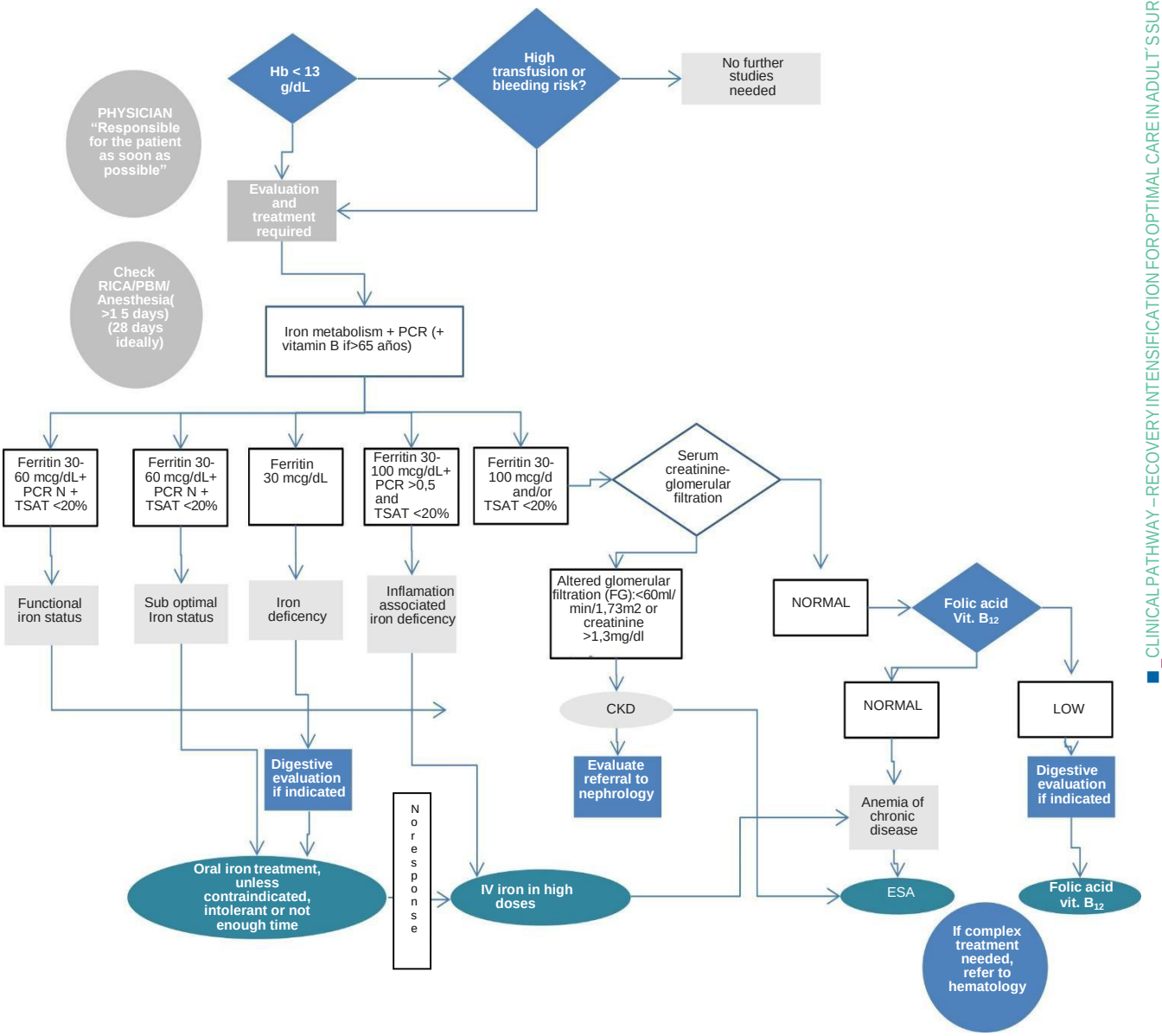
APFEL SCALE

POSTOPERATIVE NAUSA AND VOMITING PROPHYLAXIS

APFEL MODEL FOR RISK STRATIFICATION

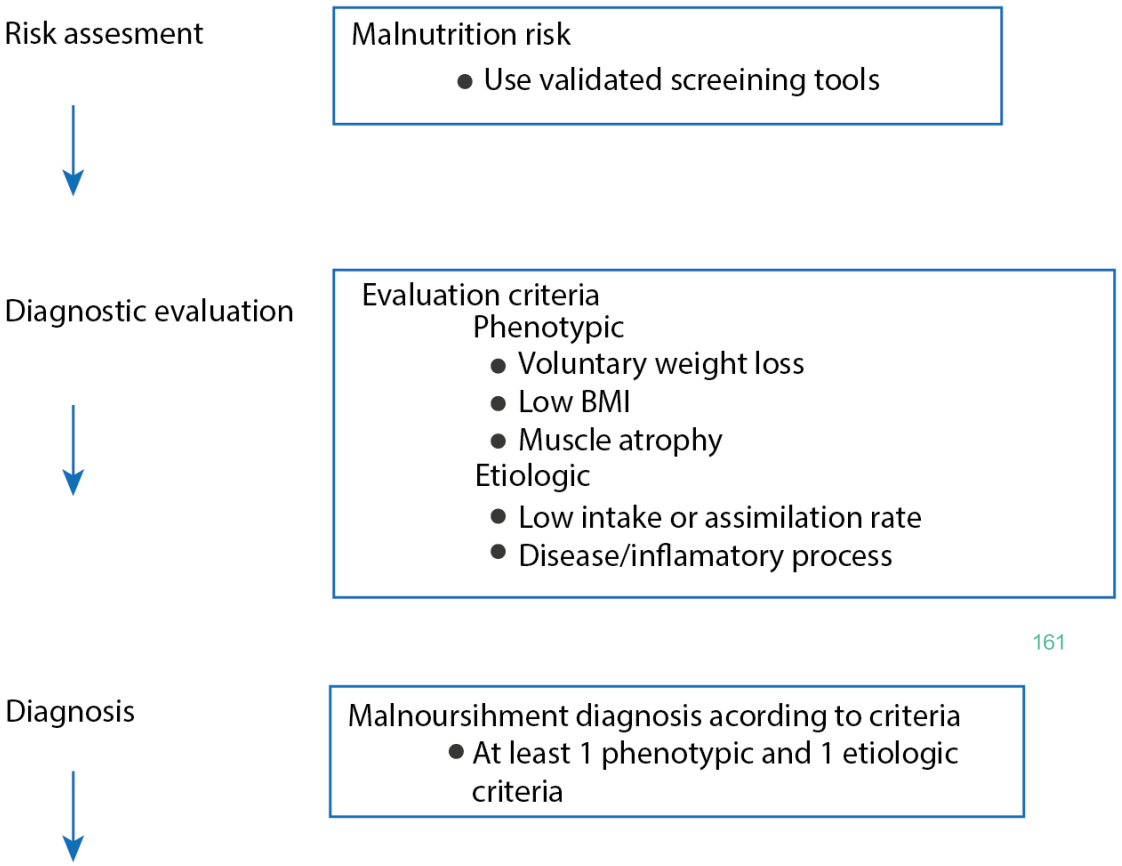
RISK FACTORS	SCORE	RISK
Woman	1	Base line: 10%
Non smoker	1	1 point: 20%
Previous PONV or kinetosis history	1	2 points: 40%
Postoperative opioid usage	1	3 points: 60%
		4 points: 80%`
Low risk (0-1 point, 10-20%); moderate (2 points, 40%); high (3-4 points, 60-80%)		

