

ABSTRACT

Anesthesia and Intensive Care is among the most complex and challenging medical specialities. Beyond the multitude of manoeuvres that must be executed, patients must be understood in the smallest physiological and pathophysiological details. Anaesthesia and intensive care represent a crucial field within the medical system, playing a vital role in managing patients who require surgical interventions, as well as in the care of those in critical health conditions.

This speciality ensures not only the survival of patients in emergencies but also the improvement of their quality of life post-intervention or during recovery in intensive care units. The thesis "Complementary Studies in ICU – from the Electrophysiology of Sodium Channels to Personalized Medicine for the Critical Patient" presents various research directions undertaken in both Anesthesia and Intensive Care.

The first part of the thesis comprises two main chapters. The first chapter presents the current state, the evolution of the career as a teaching staff and ICU doctor, and the research directions.

The second chapter of the first part details 10 representative articles, presenting 5 articles in the field of anaesthesia and 5 articles from the field of intensive care, concerning the specialised literature.

The articles presented in the document cover various aspects of anaesthesia and intensive care, from the pharmacology of local anaesthetics and their effects on neurotransmitter release to the use of lipid emulsions in combating systemic toxicity and monitoring ropivacaine through advanced methods of liquid chromatography and mass spectrometry.

Each study contributes to the understanding and improvement of clinical practices in the field of anaesthesia and intensive care, highlighting the importance of ongoing research to optimize patient care.

1. Pharmacology of local anaesthetics and diversity of sodium channels: This article explores how the pH sensitivity of different sodium channel inhibitors suggests distinct chemical pathways for drug access, having significant implications for developing more effective and safer anaesthetics.

2. Effects of local anaesthetics on neurotransmitter release: The study investigates how local anaesthetics, such as lidocaine and bupivacaine, influence the release of catecholamines, offering new perspectives on their mechanisms of action and potential neurotoxic side effects.
3. Use of lipid emulsions to combat systemic toxicity of local anaesthetics: The research highlights the potential of lipid emulsions to provide cardiovascular protection against toxicity induced by local anaesthetics, such as Ropivacaine, by mitigating the production of reactive oxygen species and protecting cardiac cells.
4. Monitoring ropivacaine through LC-MS/MS: The article presents the development of a precise and efficient method for monitoring the concentrations of ropivacaine and its metabolite in human plasma, contributing to optimizing dosing and preventing systemic toxicity in clinical practice.
5. Continuous local analgesia in treating postoperative pain: This research demonstrates the effectiveness of continuous local analgesia, through wound perfusion with ropivacaine, in reducing the need for postoperative opioid analgesics and improving patient comfort after the repair of incisional hernias.

Each of these studies adds value to the field of anaesthesia and intensive care, enhancing the understanding of the mechanisms of action of anaesthetics, exploring new therapeutic approaches, and contributing to safer and more effective patient care.

The articles on intensive care in the examined document cover a variety of essential topics, reflecting the complexity and challenges in caring for critical patients, as well as the importance of continuously adapting medical practices in the face of discoveries and emergencies, such as the COVID-19 pandemic.

1. Personalized medicine for the critical patient: Highlights the importance of tailoring treatment to the individual needs of each patient in intensive care units (ICU), emphasising how personalisation of care can improve treatment outcomes. The COVID-19 pandemic has underscored the need for such an approach, due to the diversity of clinical manifestations of the disease.
2. Assessment of diaphragm thickness reduction in critically ill COVID-19 patients: Presents a study showing a significant reduction in diaphragm thickness in mechanically ventilated COVID-19 patients, associating the decrease with an unfavourable prognosis. The study suggests CT evaluation of the diaphragm as a potentially useful tool in predicting the outcomes of critical patients.

3. Assessment of psoas area and density in COVID-19 patients using CT imaging: Investigates the rapid muscle loss and its impact on physical function and quality of life post-hospitalization. Although the changes measured in the psoas muscle were not statistically significant, the study highlights the need for monitoring muscle mass and early interventions to improve the prognosis of patients.

4. Airway ultrasonography for anaesthesia and intensive care patients: Discusses the use of ultrasound in evaluating airways, highlighting the benefits of this technique in predicting intubation difficulty and improving patient safety. The article promotes the development of protocols to make ultrasonography more accessible and integrated into clinical practice.

5. Study on anxiety and post-traumatic stress disorder among intensive care personnel during the COVID-19 pandemic: Explores the significant impact of the pandemic on the mental health of ICU staff, highlighting the increase in cases of anxiety and PTSD. The study emphasizes the need to support medical and auxiliary staff, recognizing the extraordinary challenges they faced during this critical period.

These articles highlight several facets of care in intensive care, from adapting treatments to the specifics of each patient to the challenges posed by managing the COVID-19 pandemic, and underscore the importance of continuous research for improving clinical practices and outcomes for patients.

The second part of the current thesis illustrates the career, teaching, and research perspectives that will be followed or are in development.

In conclusion, Anesthesia and Intensive Care represent a dynamic, deeply humane, and technologically advanced medical speciality, offering remarkable professional and personal satisfaction. It is a field that requires dedication but rewards with a direct and significant impact.