International Journal of Enhanced Research in Medicines & Dental Care (IJERMDC),
ISSN: 2349-1590, Vol. 10 Issue 7, July 2023, Impact Factor: 7.125

Artificial Intelligence in Anaesthesia: A Study

Majid Anwar Bhat

Assistant Professor, Centurion University of Technology and Management, Andhra Pradesh

ABSTRACT

Increased senior population demands specialized surgical services in future. For improved results, patients should receive better anaesthesia care. Surgical anaesthesia is a key advancement in the medical field's goal to lessen human suffering and pain. A controlled unconsciousness known as anaesthesia is attained by the use of medications that are given both before and during treatments. General anaesthesia (GA), a brief loss of consciousness and feeling, is frequently administered with the aid of drugs, vaporizers, and gases. Procedures that are lengthy, impede with breathing, call for extensive organ surgery, result in a major loss of blood, or expose patients to hazards may call for GA. Local anaesthesia could be necessary for patients with allergies or other medical issues. Blood glucose or blood sugar levels are essential for healthy functioning. For successful surgical outcomes, blood glucose levels must be maintained and are impacted by age, fasting, and surgery. By monitoring levels of unconsciousness and altering dosages, artificial intelligence (AI) has the potential to completely transform surgical procedures. By processing patient data and turning it into mathematical models, AI can better preoperative planning, increase operating room usage, find clinical connections, and enhance surgical results. Artificial intelligence in operating theatres can enhance productivity, precision, and patient results. The discomfort may be lessened and emergency alarms may be provided by computer-controlled anaesthetic equipment. Automating mundane activities with robotic anaesthesia frees up anaesthesiologists to concentrate on treating patients. Robotic anaesthesia has the potential to revolutionize the industry and cut down on human error with more research.

Key Words: ***Surgical services, Surgical anaesthesia, General anaesthesia, Artificial intelligence, Robotic anaesthesia***

INTRODUCTION

There is a significant increase in the population of many countries compared to the past. Worldwide, the population is growing rapidly. It is expected that in the coming decades, the percentage of senior citizens undergoing surgical procedures will increase significantly. The aging population also increases the need for surgical services, which require more specialized knowledge and abilities.

Improve anaesthetic care, reduce complications, and enhance surgical outcomes for patients, will be useful in benefiting both patients and society. Senior patients desire minimal discomfort, low anaesthesia risk, and speedy recovery, making it crucial to provide optimal anaesthesiology care.

Anaesthesiologists strive for efficient, safe, pain-controlling, and reproducible anaesthesia care for procedures without hospitalization, ensuring quick patient discharge and a comfortable experience. Aiming for careful patient and procedure selection, managing anaesthetics, and ensuring prompt discharge are crucial for safe ambulatory surgical treatment without compromising care standards.

Objectives of the Study:
The primary goal of this study is to analyze the advantages and potential benefits of using AI in anaesthesia.

RESEARCH METHODOLOGY

The content of this paper is based on conceptual thoughts and beliefs of researcher in the area of artificial intelligence in anaesthesia

Explore anaesthesia concepts and evolution
The reduction of human pain and suffering is, and always has been, the primary goal of medical art and science. This goal has never been so successfully accomplished in medicine as it has been with the development of surgical anaesthesia. Given that consenting to surgical procedures entails the conscious anticipation of pain and distress far

greater than those typically experienced in accidents or common illnesses, this is not particularly remarkable. One of science's greatest accomplishments has been the evolution of anesthesia from an empirical basis to a solid rational foundation. It also offers one of the most fascinating side stories to the expansion of knowledge. General anesthesia is a controlled state of unconsciousness attained with the aid of a number of drugs, typically given prior to and during surgery or other medical procedures. These drugs put the patient to sleep, halting any movement or discomfort throughout the procedure. They are typically given intravenously and through gas inhalation. Analgesia is the first stage of general anesthesia, followed by delirium, stage two, surgical anesthesia, stage three, and respiratory arrest, stage four. The anesthesia is said to become "deeper" as the patient is affected by the anesthetic more and more. The most frequent uses of general anesthesia are during major operations like heart surgeries, knee and hip replacements, and various cancer surgical procedures. Without general anaesthesia, many of these surgeries, many of which are life-saving or life-changing, would not be possible.

The temporary or reversible loss of consciousness and sensations is referred to as general anaesthesia (GA). GA is typically carried out with a combination of IV medication, vaporizers, and gases (anaesthetics). During the anaesthesia period, you will be unconscious, and many of your body's functions will be sluggish or need assistance to work properly. A closed mask or an endotracheal tube (ETT) may be used to assist your breathing. An anaesthesiologist will keep an eye on the patient's vital signs throughout the procedure to make sure they remain consistent with normal values for heart rate, blood pressure, and respiration. Procedures that take a long time to complete, interfere with your normal breathing, require the operation of a large organ, cause significant blood loss, or expose you to risks, such as surgery, may require general anaesthesia (GA). the sufferer to excruciating pain or discomfort. Furthermore, patients who are unable to tolerate local anaesthesia because of allergies or other medical conditions might require.

