



## AN OVERVIEW ON ANESTHESIA INTERVENTIONS THAT ALTER POSTOPERATIVE COMPLICATIONS AND MORTALITY

Mohammed Saleem Alsofiyani<sup>1\*</sup>, Faisal Abdulmohsen Aljuaid<sup>1</sup>, Fehaid Mohammed N Alghtani<sup>2</sup>, Matab Mohammed Bushnag<sup>3</sup>, Nashmi Naife Al-Jubairi<sup>4</sup>, Ghassan Hussain Alsinan<sup>5</sup>, Norh Ahmad Almodehash<sup>6</sup>, Faris Saleh Mohammed<sup>7</sup>, Zaid Alawi Alotaibi<sup>8</sup>, Ahmed Mohammad Alazwari<sup>9</sup>, Mohammed Abdullah Al Khalaf<sup>10</sup>

1. Faculty of Medicine, Taif University, Taif, KSA.
2. Department of Anesthesia, King Salman Hospital, Riyadh, KSA.
3. Faculty of Medicine, King Abdulaziz University, Jeddah, KSA.
4. Faculty of Medicine, Almajma'ah University, Riyadh, KSA.
5. Faculty of Medicine, University of Warmia and Mazury, Olsztyn, Poland.
6. Faculty of Medicine, King Saud University, Riyadh, KSA.
7. Faculty of Medicine, King Khalid University, Abha, KSA.
8. Department of Emergency Medicine, Al Iman General Hospital, Riyadh, KSA.
9. Faculty of Medicine, Imam Mohammed Bin Saud Islamic University, Riyadh, KSA.
10. Faculty of Medicine, Vision Colleges, Riyadh, KSA.

### ARTICLE INFO

#### Received:

07 Nov 2020

#### Received in revised form:

20 Feb 2021

#### Accepted:

22 Feb 2021

#### Available online:

28 Feb 2021

**Keywords:** Anesthesia complications, Mortality, Epidemiology, Medication errors

### ABSTRACT

The occurrence of anesthetic complications postoperatively is not unique. However, some anatomical and physiological change takes place after surgical procedures. Managing surgical patients remain challenging in different aspects and stages of hospital management. Morbidity and mortality that occurs postoperatively under incorrect dosing and administration are common for anesthesiologists injecting up to half a million medication throughout their profession. The expectancy and chances of committing errors are unpredictable and tragic. This review will guide anesthesiologists to modify new clinical skills that will aid their evaluation upon dealing with anesthetic complications. This literature review aims to examine and discuss the most undesirable complications categories and mortality rates after anesthetics administration. This review was obtained using an electronic-based search engine along with Google Scholar and PubMed. Anesthesiologists need to describe the complications in a categorized form, to clarify the anesthetics hazards as clear as possible. This will result in a better outcome for any at risk patients and make the intervention much quicker and precise.

*This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non commercially, as long as the author is credited and the new creations are licensed under the identical terms.*

**To Cite This Article:** Alsofiyani MS, Aljuaid FA, Alghtani FMN, Bushnag MM, Al-Jubairi NN, Alsinan GH, et al. An Overview on Anesthesia Interventions that Alter Postoperative Complications and Mortality. *Pharmacophore*. 2021;12(1):89-92. <https://doi.org/10.51847/V8daoHwkdg>

### Introduction

Managing surgical patients remain challenging in different aspects and stages of hospital management. "How are we prepared to overcome any complications of anesthesia?" question is often asked among the anesthetists' team. Several reasons are determining why anesthetists must be able to answer these questions. An anesthetist trainee is expected to be able to respond and master ways to avoid and overpower these types of controversial questions, however, it seems that it is quite tough to answer this question [1].

Some of the earliest notable effects of anesthesia postoperatively, and were managed in critical care such as airway and renal complications. Other devastating complications are associated with cardiovascular and cognitive dysfunction [2, 3]. Central and peripheral neurological systems-related injuries have not been always a field of interest in anesthesiology, and it is argued that neural function is practically ignored especially in the perioperative period [2].

**Corresponding Author:** Mohammed Saleem Alsofiyani; Faculty of Medicine, Taif University, Taif, KSA. E-mail: [Moha\\_sf@outlook.com](mailto:Moha_sf@outlook.com).

