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Review

Checklists of The Colombian Society of Anesthesiology and Resuscitation (S.C.A.R.E.) for managing critical events in the OR: Translation and evidence-based update[☆]



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ABSTRACT

Introduction: Critical intraoperative events are rare and may sometimes be managed poorly and too late.

Objective: To translate and update the checklists developed by Ariadne Labs for management of critical events in the OR and to adapt the list for managing anesthetic toxicity, based on secondary clinical evidence.

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Keywords:

Anaphylaxis
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 Intraoperative period
 Heart arrest
 Bradycardia

Materials and methods: In order to translate and update the checklists, the recommendations given by Ariadne Labs were followed to change the original checklists in accordance with a systematic methodology that comprises three phases: (1) translation of the original lists, (2) systematic literature search, (3) evaluation and selection of evidence, (4) adaptation of the list for managing anesthetic toxicity, (5) changes, deletions, and additions to the translated lists, and (6) layout of the checklists.

Results: The 12 original checklists were translated into Spanish and a new list was adapted for managing toxicity from local anesthetic agents. As a result of the systematic literature search, 1407 references were screened, from which 7 articles were selected and included for evidence-based updating of the new checklists. The layout of the new lists was consistent with the design recommendations of the original lists.

Conclusion: 12 translated and updated checklists were submitted and a new list was adapted for the management of local anesthetics toxicity, based on a systematic literature review.

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Listas de chequeo de la Sociedad Colombiana de Anestesiología y Reanimación (S.C.A.R.E.) para el manejo de eventos críticos en salas de cirugía: Traducción y actualización basada en la evidencia

R E S U M E N

Introducción: Los eventos críticos intraoperatorios son situaciones raras y su manejo en ocasiones podría ser inoportuno e inadecuado.

Objetivo: Traducir y actualizar las listas de chequeo para manejo de eventos críticos en salas de cirugía desarrolladas por Ariadne Labs y adaptar la lista para el manejo de la toxicidad por anestésicos locales, a partir de evidencia clínica secundaria.

Materiales y métodos: Para la traducción y actualización de las listas de chequeo se siguieron las recomendaciones de Ariadne Labs para la modificación de las lista de chequeo originales de acuerdo a una metodología sistemática dividida en fases: 1) traducción de las listas originales, 2) búsqueda sistemática de la literatura, 3) evaluación y selección de la evidencia, 4) adaptación de la lista para manejo de toxicidad por anestésicos locales, 5) cambios, sustracciones y adiciones a las listas traducidas, y 6) diagramación de las listas de chequeo. **Resultados:** Se tradujeron al español las 12 listas de chequeo originales y se adaptó una nueva lista para el manejo de toxicidad por anestésicos locales. Como resultado de la búsqueda sistemática de la literatura se tamizaron 1.407 referencias, de las cuales se seleccionaron e incluyeron 7 artículos con los que se actualizaron las nuevas listas de chequeo con base en la evidencia. Las nuevas listas se diagramaron según las recomendaciones de diseño de las listas originales.

Conclusión: Se presentan 12 listas de chequeo traducidas y actualizadas y se adaptó una nueva para el manejo de toxicidad por anestésicos locales. Todo ello a partir de una revisión sistemática de la literatura.

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Palabras clave:

Anafilaxis
 Quirófanos
 Periodo intraoperatorio
 Paro cardíaco
 Bradicardia

Introduction

Critical events in operating rooms are rare occurrences, but they can be stressing and potentially fatal, requiring timely, rapid and coordinated management for successful outcomes.¹⁻³ Under these circumstances, the response of the healthcare team may be crucial for patient survival.² Some observational studies on critical events requiring advanced cardiovascular life support (ACLS), have shown that the

compliance of the healthcare staff with the clinical management guidelines is poor and that in some cases the performance of the healthcare team fails to be timely and adequate.⁴ It has also been shown that after ACLS training, the health staff fails to recall most of the knowledge imparted.⁵⁻⁸

It has been estimated that the incidence of critical intraoperative events is 145 per every 100,000 surgeries.⁹ Considering that around 313 million surgical procedures are done every year around the world,¹⁰ and that by 2012 more than 5 million surgeries were performed annually in Colombia,¹¹ it may

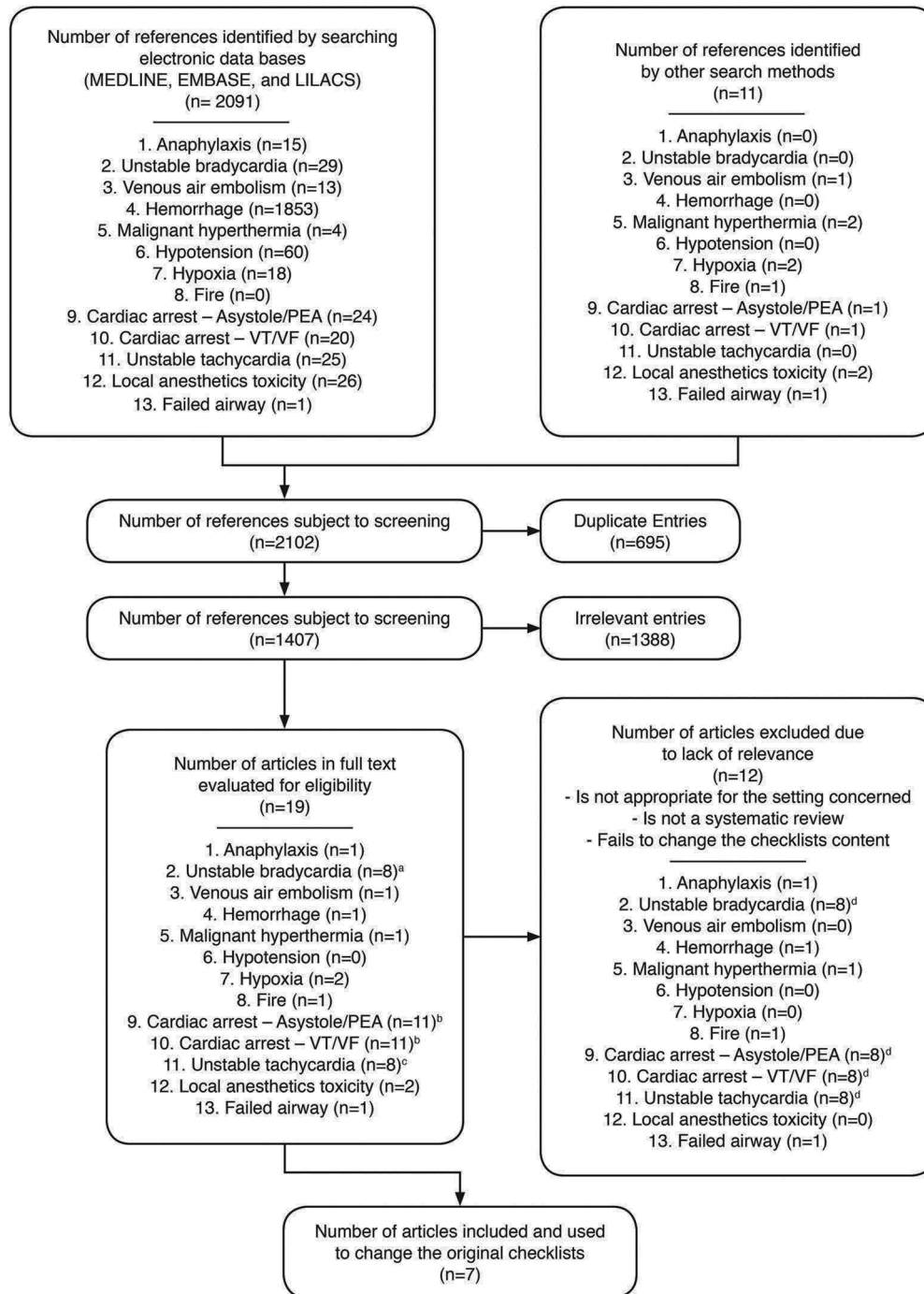


Fig. 1 – Systematic search results. ^aThe 8 articles evaluated for unstable bradycardia are included among the 11 articles evaluated for the cardiac arrest checklists. ^bThe 11 articles evaluated for both cardiac arrest checklists are the same. ^cThe 8 articles evaluated for unstable tachycardia are comprised in the 11 articles evaluated for the cardiac arrest checklists. ^dThe 8 articles excluded from the checklists for bradycardia, tachycardia, and cardiac arrest are the same.