10.2. PREOPERATIVE MANAGEMENT FOR ANEMIC PATIENTS

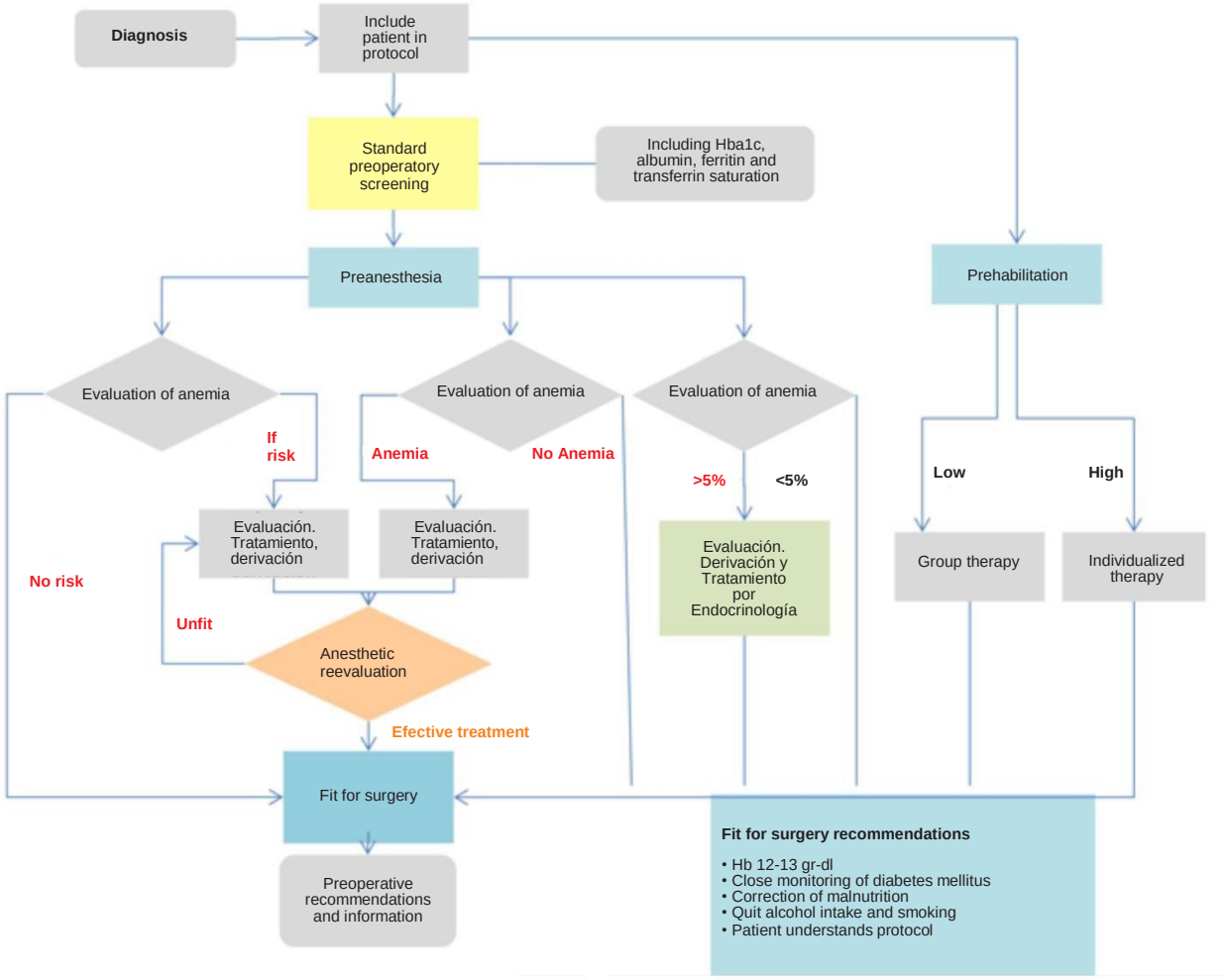


Hb: Hemoglobin
CKD: Chronic Kidney Disease
PCR: Polymerase Chain Reaction
TSAT: Transferrin Saturation
ESA: Erythropoiesis Stimulating Agents

10.3. NUTRITIONAL SCREENING ALGORITHM



10.4. PREOPERATIVE MANAGEMENT



10.5. PATIENT INFORMATION

Recovery Intensification for optimal Care in Adult's surgery (RICA)

1. Introduction
2. Preparation at home / Pre-admission
3. During your hospital stay
4. Home discharge

INTRODUCTION

This Clinical Pathway for Recovery Intensification for optimal Care in Adult's surgery, called "RICA", in which you take part during your surgical intervention, is different from traditional treatment. It consists of the application of a series of measures to minimize the impact and repercussions that any surgical intervention implies, reduces possible complications, speeds up recovery and can even reduce hospital stay.