The impact of anesthetic medication needs attention as errors are a major issue after anesthetic administration. Morbidity and mortality that occur postoperatively under incorrect dosing and administration are common for anesthesiologists injecting up to half a million medications throughout their profession. The expectancy and chances of committing errors are unpredictable and tragic [4].

This literature review aims to examine and discuss the most undesirable complications categories and mortality rates after anesthetics administration. Moreover, this review will guide anesthesiologists to modify new clinical skills that will aid their evaluation upon dealing with anesthetic complications. In addition, it will focus and participate to maintain a safe workplace for managing patients undergoing anesthesia.

**Materials and Methods**

This is overview research concluding all topics related to the complications and mortality in anesthesia within the periods of 1954 up to 2018. This review was obtained using an electronic-based search engine along with Google Scholar and PubMed. Published researches written in English and English translated researches were only collected to be analyzed in this review. Only related articles, documents, clinical trials, and reviews were included in this research. The search used a combination of these keywords on MESH and these terms were included: (( “Anesthesia” [Mesh] “Mortality”[Mesh] “Complications” [Mesh] “History” [Mesh] “Incidence” [Mesh] “Definition” [Mesh] “Medication” [Mesh]AND “Errors” [Mesh])).

*Review*

*Anesthesia Worldwide Burdens*

For many decades anesthesia mortality risks have been an intense research field. Between the periods of 1948 and 1952, ten academic medical centers and 599,500 surgical patients were studied in the United States to assess the deaths preceding anesthesia and surgery. The death rate reached up to 64 deaths upon every 100,000 procedures under anesthetic agents, patient health characteristics, and health provider types. The number of deaths reached up to 5100 or 3.3 per 100,000 populations. The number of deaths exceeded poliomyelitis at that time [5, 6].

The 1954 report helped in identifying and marking anesthesia safety measures as an existing health issue. This had a greater chance in inspiring and improving new anesthesia techniques, training administration methods, drugs. Therefore, the mortality rate associated with anesthetic procedures has declined from 1 in 1000 deaths in the late 1940s to 1 in 100,000 in the early 2000s [5, 7].

As postoperative pulmonary complication is an aggravating problem in vascular and abdominal surgeries, the rates in patients who are considered at risk increased up to 40% [8, 9]. Unlike patients being at risk and does not undergo cardiac or obstetric surgery, rates were up to 14.5%. Generally, a severe pulmonary complication occurs in about 2.8% of all cases undergoing general anesthesia [9, 10].

The mortality rate that is noticeable on acute renal injury after anesthesia often reaches up to 46%. Renal injury complicates hospital admissions up to 20%. It complicates surgical procedures approaching 30 – 40% of hospital perioperative acquired acute kidney injuries [11].

Several case reports and prospective studies were done to estimate the incidence of medication errors. The results in these prospective studies showed that the medications errors rate has not changed throughout 15 years, with a fixed rate that ranges between 0.33% and 0.73%. Errors upon medical events have been reported by a critical care safety study, where 80.5 medications were bound to harm nearly thousands of patients during medical or coronary care. The most-reported drugs included popular cardiac stimulants, opioids, and vasopressors [4].

*Defining Anesthesia Complications and Associated Clinical Events*

When deliberating the complications of anesthesia, the idea of unfavorable events applies very well to a future context regarding critical and usual postoperative conditions. The occurrence of anesthetic complications postoperatively is not unique. However, some anatomical and physiological change takes place after surgical procedures. This reflects upon the activity and response of the patient to the improvement process. **Table 1** below describes the complications in a categorized form, to clarify the anesthetics hazards as clear as possible [1].

**Table 1.** Anesthetics hazards defined by systems, categories, events, consequences, and contributing factors [1]:

Systems and related categories	Associated events	Undesired consequences	Complications contributing factors
	Tracheal intubation difficulties	Soft tissue injury Dental injury Hypoxia	Not enough experience Airway difficulties Urgencies
Lower airway tract	Difficulties in incubation Oxygenation obstacles	Airway injury Hypoxia Surgical injury Surgical delay Sudden death	Inaccurate assessment of the airway