be estimated that there are around 8 thousand critical intraoperative events per year in our country. However, from an individual perspective and considering the number of people involved in the care of surgical patients, the occurrence of an intraoperative critical event is relatively rare.¹²

The results of some trials have suggested that one of the main causes for the variation in surgical mortality among hospitals is the inability to properly manage critical intraoperative events and other potentially fatal complications.¹³⁻¹⁵

1 Anaphylaxis

Hypotension, bronchospasm, high blood pressure, reduced or absent respiratory sounds, tachycardia, urticaria

Start	Medication doses and treatments
<ol style="list-style-type: none"> 1 Ask for help, crash cart, and report to the surgical team <ul style="list-style-type: none"> ▶ Ask: "Who will be the leader during the critical event?" 2 Administer a bolus of epinephrine (may be repeated) 3 Open the IV fluids or administer boluses 4 Remove any potential causative agents 5 Use 100% FIO₂ 6 Establish/secure the airway 7 Consider... <ul style="list-style-type: none"> ▶ Stop any volatile anesthetics if the patient remains unstable ▶ Use vasopressin in patients with sustained hypotension despite repeated doses of epinephrine ▶ Start epinephrine infusion in patients with initial response to epinephrine boluses but presenting sustained symptoms ▶ Diphenhydramine ▶ H2 blockers ▶ Hydrocortisone ▶ Triptase levels: Check during the first hour, repeat after 4, and 18-24 hours post-reaction ▶ Finish the procedure 	<p>Epinefrina: Bolus: 10-100 mcg, IV repeat as needed Infusion: 1-10 mcg/min IV</p> <p>Vasopressin: 1-2 IU IV</p> <p>Diphenhydramine: 25-50 mg IV</p> <p>H2 blockers: Ranitidine: 50mg IV</p> <p>Hydrocortisone: 100 mg IV</p>
	Common causative agents
	<ul style="list-style-type: none"> • Neuromuscular blockers • Antibiotics • Latex products • IV contrast medium
	Critical events
	<p>In case of cardiac arrest, refer to:</p> <ul style="list-style-type: none"> ▶ List 4 Cardiac arrest – Asystole/PEA ▶ List 5 Cardiac arrest – VF/VT

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Fig. 2 – Checklist for managing anaphylaxis. PEA, pulseless electrical activity; FIO₂, oxygen inspired fraction; FV, ventricular fibrillation; IV, intravenous; VT, ventricular tachycardia. Source: Translated and updated with authorization based on "OR Crisis Checklists" available at: www.projectcheck.org/crisis.

2 Unstable bradycardia

HR <50 bpm with hypotension, altered mental state, shock, typical angina pain or acute cardiac failure

Start	Medication doses and treatments
<ol style="list-style-type: none"> 1 Ask for help, crash cart, and report to the surgical team <ul style="list-style-type: none"> ▶ Ask: "Who will be the leader during the critical event?" 2 Use 100% FIO₂ <ul style="list-style-type: none"> ▶ Check proper oxygenation/ventilation 3 Administer atropine 4 Stop surgical stimulus (deflate if using laparoscopy) 5 If atropine is not effective: <ul style="list-style-type: none"> ▶ Start epinephrine or dopamine infusion Or ▶ Use transcutaneous pacemaker 6 Consider... <ul style="list-style-type: none"> ▶ Stop volatile anesthetics if the patient remains unstable ▶ Calling for expert consultation (i.e. cardiologist) ▶ Assessing for drug induced causes (e.g., beta blockers, calcium channel blockers, digoxin) ▶ Calling for cardiology consultation if myocardial infarction suspected (e.g., ECG changes) 	<p>Atropine: 0.5 mg IV, may be repeated up to 3 mg Epinephrine: 2-10 mcg/min, IV Or: Dopamine: 2-20 mcg/kg/min IV</p> <p>Overdose treatment</p> <p>Local anesthetic agents: refer to ▶ List 12</p> <p>Beta-Blockers: Glucagon: 2-4 mg IV bolus</p> <p>Calcium channel blockers: calcium chloride: 1g IV</p> <p>Digoxin: Specific Digoxin antibody (FAB); consult with pharmacy about the specific dose for each patient</p>
	Transcutaneous pacing instructions
	<ol style="list-style-type: none"> 1. Place the electrodes on the chest and back 2. Connect 3-lead ECG from the defibrillator to the patient 3. Turn the monitor/defibrillator on PACEMAKER mode 4. Set the PACEMAKER FREQUENCY (ppm) to 80/min (setting based on the clinical response to capture) 5. Start with 60mA OUTPUT and increase up to electrical capture (the pacemaker spikes align with QRS complexes) 6. Set the OUTPUT 10 mA above the initial capture level 7. Confirm effective capture <ul style="list-style-type: none"> • Electrical: evaluate the EKG tracing • Mechanical: feel the femoral pulse (the carotid pulse unreliable)
	During resuscitation
	<p>Airway: Evaluate and secure</p> <p>Circulation: • Confirm adequate IV or IO access • Consider IV fluids wide open</p>
Critical events	
<p>If PEA is present, refer to ▶ List 9</p>	

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Fig. 3 – Checklist for the management of unstable bradycardia. PEA, pulseless electrical activity; FIO₂, inspired oxygen fraction; IV, intravenous. Source: Translated and updated with authorization, based on "OR Crisis Checklists" available at: www.projectcheck.org/crisis.

3 Venous air embolism

Reduced $ETCO_2$, oxygen saturation, and hypotension

Start

- 1 **Ask for help, crash cart, and report to the surgical team**
 - ▶ Ask: “¿Who would lead the critical event?”
- 2 **Use 100% FiO_2**
- 3 **Stop nitrous oxide**
- 4 **Stop source of air entry**
 - ▶ Irrigate the surgical field
 - ▶ Lower surgical site below level of heart, if possible
 - ▶ Localize the point of entry (including open venous lines)
- 5 **Consider...**
 - ▶ Position the patient on the left side
 - Continue proper monitoring during repositioning
 - ▶ If available, put cement or bone wax on the bone margins
 - ▶ In case of unclear diagnosis, consider transesophageal echocardiography (TEE) or transthoracic echocardiography (TTE) when available
 - ▶ Using $ETCO_2$ to monitor progression and resolution of embolus or for assessment of adequate cardiac output

Critical events

In case of PEA, refer to ▷ List 9

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Fig. 4 – Checklist for the management of venous air embolism. PEA, pulseless electrical activity; FiO_2 , inspired oxygen fraction; IV, intravenous. Source: Translated and updated with authorization, based on “OR Crisis Checklists” available at: www.projectcheck.org/crisis.