Your active collaboration as a patient and that of your family members or caretakers, as well as the completion of all its steps is essential for the proper functioning and success of this program.

There are three main stages:

1. *Preparation prior to admission. Since the need for a surgical intervention is decided with your doctor.*
2. *During your stay in the hospital.*
3. *Recommendations at discharge.*

The team of professionals that will assist you throughout this Clinical Pathway is trained to answer all your doubts and guide you in the development of each stage of the Program.

PREPARATION FOR ADMISSION

Prior preparation of the patient is essential and ensures that the patient is in the best possible condition, identifying personal risks in the preoperative period.

You will go to surgery, anesthesia, and nursing consultations to receive all the information necessary about the details of your intervention and the tasks that require your prior collaboration in this program.

Since you have made the decision to undergo surgery, you must commit to avoiding toxins such as alcohol and tobacco. It is important that you understand that all the effort you can put into reducing these habits will directly revert to a reduction in possible respiratory complications that you may suffer during the surgical process.

Surgery can increase the risk of respiratory complications. To prevent them, your nurse/physical therapist will teach you how to prepare your respiratory muscles. In addition, they will teach you how to use the incentive spirometer, to help you carry out respiratory exercises during the days prior to the intervention.

Preoperative nutrition. During the surgery, a high energy expenditure will be required, and it will be particularly important to have an adequate nutritional state to promote healing and the body's defense against infections.

To achieve a better preoperative nutritional status, a rich-in-protein diet is recommended in addition to proper hydration, at least 7 to 10 days prior to surgery.

The night before the intervention, you can have solid food up to 6 hours before surgery and clear liquids (chamomile, juice or sugar solution) up to 2 hours before surgery.

You will not be able to eat or drink anything 2 hours before surgery.

You should not drink alcoholic beverages; alcohol is related to post-operative complications.

Exercise prior to surgery. Practicing moderate exercise before admission will help your later recovery. Your nurse will advise you on what type of activity you can practice depending on your physical condition.

DURING YOUR HOSPITAL STAY

After the surgery, the team of professionals who will take care of you will indicate what the steps of your recovery should be on a day-to-day basis. Remember that your collaboration and involvement is key to your progress. Do not hesitate to ask any questions you have or to let people know if you are in discomfort.

To help prevent the possible complications associated to any surgery, we will work on three main fields:

1. *Early mobilisation*
2. *Early oral feeding*
3. *Respiratory physiotherapy exercises*

EARLY MOBILISATION

As valued in this programme, the sooner you can move, the better results you will achieve, so we will ask you to stand after surgery and move around.

Your ideal progression would be the following:

On the day of the intervention, the nursing staff will help you get out of bed to sit in your chair. You should try to sit out of bed for up to 2 hours. We know that this is a great effort, and it may seem hard, but you will see how your recovery will be faster. For example: the surgery paralyses the intestine for a variable time that can be shortened if you get up and walk after the intervention but lengthened if you lie down.

The day after the intervention, you will be able to sit on the chair at intervals for up to 6 hours, in addition to walking short distances, around four sets of 60 meters.

Successive days You will continue to walk and attempt a steady progression.

EARLY ORAL FEEDING

In this programme we value nutrition very highly, so that you can tolerate food as soon as possible, at the rate you need it.

On the same day of surgery, it is recommended to start drinking as soon as possible. This will be done progressively, starting with small amounts and continuing with other types of easy-to-digest foods provided there is good tolerance.

The day after the intervention, you will increase your fluid intake to 1.5 litres. Do not drink carbonated drinks.

Provided you are tolerating this well, in the following days you will evolve to a more solid diet. You must continue to drink liquids on a regular basis.