The term "blood sugar level" refers to the quantity of sugar in the blood. Blood glucose levels that are higher than normal are referred to as hyperglycaemia, whereas low blood sugar levels are referred to as hypoglycaemia. Fasting blood sugar levels should be between 70 and 99 mg/dL. In the liver and skeletal muscle cells, glucose is stored as glycogen. Insulin promotes the removal of glucose from the bloodstream into the muscles, fats, and liver while also slowing the release of glucose into the bloodstream from the liver. A 70 kg person's blood will contain 4 grams of glucose. In surgical patients, elevated blood sugar has been linked to higher rates of mortality and morbidity. Additionally, hyperglycemia has been connected to a poor clinical outcome in both diabetic and non-diabetic people. Despite the lack of a perfect peri-operative blood glucose target, a level of 150 mg/dl is typically regarded as clinically acceptable, despite the fact that it is frequently difficult to achieve. Several illnesses could result in either hyper- or hypoglycaemia during the peri-operative period. Both diabetics and non-diabetics will experience stress-related hyperglycemiaas a result of the procedure and anesthesia. Hyperglycemia is a condition in which there are elevated levels of glucagon, cortisol, and insulin in the blood. With plasma cortisol and blood glucose levels rising somewhat after straightforward surgical procedures but dramatically with serious intra-abdominal surgeries, the metabolic changes seem to be proportionate to the surgical stress.

Maintaining blood glucose levels during the pre-operative and intra-operative phases is crucial as abnormal levels can impact surgery outcomes. Low blood sugar levels can cause neuro-endocrine stimulation and delayed wound healing, while high blood sugar levels may cause infection. Factors influencing blood sugar levels include age, fasting, surgery, anaesthetic stress, steroid or antibiotic use, and intravenous fluid type.

AI applications in anaesthesia practice

Anesthesiologists carry out several important tasks during surgery. A recent development in artificial intelligence might continuously monitor a patient's level of unconsciousness and adjust the propofol dose accordingly, helping the doctor by offering valuable support. The incorporation of artificial intelligence (AI) in the operating theater has the potential to revolutionize surgical practices and enhance patient outcomes. AI serves as a decision-support tool for surgeons, objectively analyzing patient data and compensating for variations in knowledge and experience among surgeons. One of the key advantages of AI is its ability to identify clinically relevant correlations that physicians may not recognize, leading to more accurate diagnoses and treatment plans. In terms of efficiency, AI can have a significant impact on preoperative planning, optimizing the utilization of operating theaters and reducing overtime.

The use of AI is primarily applied in imaging, navigation, and robotic intervention in surgery, providing surgeons with real-time assistance and improving precision. Moreover, AI-based decision-making systems have the potential to overcome limitations caused by surgeon judgment or bias, ensuring more consistent and evidence-based treatment approaches. These AI systems are capable of processing large amounts of patient data and converting it into mathematical models, enabling surgeons to make more informed decisions and improve surgical outcomes. Overall, the use of artificial intelligence in the operating theater holds great promise in enhancing efficiency, accuracy, and patient outcomes. Computer-controlled anesthesia machines aid in reducing the patient's discomfort during surgical procedures and also come equipped with features like alarms that will sound in an emergency or

when a backup is required to switch a damaged pipeline or cylinder. Anymechanical system that can interact with the environment in response to directed interventions is a robot. Robotic interventions in medicine can be precise and repeatable, which makes them particularly appealing for complex surgery and anesthesia. They relieve the anesthesiologist of time-consuming technical duties so they can focus on overall evaluation and decision-making. Robots are made to assist clinicians by automating routine tasks and providing pertinent recommendations based on the clinical scenario to support decision-making.

The future of anesthesia is robotic anesthesia. Robotic anesthesia is an emerging field that aims to automate and improve the administration of anesthesia during medical procedures. Robotics in anesthesia has the benefit of taking over the repetitive tasks, freeing up the anesthesiologist to concentrate on the patients. Robots can accurately administer the medications and monitor vital signs, reducing the risk of human error. This technology also allows for precise control over the dosage and timing of anesthesia, ensuring optimal patient comfort and safety. By utilizing advanced technologies and artificial intelligence, robotic anesthesia has the potential to enhance precision, reduce human error, and provide personalized patient care. With ongoing research and development, it holds promise for revolutionizing the field of anesthesiain the near future.

The majority of artificial intelligence experts speculate on the Singularity, when computers will eventually catch up to and surpass human intelligence, and forecast it to happen between 2030 and 2045.This would eliminate the need for human anesthesia providers, though it would also eliminate most other areas of human activity. The broad effect s of such an event, however, are unpredictable. and might lose job opportunities in this field. The advancement of artificial intelligence in the field of anesthesia raises concerns about job displacement for human anesthesia providers. While it is true that the development of AI could potentially lead to a decrease in job opportunities in this field, it is important to consider the potential benefits and advancements that AI can bring to healthcare as a whole. Additionally, it is crucial to explore ways in which human anesthesia providers can adapt and collaborate with AI technologies to enhance patient care and safety.

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