Cognitive aids are memory prompts containing important information presented in an analog or digital format that serve as a reminder of diagnostic and corrective instructions for managing special situations.¹⁶ Cognitive aids are tools that assist in decision making since they are not just learning aids.^{17,18} Cognitive aids may be presented as algorithms, acronyms, and checklists, inter alia.¹⁹ Checklists are widely accepted in other high-risk settings (aviation and nuclear plants) as a tool to help improve performance during critical, rare and unpredictable events.²⁰ Several of these cognitive aids have been described in the literature for managing critical events in the OR.^{1,21-24} A collection of cognitive aids or checklists is called an emergency manual.¹⁷

The use of cognitive aids in the management of critical events has been correlated with improved compliance with the clinical management guidelines.^{16,25} Evidence suggests that checklists have a favorable impact on the coordination, communication, and overall performance of clinical teams and that their lineal design could offer some advantages versus the branched design of algorithms.²⁶ In anesthesiology, the use of the checklist for surgical safety during routine perioperative care has been associated with a significant decrease in morbidity and mortality.^{27,28} Consequently, with this evidence, checklists have quickly become a standard of care in perioperative medicine.²⁹⁻³²

In 2011 Ziewacz et al., developed and initially tested in high-fidelity simulated surgical settings some checklists for managing critical events in the OR. The actions (recommendations) described in the checklists were initially developed based on an extended literature search including 48 articles that defined the potentially lethal critical events in the OR

and the corresponding evidence-based clinical management was established.¹ The lists were then subject to a process of effectiveness evaluation by the same developer group. The effectiveness of checklists to improve compliance with management guidelines and the perception of the healthcare staff about the usefulness and clinical relevance of these cognitive aids was evaluated in a controlled randomized trial in simulated surgical environments.² The trial showed that when checklists are available, non-compliance with vital processes established under the clinical management guidelines is considerably reduced (adjusted relative risk, 0.28; 95% confidence interval, 0.18–0.42; P value <0.001), and that 97% of the staff involved in perioperative management would use the checklists in the occurrence of an actual critical intraoperative event.²

Up to now, no formal checklists (neither other cognitive aids) have been formally established in Spanish for the management of critical events in the OR, adapted to the Colombian environment. Hence, the purpose of this initiative was to update the checklists developed by Ariadne Labs (Brigham and Women’s Hospital and Harvard School of Public Health)³³ for managing critical events in the OR and to adapt the list for the management of local anesthetic toxicity, based on secondary clinical evidence.

Methods

This project was possible thanks to the initiative and sponsorship of the Colombian Society of Anesthesiology and Resuscitation (S.C.A.R.E.). A group of methodology experts

4 Hemorrhage

Acute Massive Bleeding

Start

- 1 **Ask for help, crash cart and report to the surgical team**
 - ▶ Ask: "Who will lead the critical event?"
- 2 **Open IV fluids and secure an adequate venous access**
- 3 **Use 100% FiO₂ and stop volatile anesthetics**
- 4 **Call the blood bank**
 - ▶ Activate the massive transfusion protocol
 - ▶ Appoint a primary contact person with the blood bank
 - ▶ Order blood products (in addition to packed red blood cells – pRBCs)
 - 1 unit pRBCs: 1 unit FFP: 1 unit platelets (platelet apheresis)
- 5 **Request rapid infuser (or pressure bags)**
- 6 **Discuss management plan with the surgical, anesthesia and nursing team**
- 7 **Call for vascular surgery consultation, if applicable**
- 8 **Keep patient warm**

- 9 **Send labs**
 - ▶ CBC, PT, PTT, INR, fibrinogen, lactate, arterial gases, potassium, ionized calcium
- 10 **Consider...**
 - ▶ Electrolytic imbalances (hypocalcemia and hyperkalemia)
 - ▶ Uncrossmatched type O negative blood if crossmatched blood not available
 - ▶ Damage control surgery (packing, closure, and resuscitation)
 - ▶ Special populations (see further considerations)

Medication doses and treatments

Treatment for Hypokalemia	
Calcium replacement (gluconate or calcium chloride)	
Treatment for hyperpotasemia	
1. Calcium gluconate • 30 mg/kg IV -Or- Calcium chloride • 10 mg/kg IV	
2. Insulin	• 110 units regular IV (children-0.1 IU/kg) with 1– 2 amps D50W (children-1 mL/kg) as needed
3. Sodium bicarbonate: • 1-2 mEq/kg slow IV push	

Special populations

Pregnant women: <ul style="list-style-type: none"> • Administer antifibrinolytic (tranexamic acid): 1 g IV over 30 minutes, repeat doses of 1 g IV in 30 minutes are allowed (WOMAN Trial) • Empirical administration of 1 pack of cryoprecipitate (10 units) • Check fibrinogen (goal >200 mg/dL) <p>If the first fibrinogen level <200 mg/dL, order 2 additional packs of cryoprecipitate or fibrinogen concentrate 3 g IV</p>	Trauma: <p>Administer: Antifibrinolytic (tranexamic acid):1g IV over 10 minutes followed by 1 g over the next 8 hours (CRASH 2 Trial)</p>	Uncontrolled non-surgical bleeding despite massive PRBC transfusion, FFP, platelets and cryoprecipitate: <ul style="list-style-type: none"> • Consider recombinant factor VIIa: 40 mcg/kg IV <ul style="list-style-type: none"> – Surgical bleeding must be controlled first – Use with caution in patients at risk of thrombosis – Do not use when pH <7.2
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Fig. 5 – Checklist for hemorrhage management. DDW, dextrose in distilled water; FiO₂, inspired oxygen fraction; VF, ventricular fibrillation; IV, intravenous; VT, ventricular tachycardia. Source: Translated and updated with authorization from "OR Crisis Checklists" available at: www.projectcheck.org/crisis.

(with their respective support staff) and clinical experts was organized to advance the project. Every project team member was required to complete a form stating any conflicts of interest. Then a phased methodology was used. Each phase followed standard procedures to develop evidence-based secondary evidence.³⁴

Generally speaking, Ariadne Labs recommendations were followed for making changes to the original checklists³³:

Any additional impact on the applicability of the list was carefully evaluated, maintaining a balance between content and complexity.

Short, direct and unequivocal sentences were used, that were easy to read aloud. The number of actions was limited to exclusively the most important ones, following the conventions of color, typographic, and layout. The font shall be as large as possible, consistent with the style established.

No text or color tabs were added.

Considering that tables, arrows and other graphics further complicate the visualization of the checklist, these were only

used if strictly necessary to avoid ambiguity of the actions. Light colors were used to minimize any distraction.

Blank spaces were preserved as much as possible.

Translation of the original checklists

Ariadne Labs granted written permission to translate and make changes to the original checklists. The original checklists in English were used, extracting the various components into plain text: (1) list identification and description, (2) actions, and (3) information on references. Two of the authors were responsible for translating the complete original lists, with particular emphasis on adapting the language to the Colombian setting and changing any ambiguous terms and sentences. Any medications not available in Colombia were removed, while others that are commonly used in the country were added. The resulting initial translation was primarily validated by an expert on each list's topic and finally by all the team members in the project via non-formal consensus.