Respiratory system	Airway subjected to high pressures	Pneumothorax Pulmonary barotrauma	Incomplete muscle relaxation Overweight Pneumoperitoneum Bronchospasm
	Endotracheal tube placement	Hypoxia	Unable to do chest auscultation Lack of experience
	Aspiration	Pneumonitis Ventilation is prolonged	Reflux might occur Patient might not be fasting
	Lung injury by needles	Pneumothorax	Central line insertion difficulties Lack of experience
Cardiovascular	Hypotension	Sudden arrest Ischemia Brain injuries	Hemorrhage Sepsis Hypovolemic shock Neuraxial block
	Hypertension	Hemorrhage Stroke Aneurysmal or anastomosis rupture	Twilight sedation Incompetent analgesia Awareness
Central nervous system	Post Dural punctures	Postural headaches	Spinal or epidural difficulties Lack of experiences
	Misplaced epidural catheterization	Post-or intraoperative pain	Prolonged surgery Lack of experiences Procedure obstacles
	Epidural vessels damage	Paraplegic epidural hematoma	Coagulopathies Anticoagulation Bleeding disorders
	Unable to turn the vapouriser on	Psychological traumas Awareness	Distractions Comorbidity Surgeries of high risk
Peripheral nervous system	Intra-neural injections	Injury of the peripheral nerve Pain and weakness	The patient is positioned incorrectly Lack of experience
Drug-related	Allergic reactions	Anaphylaxis	Patient-related factors Insufficient history taking information
	Adverse drug reactions	Malignant hyperthermia	Patient-related factors Insufficient history taking information
	Error in drug administration	Neuromuscular blockade Hypertension	Inaccurate labeling Lack of attention Distractions
	Intravenous line infiltration	Absence of drug effect	Access difficulties Insert in situ lines from the ward

### Conclusion

For many decades, anesthesia mortality risks have been an intense research field. Identifying and marking anesthesia safety measures as an existing health issue has a greater chance of inspiring and improving new anesthesia techniques, training administration methods, drugs. The occurrence of anesthetic complications postoperatively is not unique. However, some anatomical and physiological change takes place after surgical procedures. This reflects upon the activity and response of the patient to the improvement process. Anesthesiologists need to describe the complications in a categorized form, to clarify the anesthetics hazards as clear as possible. This will result in a better outcome for any at-risk patients and make the intervention much quicker and precise.

**Acknowledgments:** None

**Conflict of interest:** None

**Financial support:** None

**Ethics statement:** None

## References

1. Merry AF, Mitchell SJ. Complications of anaesthesia. *Anaesthesia*. 2018;73 Suppl 1:7-11.
2. Mashour GA, Woodrum DT, Avidan MS. Neurological complications of surgery and anaesthesia. *Br J Anaesth*. 2015;114(2):194-203.
3. Lankhorst S, Keet SW, Bulte CS, Boer C. The impact of autonomic dysfunction on peri-operative cardiovascular complications. *Anaesthesia*. 2015;70(3):336-43.
4. Dhawan I, Tewari A, Sehgal S, Sinha AC. Medication errors in anesthesia: unacceptable or unavoidable? *Braz J Anesthesiol*. 2017;67(2):184-92.
5. Li G, Warner M, Lang BH, Huang L, Sun LS. Epidemiology of anesthesia-related mortality in the United States, 1999-2005. *Anesthesiology*. 2009;110(4):759-65.
6. Beecher HK, Todd DP. A study of the deaths associated with anesthesia and surgery: based on a study of 599, 548 anesthetics in ten institutions 1948-1952, inclusive. *Ann Surg*. 1954;140(1):2-35.
7. Dripps RD, Lamont A, Eckenhoff JE. The role of anesthesia in surgical mortality. *Jama*. 1961;178:261-6.
8. LAS VEGAS investigators. Epidemiology, practice of ventilation and outcome for patients at increased risk of postoperative pulmonary complications: LAS VEGAS - an observational study in 29 countries. *Eur J Anaesthesiol*. 2017;34(8):492-507.
9. Mills GH. Respiratory complications of anaesthesia. *Anaesthesia*. 2018;73 Suppl 1:25-33.
10. Gupta H, Gupta PK, Fang X, Miller WJ, Cemaj S, Forse RA. Development and validation of a risk calculator predicting postoperative respiratory failure. *Chest*. 2011;140(5):1207-15.
11. McKinlay J, Tyson E, Forni LG. Renal complications of anaesthesia. *Anaesthesia*. 2018;73 Suppl 1:85-94.