RESPIRATORY PHYSIOTHERAPY EXERCISES

In all surgery, the risk of respiratory complications is increased due to bed rest, discomfort at the incision sit, and other factors. The risk can be prevented through chest mobilisation exercises, which you will perform with the incentive spirometer.

By doing these exercises you will:

- *Increase lung ventilation to prevent respiratory infections*
- *Increase the strength of the respiratory muscles*
- *Prevent respiratory secretions from accumulating*

Approximately 4–6 hours after the intervention, you can start using the incentive. The frequency of use will be every 2 hours for 10 minutes at a time.

RECOMMENDATIONS AT DISCHARGE

The high level of planning behind RICA pathways means that all the practical support that you will need at home must be prepared.

If you have any doubts in how this is handled, you should consult with your healthcare personnel.

The planning prepared for you will be reviewed and validated by the doctors and nurses responsible for your discharge from the hospital.

Your probable discharge date may be communicated to you in advance by your doctor. This makes it easier for you to have everything you need ready to go home, or to a health centre if required, with enough time.

Your discharge from the hospital is based on specific criteria and goals. When you achieve them, you will be discharged.

These criteria are:

- *Effective pain control with oral analgesics.*
- *Good oral tolerance to liquids and diet, without nausea or vomiting.*
- *Autonomy in mobility.*

If you need more information, do not hesitate to ask your doctor or the Unit nurse.

10.6. PATIENT SATISFACTION QUESTIONNAIRE

PATIENT SATISFACTION QUESTIONNAIRE

(RECOVERY INTENSIFICATION PROGRAM FOR ADULT'S SURGERY)

Dear patient:

We would like you to answer this questionnaire with the purpose of knowing your grade of satisfaction with the assistance given.

We would like to thank you for your interest and attention by accepting to answer these questions, helping us to improve our care.

The healthcare team.

General Data

Age: Gender: Male □ Female □

Education: None □ Primary □ Secondary □ Further □ Higher □

Information Before Surgery

How would you rate the information given to you by the SURGEON before surgery?

Excellent □ Good □ Average □ Bad □ Terrible □

How would you rate the information given to you by the ANESTHETIST before surgery?

Excellent □ Good □ Average □ Bad □ Terrible □

How would you rate the information given to you by the NURSES before surgery?

Excellent □ Good □ Average □ Bad □ Terrible □

Facilities and equipment

The visual appearance of the operating room was:

Excellent □ Good □ Average □ Bad □ Terrible □

Your room when taken to ward was:

Single □ Double □ Other □

Your room was:

Very comfortable □ Quite comfortable □ Average □ Uncomfortable □ Not comfortable at all □

Pain

What was your maximum level of pain during the first hours after surgery? (0 = no pain ⇨10 = unbearable pain)

0	1	2	3	4	5	6	7	8	9	10

Onceat ward, what was your maximum level of pain after surgery? (0 = no pain ⇨10 = unbearable pain)

0	1	2	3	4	5	6	7	8	9	10

Postoperative feeding

After surgery, did you experience any nausea or vomiting? YES □ NO

□ When you were told you had to eat and drink, you thought it was:

Too early □ Early □ On time □ Late □ Too late □

Early Mobilisation

When you were told you had to stand up, you thought it was:

Too early □ Early □ On time □ Late □

When you were told you had to walk, you thought it was:

Too early □ Early □ On time □ Late □

At Discharge

How would you rate the information and recommendations you received from the SURGEON at discharge?

Very good □ Good □ Average □ Bad □ Very Bad □ I was not informed □

How would you rate the information and recommendations you received from the NURSES at discharge?

Very good □ Good □ Average □ Bad □ Very Bad □ I was not informed □

Once at home, did you have to call the phone number you were given?

YES □ NO □ I was not given any □

Care given

How would you rate the care given by the SURGEON?

Excellent □ Good □ Average □ Bad □ Terrible □

How would you rate the care given by the ANESTHETIST?

Excellent □ Good □ Average □ Bad □ Terrible □

How would you rate the care given by the NURSES?