5 Malignant hyperthermia

In the presence of triggers: unexplained and unexpected increase in end-tidal CO₂, unexplained tachycardia/tachypnea, prolonged masseter muscle spasm following the administration of succinylcholine; hyperthermia may be late

<p>Start</p> <ol style="list-style-type: none"> 1 Ask for help, crash cart and report to the surgical team <ul style="list-style-type: none"> ▶ Ask: "Who will lead the critical event?" 2 Stop volatile anesthetics and consider using safe anesthetic agents <ul style="list-style-type: none"> • Do not delay treatment to change the respiratory circuit or the CO₂ absorber. Consider the use of activated charcoal filters 3 Ask for the malignant hyperthermia kit 4 Assign one person responsible for diluting dantrolene 5 Ask for frozen saline solution 6 Use 100% FiO₂ 7 Hyperventilate patient at flows of 10 L/min or more 8 Finish the procedure if possible 9 Administer dantrolene 10 Treat the hyperkalemia when suspected 11 Treat any arrhythmias present <ul style="list-style-type: none"> • The usual anti-arrhythmic agents are acceptable; do not use calcium channel blockers 	<ol style="list-style-type: none"> 12 Send labs <ul style="list-style-type: none"> • Arterial blood gases (ABG) • Electrolytes • Creatinine kinase (CK) • Serum/Urine myoglobin • Coagulation tests 13 Initiate supportive care <ul style="list-style-type: none"> ▶ Consider cooling patient if temperature > 38.5°C: <ul style="list-style-type: none"> • Stop cooling if the temperature <37 °C • Lavage open body cavities • Nasogastric lavage with cold water • Apply ice externally • Infuse cold saline intravenously ▶ Place Foley catheter, monitor urinary output ▶ Contact the ICU 	<p>Medication doses and treatments</p> <p>Dantrolene According to presentation:</p> <ul style="list-style-type: none"> • 20 mg: dilute in 60 mL of sterile water • 250 mg: dilute in 5 mL of sterile water • 2.5 mg/kg IV every 5 minutes until the relief of symptoms • Total doses of up to 30 mg/kg may be required <p>Treatment for hyperkalemia</p> <ol style="list-style-type: none"> 1. Calcium gluconate • 30 mg/kg IV or Calcium chloride • 10 mg/kg IV 2. Insulin • 10 units regular IV (children-0.1 IU/kg) with 1–2 amps D50W (children-1 mL/kg) as needed 3. Sodium bicarbonate: • 1-2 mEq/kg IV slow <p>Triggering agents</p> <ul style="list-style-type: none"> • Inhaled anesthetics (volatile) • Succinylcholine
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Differential diagnosis			
<p>Cardiorespiratory</p> <ul style="list-style-type: none"> • Hypoventilation • Sepsis <p>Endocrine</p> <ul style="list-style-type: none"> • Thyrotoxicosis • Pheochromocytoma 	<p>Iatrogenic</p> <ul style="list-style-type: none"> • Exogenous CO₂ (laparoscopy) • Overheating • Neuroleptic Malignant Syndrome 	<p>Neurological</p> <ul style="list-style-type: none"> • Meningitis • Intracranial bleeding • Hypoxic encephalopathy • Traumatic brain injury 	<p>Toxicological</p> <ul style="list-style-type: none"> • Radiologic contrast neurotoxicity • Anticholinergic syndrome • Cocaine, amphetamines, salicylate toxicity • Alcohol withdrawal

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Fig. 6 – Checklist for the management of malignant hyperthermia. DDW, dextrose in distilled water; ETCO₂, end-tidal carbon dioxide; FiO₂, inspired oxygen fraction; VF, ventricular fibrillation; IV, intravenous; ICU, intensive care unit. Source: Translated and updated with authorization from "OR Crisis Checklists" available at www.projectcheck.org/crisis.

Systematic literature search

For the design of the search strategies a generic question was asked that could be answered on the basis of clinical evidence. The question was: which are the most effective and safe interventions for managing any critical events arising in the OR? This question was asked for each checklist in order to design a search strategy in electronic data bases (MEDLINE, EMBASE, and LILACS) using the terms MeSH (Medical Subject Headings), Emtree (EMBASE tree), DeCS (Health Sciences Descriptors), text terms, Boolean operators (AND, OR) adaptable to the various data bases. The validated filters were introduced to identify any systematic reviews to answer the question asked.

In addition to the electronic database, other gray literature searches were done, manual search of specialized journals and contacts with experts. Furthermore, the snowball search strategy was used based on the list of references in each publication selected and the Google scholar citation function.

The process complied with the quality standards used in systematic literature reviews and met the requirements and

strategies listed in the methodological guidelines. The systematic database search was lead by the Cochrane Review Group STI from the Universidad Nacional de Colombia.

Evidence Evaluation and Selection

Upon selecting the final electronic searches as well as other sources of information, a selection of the relevant literature for each checklist was undertaken. At least two reviewers reviewed the titles and abstracts. Any disagreements regarding the inclusion or exclusion of references were solved by consensus. After selecting the articles included, the complete texts were obtained. Two independent authors completed the quality evaluation and data collection. At this stage, any disagreements were settled through third-party reviewer arbitration.

Development of checklist for managing local anesthetic toxicity

To develop the checklist for managing systemic toxicity resulting from local anesthetic agents, two background documents

6 Hypotension

Unexpected blood pressure drop, refractory to initial treatment

Start

- 1 **Ask for help, crash cart and report to the surgical team**
 - ▶ Ask: "Who will lead the critical event?"
- 2 **Check...**
 - ▶ Pulse / blood pressure
 - ▶ Monitoring equipment
 - ▶ Heart rate
 - In the presence of bradycardia, refer to ▷ List 3
 - ▶ Rhythm
 - If VF/VT, refer to ▷ List 5
 - If PEA, refer to ▷ List 4
- 3 **Run IV fluids wide open**
- 4 **Administer vasopressor and titrate according to response**
 - ▶ Mild hypotension: Administer etilefrine, phenylephrine, or ephedrine as available
 - ▶ Significant/refractory hypotension: Administer epinephrine bolus; consider initiating epinephrine or norepinephrine infusion
- 5 **Use 100% FiO₂ and stop volatile anesthetics**
- 6 **Inspect the surgical field for bleeding**
 - In case of bleeding, refer to ▷ List 4
- 7 **Consider actions...**
 - ▶ Place the patient in Trendelenberg position
 - ▶ Secure additional IV access
 - ▶ Place an arterial line
- 8 **Consider causes...**
 - Surgical field**
 - Mechanical or surgical manipulation
 - Insufflation during laparoscopy
 - Retraction
 - Vagal stimulation
 - Vascular compression
 - Unaccounted blood loss**
 - Blood in suction canister
 - Sponges with blood
 - Blood on the floor
 - Internal bleeding
 - Medications/allergy**
 - Anaphylaxis, refer to ▷ List 2
 - Recently administered medications
 - Dosing error
 - Medications used in the field (IV local anesthetic injection)
 - Wrong medication

Medication doses and treatments

Ephedrine:	5-25 mg IV, repeat as needed
Etilefrine:	1-4 mg IV, repeat as needed
Phenylephrine:	50-200 mcg IV, repeat as needed
Epinephrine:	Bolus: 5-10 mcg IV
	Infusion: 0.05-1 mcg/kg/min IV
Norepinephrine:	Bolus: 5-10 mcg IV
	Infusion: 0.05-1 mcg/kg/min IV

Respiration

- Increased PEEP
- Hypoventilation
- Hypoxia, refer to ▷ List 7
- Persistent hyperventilation
- Pneumothorax
- Pulmonary edema

Circulation

- Air embolism, refer to ▷ List 3
- Bradycardia, refer to ▷ List 2
- Malignant hyperthermia, refer to ▷ List 5
- Tachycardia, refer to ▷ List 11
- Bone cementing (methylmethacrylate effect)
- Myocardial ischemia
- Embolism (pulmonary, septic, fat, amniotic, CO₂)
- Severe sepsis
- Cardiac tamponade

Every reasonable precaution has been considered to check the information herein. The reader accepts the responsibility of interpreting and using this material. Revised, June 2016

Fig. 7 – Checklist for the management of hypotension. PEA, pulseless electrical activity; FiO₂, inspired oxygen fraction; VF, ventricular fibrillation, IV, intravenous; VT, ventricular tachycardia. Source: Translated and updated with authorization, based on "OR Crisis Checklists" available at: www.projectcheck.org/crisis.

were used: the safety guideless of the Association of Anesthetists of Great Britain and Ireland – AAGBI,³⁵ and the checklist of the American Society of Regional Anesthesia and Pain Medicine – ASRA.²³ A written authorization was obtained for the translation and amendment of these tools.

One of the authors transcribed all the relevant elements for the original lists and then translated the original text into Spanish, emphasizing the importance of adapting the terminology to the Colombian setting and changing any ambiguous terms and sentences. The result of the initial translation was initially validated by a clinical expert, and lastly by all of the authors participating in the project. Any disagreements were solved by consensus.

Changes, deletions and additions to the translated lists

After a critical reading of the literature, changes, deletions and additions to the checklists translated into Spanish were drafted. All changes were done to the checklists in plain text. Any changes were initially approved by the expert on the topic of the checklist. All of the final items in the checklists were discussed and approved by all the experts on the various topics and methodologies.

Checklist layout

Two authors were responsible for the layout of the translated and updated checklists. This process was completed using Adobe InDesign CC[®] (2016, Adobe Systems Incorporated, San Jose, CA, EUA) with the original templates designed by Ariadne Labs. The result of the layout was approved by all the authors.

Drafting of the final document

The document reflects the context, the methodology, and the results of the translation initiative and update of the checklists, incorporating and reconciling the recommendations with the expert consensus. The written document was submitted for publication upon approval of all the team members and shall be endorsed by the center for technological development of S.C.A.R.E.

Peer review and publication

The final document was submitted for review by two academic peers, one expert on the specific topic and the other on methodology. The academic peers evaluated the paper from the thematic and methodological perspective. This process followed the guidelines set forth by the

7 Hypoxia

Unexplained oxygen desaturation

Start

1 Ask for help, crash cart and report to the surgical team

- ▶ Ask: "Who will lead the critical event?"

2 Use 100% FiO₂ at high fresh gas flows

- ▶ Confirm in the gas analyzer that the inspired FiO₂ is = 100%
- ▶ Confirm ETCO₂ and changes in the capnogram morphology

3 Ventilate manually to assess pulmonary compliance

4 Auscultation for breath sounds

5 Check...

- ▶ Blood pressure, PIP, pulse
- ▶ Position of the endotracheal tube
- ▶ Position of the pulse oximeter
- ▶ Integrity of the respiratory circuit: disconnected, kinking, holes

6 Consider actions to assess potential breathing problems...

- ▶ Draw blood gases
- ▶ Suction (to clean secretions and mucus plugs)
- ▶ Remove the circuit and use self-inflatable bag
- ▶ Bronchoscopy

7 Consider causes...

Is it an airway or a breathing problem?

No airway problem suspected	If an airway problem is suspected
<p><u>Circulation</u></p> <ul style="list-style-type: none"> • Embolism <ul style="list-style-type: none"> – Pulmonary embolism – Venous air embolism, refer to ▷ List 1 – Other embolism (fat, septic, CO₂, amniotic fluid) • Heart disease <ul style="list-style-type: none"> – Congestive heart failure – Coronary Heart Disease – Myocardial ischemia – Cardiac tamponade – Congenital/anatomic defect • Severe sepsis • If the hypoxia is hypotension-associated, refer to ▷ List 6 <p><u>Medications/Allergy</u></p> <ul style="list-style-type: none"> • Recently administered medications • Dosing error / allergy / anaphylaxis • Dyes and abnormal hemoglobin (methemoglobinemia, methylene blue) 	<p><u>Airway / respiration</u></p> <ul style="list-style-type: none"> • Aspiration • Atelectasis • Bronchospasm / laryngospasm • Hypoventilation • Obesity / position • Pneumothorax • Pulmonary edema • Right mainstem intubation • Ventilator parameters resulting in auto-PEEP
<p>Additional diagnostic tests</p> <ul style="list-style-type: none"> • Fiberoptic bronchoscope • Chest X-ray • ECG • Transesophageal (TE)/Transthoracic (TT) Echo as available 	

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Fig. 8 – Checklist for the management of hypoxia. ETCO₂, end tidal carbon dioxide; FiO₂, inspired oxygen fraction; PIP, peak inspiratory pressure. Source: Translated and updated with authorization from "OR Crisis Checklists" available at: www.projectcheck.org/crisis.

editorial committee of the Colombian Journal of Anesthesiology (<http://www.revcolanest.com.co/es/guia-autores>).

Results

The systematic search of electronic databases identified a total of 2091 articles. Through manual search strategies and snow-ball, 11 additional articles were identified. After eliminating the duplicate entries, the titles and abstracts of 1407 references were selected. Following the screening process, 19 full text articles were obtained, of which seven were finally included and used to change the original checklists (Fig. 1).^{23,35-40}

The checklists were reorganized in alphabetical order according to the Spanish title. The tables used as reference information under the title of "critical changes" in the original checklists, were translated into Spanish as "eventos críticos" in order to avoid user confusion.

To update the checklist for managing anaphylaxis, a full text article was evaluated.⁴¹ The review generated no changes

in the actions submitted in the original list. The checklist layout in Spanish is depicted in the corresponding figure (Fig. 2).

8 articles for managing bradycardia were identified and revised to consider probable changes to the original English checklist.^{37,39,42-47} However, no secondary evidence was found to change, add, or delete any action proposed in the original list. The corresponding figure exhibits the Spanish checklist (Fig. 3).

An article evaluated as full text was used to change one action in the checklist for the management of venous air embolism. Additionally, the possibility to consider transthoracic echocardiography in cases of uncertain diagnosis³⁶ was introduced (Fig. 4).

1853 references were identified on the management of bleeding in the OR and were subject to screening for complete text review and discussion.⁴⁸ None of the actions in the original checklist was changed. The list in Spanish is exhibited with the respective figure (Fig. 5).

A full text reference was identified and analyzed for the list of intraoperative management of hyperthermia crisis. Based on this reference,³⁸ the order of the initial actions for crisis management was changed. In the original checklist,

8 Fire

Evidence of fire (smoke, odor, flash) on patient or drapes, or in patient's airway

Start

1 Ask for help, and activate the fire alarm

- ▶ Ask: "Who will lead the critical event?"