Excellent □ Good □ Average □ Bad □ Terrible □

How would you rate the care given by the REST OF THE STAFF?

Excellent □ Good □ Average □ Bad □ Terrible □

Expertise, healthcare coordination and outcome

How would you rate the SURGEONS' professional expertise?

Very high □ High □ Average □ Low □ Very Low □

How would you rate the ANESTHETIST'S professional expertise?

Very high □ High □ Average □ Low □ Very Low □

How would you rate the NURSES' professional expertise?

Very high □ High □ Average □ Low □ Very Low □

How would you rate the professional expertise of the REST OF THE STAFF?

Very high □ High □ Average □ Low □ Very Low □

Regarding coordination between healthcare professionals, you thought they were:

Very coordinated □ Quite coordinated □ Average □ Poorly coordinated □ Not coordinated □

How would you rate the outcome of your surgery?

Excellent □ Good □ Average □ Bad □ Terrible □

If you had to undergo surgery again, would you use this same protocol? YES □ NO □

General Satisfaction

Generally speaking, how satisfied are you with the whole process?

Very satisfied □ Quite satisfied □ Neither satisfied nor unsatisfied □ Quite unsatisfied □ Not satisfied □

The best thing for you was:

The worst thing for you was:

Please, list the improvements you would include in this protocol:

Other comments:

Thanks for your collaboration.

10.7. ABBREVIATIONS

ABT	Allogenic Blood Transfusion
AF	Atrial Fibrillation
AKI	Acute Kidney Injury
ASA	American Society of Anaesthesiologists
AP	Antibiotic Prophylaxis
BIS	Bispectral Index
BMI	Body Mass Index
CI	Cardiac Index
CKD	Chronic Kidney Disease
CPAP	Continuous Positive Airway Pressure
CRP	C-Reactive Protein
CVC	Central Venous Catheter
DM	Diabetes Mellitus
DXA	Dual-energy X-ray Absorptiometry
ESA	Erythropoiesis Stimulating Agents
$EtCO_2$	End-Tidal Carbon Dioxide Capnography
FiO2	Fraction of Inspired Oxygen
GDFT	Goal-Directed Fluid Therapy
ICU	Intensive Care Unit
IM	Immunonutrition
IMPRICA	IMPlementation of RICA pathway
IR	Intensified Recovery
IRP	Intensified Recovery Protocol
LMWH	Low-Molecular-Weight Heparin
MAS	Major Abdominal Surgery
MBP	Mechanical Bowel Preparation
MIS	Minimally Invasive Surgery
NIAP	Non-Invasive Arterial Pressure
NG	Nasogastric
NMB	NeuroMuscular Blockade
NPWT	Negative Pressure Wound Therapy.
NSAIDs	Non-Steroidal Anti-Inflammatory Drugs

OEBP	Other Evidence-Based Products
OPA	Opioid-free Anaesthesia
OSAS	Obstructive Sleep Apnoea Syndrome
PAR	Post-Anesthesia Recovery unit
PBM	Patient Blood Management
PDT	Pleural Drainage Tubes
PEEP	Positive End-Expiratory Pressure
PCP	Primary Care Physician
PONV	Post Operative Nausea and Vomiting
RCT	Randomised Controlled Trial
RICA	Recovery Intensification for optimal Care in Adult's surgery
RM	Recruitment Manoeuvres.
SEDAR	Sociedad Española de Anestesiologia, Reanimación y Terapia del Dolor
SEHH	Sociedad Española de Hematología y Hemoterapia
SEMICYUC	Sociedad Española de Medicina Intensiva, Crítica y Unidades Coronarias
SETS	Sociedad Española de Transfusión Sanguínea y Terapia Celular
SSI	Surgical Site Infection
SV	Stroke Volume
SVV	Stroke Volume Variation
TIVA	Total Intravenous Anaesthesia
UFH	UnFractioned Heparin
VAC	Vacuum Assisted Closure
VAS	Visual Analogue Scale
VTE	Venous Thromboembolism
WHO	World Health Organisation

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