2 Get a fire extinguisher for use as needed

If there is fire in the airway

3 Try to put off the fire

- ▶ Shut off medical gases
- ▶ Disconnect the ventilator
- ▶ Remove the endotracheal tube
- ▶ Remove any flammable material from the airway
- ▶ Pour saline solution into the airway

4 Once the fire is extinguished

- ▶ Re-establish ventilation using a self-inflating bag with room air
 - If unable to re-establish ventilation, go to ▷ List 13
 - Avoid N₂O and minimize FiO₂
- ▶ Make sure there is no residual fire
 - Check the surgical field, drapes and towels
- ▶ Assess the airway to identify any lesions or foreign bodies
 - Evaluate the integrity of the endotracheal tube (OTT) (fragments in the airway)
 - Consider bronchoscopy

5 Evaluate the patient's condition and design a subsequent management plan

6 Save any materials and devices involved for review

If the fire is NOT in the airway

3 Try to extinguish the fire

Primary attempt

- ▶ Avoid N₂O and minimize FiO₂
 - ▶ Remove drapes, towels, and any other flammable elements from the patient
 - ▶ Extinguish burning materials with saline or saline-soaked gauze
- Never use**
- Alcohol-based solutions
 - Any liquids in or on top of energized electrical equipment (laser, anesthesia machine, electroblade, etc.)

Fire persists after one attempt

- ▶ Use fire extinguisher (safe on wounds)

Fire still persists

- ▶ Evacuate the patient
- ▶ Close the OR door
- ▶ Turn OFF gas supply to room

4 After extinguishing the fire

- ▶ Maintain the airway
- ▶ Evaluate the patient to identify any inhalational injury and burns if not intubated
- ▶ Confirm the absence of secondary fires
 - Check the surgical field, drapes and towels

5 Assess patient status and devise ongoing management plan

6 Save involved materials/ devices for review

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Fig. 9 – Checklist for fire management. Source: Translated and updated with authorization from "OR Crisis Checklists" available at: www.projectcheck.org/crisis.

suspending volatile anesthetics and the use of safe anesthetic agents is in the fifth place but for the Spanish list, this became the second action following the activation of the aid system. The probability to consider the use of activated carbon filter in the respiratory circuit was also added, together with information about the clinical use of concentrated dantrolene (250 mg per vial). The contact number for the crisis hot line of the US Malignant Hyperthermia Association (MHAUS) was removed. The Spanish checklist is exhibited in the figure attached (Fig. 6).

The Spanish checklist for intraoperative management of hypotension is in the corresponding table. None of the articles lead to changes in the original list. Etilefrine and norepinephrine were added as reference information for selecting the pharmacological intervention (Fig. 7).

Full text articles were not evaluated for the checklist for management of hypoxia. Just as with the list for managing venous air embolism, the possibility to use transthoracic echocardiography for diagnostic evaluation was included in the reference information.³⁶ The Spanish list is available at the end of this document (Fig. 8).

A full text article on fire in the OR was evaluated.⁴⁹ The checklist translated into Spanish was not amended versus the original checklist (Fig. 9).

In order to update the checklists for managing intraoperative cardiac arrest, the complete text of the 2015 guidelines was evaluated^{37,39,42-47,50,51} and a second additional article on the management of body temperature during the post-arrest period.⁴⁰ In terms of the original lists, the number of thoracic compressions per minute was changed from a fixed value of 100 to a range of 100-120 compressions per minute. The number of breaths per minute was changed from 8 to 10. The use of vasopressin was eliminated in both scenarios of cardiac arrest. Information about some considerations to be kept in mind with the multimodal approach, to decide whether to stop the resuscitation. Extracorporeal membrane oxygenation (ECMO) was also included as an option to consider in the treatment of selected and potentially reversible causes (Figs. 10 and 11).

8 full text articles were evaluated for the translation of the checklist for management of unstable tachycardia.^{37,39,42-47} The information collected did not change the actions considered in the original list (Fig. 12).

9 Cardiac arrest – asystole/PEA



Non-shockable pulseless cardiac arrest

Start

- 1 **Ask for help, crash cart and report to the surgical team**
 - ▶ Ask: “Who will lead the critical event?”
 - ▶ State: “The top priority is high-quality CPR”
- 2 **Put backboard under patient, supine position**
- 3 **Use 100% FIO₂, turn off volatile anesthetics**
- 4 **Start CPR**
 - ▶ **Perform CPR**
 - “Hard and fast” about 100 – 120 compressions/min to depth of 5 – 6 cm
 - Ensure full chest recoil with minimal interruptions
 - 10 breaths/min, do not hyperventilate
 - ▶ **Administer epinephrine**
 - Repeat epinephrine every 3-5 min
 - ▶ **Reassess every 2 minutes**
 - Change CPR compression provider
 - Check ETCO₂
 - If: <10mmHg, evaluate the CPR technique
 - If: sudden rise >10 mmHg over baseline during CPR may signal return of spontaneous circulation (ROSC)
 - Check rhythm; if organized, check pulse
 - If: Asystole/PEA continue:
 - Reinitiate CPR (step 4)
 - Read aloud the Hs and Ts of cardiac arrest
 - If: VT/VF
 - Restart CPR
 - Refer to >List 10
 - If: return to spontaneous circulation but the patient is still in coma, consider Targeted Temperature Management (TTM)

Medication doses and treatments		
Epinephrine: 1mg IV, repeat every 3-5 min		
Toxicity treatment		
Local anesthetics: refer to >List 12		
Beta-Blockers: Glucagon 2-4 mg IV bolus		
Calcium Channel Blockers: Calcium chloride 1 g IV		
Hyperkalemia treatment		
1. Calcium gluconate	• 30 mg/kg IV	
or		
Calcium chloride	• 10 mg/kg IV	
2. Insulin	• 10 units regular IV (0.1 units/kg in children) with 1– 2 amps D50W (1 mL/kg in children) as needed	
3. Sodium Bicarbonate:	• 1-2 mEq/kg slow IV push	
Hs & Ts		
• Hydrogen ions (acidosis)	• Hypoxia	• Toxin (local anesthetic, beta blocker, calcium channel blocker)
• Hyperkalemia	• Cardiac tamponade	
• Hypothermia	• Tension Pneumothorax	
• Hypovolemia	• Thrombosis (pulmonary, coronary)	
During CPR		
Airway: Bag-mask (if adequate ventilation present)		
Circulation: Confirm adequate IV/IO access. Consider IV fluids wide open		
Assign roles: Chest compressions, Airway, Vascular access, Documentation, Code cart, Time keeping		
Failure to achieve ETCO ₂ >10 mmHg in capnography after 20 minutes of CPR may be considered as a component in the multimodal approach to decide stopping resuscitation		
Extracorporeal Membrane Oxygenation (ECMO) may be considered for select and potentially reversible causes		

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Fig. 10 – Checklist for management of cardiac arrest – asystole/PEA. Source: Translated and updated with authorization from “OR Crisis Checklists” available at: www.projectcheck.org/crisis.

The checklist for managing anesthetic systemic toxicity in the OR is available at the end of this document. 11 actions were included based on two checklists selected a priori.^{23,35} The actions for the new Spanish list were generated in accordance with the structure proposed by the original Ariadne Labs. The layout was adapted to the design style of the other checklists. Reference information about the clinical used of 20% lipid emulsion was included, in addition to potential critical events that may occur during an intraoperative local anesthetics crisis (Fig. 13).

A full text article was evaluated on failed airway management.⁵² The actions in the original list were not amended. The file used at the basis to print the translated and updated checklists in the form of a booklet, is available as an appendix in this document (Fig. 14).

Implementation guidelines

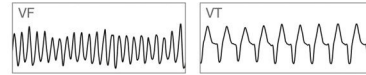
The implementation guidelines are based on the recommendations from Ariadne Labs.³³ It is recommended to organize a multidisciplinary team prior to implementation. Such team

shall be in charge of coordinating the implementation efforts and should comprise several anesthesiologists, OR nurses, and ideally a hospital administrator.³³ Depending on the individual institutional culture, you may consider including representatives from other disciplines in the team, for instance a specialized surgeon. Team members shall be highly motivated, though it is not a requirement to have held a leadership position in the institution.³³

It may be necessary to adapt the contents of the checklists to the particular clinic of hospital prior to their implementation. Changes in some actions may be relevant, for instance with regards to the specific information about available equipment and supplies, as well as institutional telephone numbers.³³

There are multiple approaches to the use of the checklist in the OR. In order to achieve the best performance, the implementation team shall consider some specific aspects. Any decision regarding such consideration shall be adopted upon evaluating their impact on simulated emergency situations. The opinion of potential checklist users should also be taken into account, in terms of their expectations for availability and use.³³

10 Cardiac arrest – VT/VF



Shockable pulseless cardiac arrest

Start

- 1 **Ask for help, crash cart and report to the surgical team**
 - ▶ Ask: "Who will lead the critical event?"
 - ▶ State: "Shock the patient, as soon as the equipment is ready"
- 2 **Put backboard under patient, supine position**
- 3 **Use 100% FIO₂, turn off volatile anesthetics**
- 4 **Start CPR**
 - ▶ **Perform CPR**
 - "Hard and fast" around 100-120 compressions/min to depth of 5 cm
 - Allow for full chest recoil with minimal interruptions
 - 10 breaths/min, do not hyperventilate
 - ▶ **Defibrillate**
 - Discharge at maximum power
 - Reinitiate COMPRESSIONS immediately after discharge
 - ▶ **Administer epinephrine**
 - Repeat epinephrine every 3-5 min
 - ▶ **Consider administering antiarrhythmics for refractory VT/VF** (Amiodarone is preferred if available)
 - ▶ **Assess every 2 minutes**
 - Rotate the person responsible for administering the compressions
 - Check ETCO₂
 - If: <10 mmHg, evaluate CPR technique
 - If: sudden increase to >10 mmHg over the baseline during CPR may indicate return of spontaneous circulation (ROSC)
 - Treat any reversible causes, consider reading aloud Hs and Ts of cardiac arrest (see list in the right column)
 - Check rhythm; if organized, check pulse
 - If: VT/VF persists: reinitiate CPR (Step 4)
 - If: Asystole/PEA refer to > List 9
 - If: return to spontaneous circulation but the patient is still in coma, consider Targeted Temperature Management (TTM)

Medication doses and treatments

Epinephrine: 1 mg IV, repeat every 3-5 min
 Amiodarone : • 1st dose: 300 mg IV/IO
 • 2nd dose: 150 mg IV/IO
 Magnesium • 1-2 IV/IO for *torsades de pointes*

Defibrillator instructions

1. Place the electrodes/paddles on the chest
2. Turn the defibrillator on, select the DEFIBRILLATION mode, increase ENERGY LEVEL to highest setting:
 - Biphasic: 200 J
 - Monophasic: 360 J
3. Deliver shock: press CHARGE then SHOCK

Hs & Ts

• Hydrogen ions (acidosis)	• Hypoxia	• Tension Pneumothorax
• Hyperkalemia	• Thrombosis (pulmonary, coronary)	• Toxin (local anesthetic beta blocker, calcium channel blocker)
• Hypothermia	• Cardiac tamponade	
• Hypovolemia		

During CPR

Airway: Bag-mask (if adequate ventilation present)
 Circulation: • Confirm adequate IV/IO access
 • Consider IV fluids wide open
 Assign roles: Chest compressions, Airway, Vascular access, Documentation, Code cart, Time keeping
 Failure to achieve ETCO₂ > 10 mmHg in capnography after 20 minutes of CPR may be considered as a component in the multimodal approach to decide stopping resuscitation
 Extracorporeal Membrane Oxygenation (ECMO) may be considered for select and potentially reversible causes

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Fig. 11 – Checklist for managing cardiac arrest – VT/VF. ECMO, extracorporeal membrane oxygenation; FiO₂, inspired oxygen fraction; VF, ventricular fibrillation; IV, intravenous; IO, intraosseous; CPR, cardiopulmonary resuscitation; ROSC, return of spontaneous circulation; VT, ventricular tachycardia. Source: Translated and updated with authorization from "OR Crisis Checklists" available at: www.projectcheck.org/crisis.

Location, presentation, and number of brochures available

There are many locations where checklists may be posted in the OR. Consider the possibility of having several copies of the brochures. Usually a hard copy of the checklist shall be made available next to every anesthesia machine. Furthermore, each person involved in the care of surgical patients may have a digital copy available in his/her own mobile device.

Using checklists during a critical event

It is advisable that the person reading the checklist during a critical event does not directly participate in the patient care. The list reader may be for instance the head nurse or a nursing assistant, medical student, intern, resident, or any team member able to use his/her time in directly reading the checklists.

Dissemination plan

As a general rule, everyone working in the OR must be aware of checklists available for use. In order to accomplish this goal, a few activities may be organized:

Presenting the checklists at formal work meetings with the healthcare staff and hospital leadership.

Talking personally with the surgical team members about the checklists asking for their collaboration in the implementation thereof. This may make some individuals less reluctant to using them.

Make an announcement about the fact that the checklists will be used in the institution. There are several ways to make this information available, including; internal newsletters, memoranda, posters, screen savers and badges.

Assess the impact of the implementation

It is critical to keep the information on the impact of the checklists at the site of implementation. This information shall be shared with the members of the surgical team, and particularly with the institutional leadership, since this furthers institutional support to the project.

Long term strategy

The initial implementation is critically important to the success of this type of initiatives. Likewise, consider the possibility of providing regular training with surgical team members.

11 Unstable tachycardia

Persistent tachycardia with hypotension, ischemic chest pain, altered mental status or shock

Start

- 1 **Ask for help, crash cart and report to the surgical team**
 - ▶ Ask: "Who will lead the critical event?"
- 2 **Use 100% FiO₂, turn down volatile anesthetics**
- 3 **Analyze rhythm**
 - If it is wide complex and irregular: treat as VF/VT and refer to ▷List 10
 - Otherwise, get ready for cardioversion
- 4 **Prepare for immediate synchronized cardioversion**
 1. Every patient who is conscious should be sedated unless deteriorating rapidly
 2. Turn the monitor/defibrillator on, use DEFIBRILLATOR mode
 3. Place electrodes on chest
 4. Activate the synch mode (SYNC)
 5. Look for the mark/spike on the R wave indicating SYNC mode
 6. If necessary, adjust until the SYNC signs are seen with every R wave
- 5 **Use the appropriate energy level for cardioversion**
 1. Determine appropriate energy level using Biphasic Cardioversion table at right; begin with lowest energy level and progress as needed
 2. Press ENERGY SELECT until desired energy level is shown
 3. Press the CHARGE button
 4. Press and hold the SHOCK button
 5. Check the monitor. If tachycardia persists, increase energy level
 6. Activate the SYNC mode after each discharge
- 6 **Consider expert consultation with Intensive Care / Cardiology**

Biphasic cardioversion: Energy levels	
Condition	Energy level (progression)
Narrow complex, regular	50 J → 100 J → 150 J → 200 J
Narrow complex, irregular	120 J → 150 J → 200 J
Wide complex, regular	100 J → 150 J → 200 J
Wide complex, irregular	Manage as VT/VF, refer to ▷ List 10

Critical events

If cardioversion is required and it is not possible to synchronize shock, use high-energy unsynchronized shocks

Biphasic: 200 J
Monophasic: 360 J

If cardiac arrest, refer to:

- ▷ List 9 Cardiac arrest – Asystole/PEA
- ▷ List 10 Cardiac arrest – VT/VF

During CPR

Airway: Assess and secure

Circulation: • Confirm adequate IV or IO access
• Consider IV fluids wide open

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Fig. 12 – Checklist of management of unstable tachycardia. FiO₂, inspired oxygen fraction; VF, ventricular fibrillation; IV, intravenous; VT, ventricular tachycardia. Source: Translated and updated with authorization from "OR Crisis Checklists" available at: www.projectcheck.org/crisis.

12 Local anesthetics toxicity

Sudden mental status changes (agitation or loss of consciousness, with or without tonic-clonic seizures) or cardiovascular instability (sinus bradycardia, heart block, asystole, ventricular tachyarrhythmias) following the administration of local anesthetic agents

Start	Medication doses and treatment
<ol style="list-style-type: none"> 1 Ask for help, crash cart and report to the surgical team <ul style="list-style-type: none"> ▶ Ask: "Who will lead the critical event?" 2 Use 100% FiO₂ 3 Stop the administration of local anesthetic 4 Secure the airway, if necessary consider endotracheal intubation 5 Confirm or establish IV access 6 If any sign of systemic toxicity due to local anesthetics or cardiac arrest were to occur, administer 20% lipid emulsion <ul style="list-style-type: none"> • Propofol is not a proper substitute for lipid emulsion • Avoid using propofol in patients with signs of hemodynamic instability 7 If seizures occur <ul style="list-style-type: none"> • Administer benzodiazepines, thiopental, or propofol at low doses increasing progressively 8 If hemodynamic instability were to occur, see critical events <ul style="list-style-type: none"> • Basic and Advanced Life Support (ACLS) will require adjustments in the medications and extended effort • Continue with CPR during treatment with lipid emulsion 9 Avoid calcium channel blockers, beta blockers, vasopressin, and local anesthetics 10 Reduce the individual dose of epinephrine to <1 mcg/kg 11 Consider using Extracorporeal Membrane Oxygenation (ECMO) if available 	<div style="background-color: #0056b3; color: white; padding: 5px;">Medication doses and treatment</div> <p>Lipid emulsion (20%): Bolus of 1.5 mL/kg (dry weight) IV/1 min Continuous infusion 0.25 mL/kg/min = 1000 cc/h Repeat bolus once or twice for persistent cardiovascular collapse (5 min interval between boluses)</p> <hr/> <p>– Continue infusion for at least 10 minutes after achieving cardiovascular stability or reaching the maximum dose – If failure to achieve hemodynamic stability or further impairment of circulation, consider doubling the infusion rate to 0.5 mL/kg/min = 2000 cc/h – Maximum recommended dose: Approximately 12 cc/kg = 840 cc of lipid emulsion over the first 30 minutes</p> <hr/> <p>Dose for 70 Kg patient – Bolus: 100 mL – Infusion: 1000 mL/hour – Double the infusion: 2000 mL/hour</p>
	<div style="background-color: #8b4513; color: white; padding: 5px;">Critical events</div> <p>If hemodynamic instability is present:</p> <ul style="list-style-type: none"> • Unstable bradycardia, refer to > List 2 • Cardiac arrest – Asystole/PEA, refer to > List 9 • Cardiac arrest – VT/VF, refer to > List 10 • Unstable tachycardia, refer to > List 11

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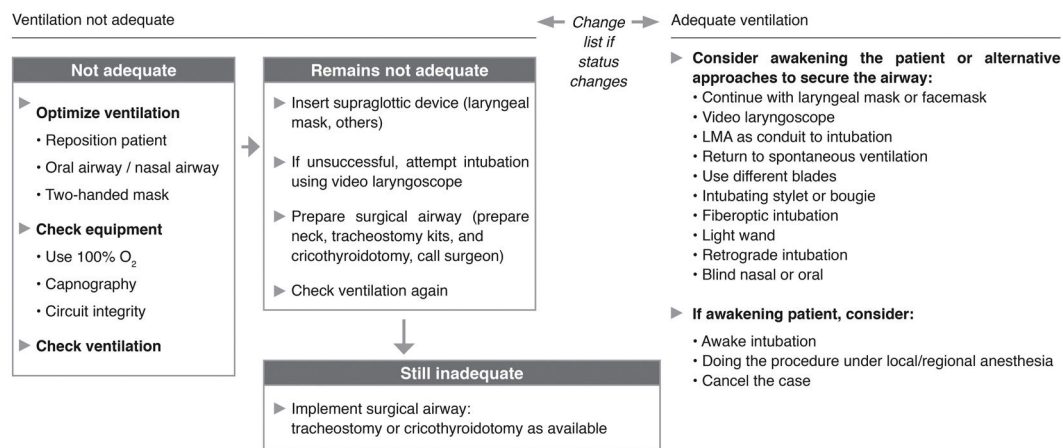
Fig. 13 – Checklist for managing local anesthetics toxicity. ACLS, advanced cardiovascular life support; BLS, basic life support. Source: Translated and updated with authorization from "The Association of Anaesthetists of Great Britain & Ireland" available at: www.rcoa.ac.uk.

13 Failed airway

Two failed intubation attempts by an airway expert

Start

- 1 Ask for help, crash cart and report to the surgical team
 - ▶ Ask: "Who will lead the critical event?"
- 2 Get the difficult airway car and a video laryngoscope (if available)
- 3 Bag-mask ventilate with 100% oxygen
- 4 Is the ventilation adequate?



Every reasonable precaution has been considered to check the information herein. The reader accepts the responsibility of interpreting and using this material. Revised, June 2016

Fig. 14 – Checklist for failed airway management. Source: Translated and updated with authorization from "OR Crisis Checklists" available at: www.projectcheck.org/crisis.

Discussion

As a result of this initiative by S.C.A.R.E. some checklists were translated and adapted to the Colombian Spanish terminology, in addition to updated based on the current evidence. The expectation is that the information contained in the new checklists have a stronger content validity as compared with doing the translation without going through a systematic review, leading to enhanced probabilities of recommending actions consistent with the current knowledge.

Although cognitive aids are a very important tool in the management of critical events, having available checklists properly translated and updated does not necessarily ensure having better outcomes in surgical patients. The leaders of the surgical departments must be aware of the need to establish a sound implementation program for checklists.²⁴

The evidence of the positive impact of checklists on the performance of the staff responsible for the clinical management of surgical patients is consistent. However, there have been cases in which this positive impact is not materialized. For example, a misdiagnosis of a critical event may result in the selection and use of the inadequate checklist for the particular critical situation. The fact that strategies such as the use checklists have been adopted in the airplane industry may not be extended to a wrongful and potentially dangerous analogy.⁵³ Clearly patients are not airplanes, and anesthesiologists are not pilots.⁵⁴ It is impossible for a checklist to perfectly fit any critical situation that may arise in the OR. Consequently, despite the usefulness of checklists and other cognitive aids, proper skill-based training (knowledge, skills, and attitudes),⁵⁵ clinical experience, and a commitment to patient safety, are still key for the management of critical events in the OR.⁵⁶

In summary, the new translated and updated checklists resulting from S.C.A.R.E.'s initiative, are available to all the members of the healthcare staff for implementation at simulation educational settings and in clinical practice, as an additional tool in our quest for better outcomes in patients undergoing treatment in the OR.

Funding

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Conflicts of interest

Prior to the development of this document, all authors completed a form to disclose any conflicts of interest. The authors have no conflicts of interest to disclose.

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