UMEÅ UNIVERSITY

Tracheal extubation of patients in the anesthesia setting

From the perspectives of registered nurse anesthetists and anesthesiologists

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This thesis I dedicate to You, Linnéa, Lovisa, and Leonora.

When all the pieces fall into place, you'll understand why things happened the way they did.

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Abstract

Background: Tracheal extubation is a critical risk phase for patients undergoing general anesthesia and is related to complications for the patient. In Sweden, registered nurse anesthetists and anesthesiologists perform extubations and share responsibility for the patient. While there is research regarding the medical and technical aspects of when to extubate, there is a lack of research regarding the experience of registered nurse anesthetists (RNAs) and anesthesiologists (ANs) and their reasons for deciding when to perform extubation. Clinical judgment is applied in making crucial decisions, and non-technical skills are essential in clinical practice.

Aim: To describe and explore registered nurse anesthetists' and anesthesiologists' experiences of tracheal extubation in the anesthesia setting.

Methods: This thesis was based on interviews with registered nurse anesthetists and anesthesiologists. In Study I, focus group interviews were performed with RNAs (n=20). Individual interviews were conducted with ANs (n=17) in Study II. Both studies employed qualitative content analysis to analyze data. In Study III, individual interviews were conducted with RNAs (n=20) to determine their main concerns during the extubation process. Observation and individual interviews were performed, and data were analyzed using grounded theory. In Study IV, the focus group interviews (Study I) with RNAs (n=20) and individual (Study II) interviews with ANs (n=17), were analyzed using reflexive thematic analysis, with Tanner's model of clinical judgment as a lens.

Findings: The results showed that RNAs (Study I) and ANs (Study II) described extubation as a process that begins when preparing for the anesthesia procedure and meeting the patient. From then, they continuously assessed and prepared the patient for extubation and assembled a unique extubation plan to prevent extubation failure. At extubations, they acted upon recognizable patterns and relied on experience and intuition. The RNAs and ANs protected the patient by speaking for them and keeping them safe during the vulnerable situation of extubation. They shared the responsibility for the patient, but their roles differed. The RNA felt lonely during extubations despite other professionals being in the operating room. Conversely, ANs felt like a

member of the team when entering the operating room during extubations. In Study III, the RNAs' main concern was safeguarding the patient in a highly technological environment. This they managed by maintaining adaptability while moving between challenges and facilitators. In Study IV, the RNAs' and ANs' extubation process comprised putting the pieces together when holding responsibility for the patient. They noticed patient reactions and recognizable situations during extubations, which they interpreted and made sense of by using clinical reasoning. They responded to these interpretations based on clinical experience and intuition. They reflected during and after extubation, evaluating their actions and contemplating improvement.

Conclusion: In the extubation process, RNAs and ANs combine theoretical knowledge, clinical experience, and intuition with each patient's uniqueness to make decisions on extubations. However, extubation decision-making does not rely solely on what is visible on the monitors or a prescribed technique. Instead, it involves professional skills, critical thinking, and clinical reasoning. At the point of extubation, there is a need for improvement in the working environment for the professionals who perform this critical task. The patient is in a vulnerable phase, and the professionals need to be able to focus in order to safeguard the patient.

Abbreviations

AACN: American Association of Colleges of Nursing

AN: Anesthesiologist

ANIVA: Riksföreningen för Anestesi och Intensivvård

ASA: American Association of Anesthesiologists

CJM: Tanner's (2006) Clinical Judgment Model

GA: General Anesthesia

GT: Grounded Theory

ICU: Intensive Care Units

OR: Operating Room

RNA: Registered Nurse Anesthetist

RTA: Reflexive Thematic Analysis

SFAI: Svensk Förening för Anestesi och Intensivvård

TIVA: Total Intravenös Anestesi

Enkel sammanfattning på svenska

Bakgrund Hos en patient som genomgått generell anestesi utgör den trakeala extubationen en kritisk fas, det är ett moment där allvarliga komplikationer kan uppstå. Inom svenska anestesisjukvården delas ansvaret för patienten mellan anestesisjuksköterskor och anestesiologer, båda dessa professioner utför extubationer i sitt kliniska arbete. Vid kliniskt beslutsfattande används både tekniska och icke-tekniska färdigheter samt kliniskt omdöme. De tekniska och medicinska aspekterna av extubation är väl beskrivna i litteraturen, med det saknas forskning kring anestesisjuksköterskors och anestesiologers erfarenheter av att utföra trakeal extubation.

Syfte Att beskriva och utforska anestesisjuksköterskors och anestesiologers erfarenheter av trakeal extubation inom den anestesiologiska kontexten.

Metod Avhandlingen består av fyra kvalitativa studier. I Studie I samlades data in genom fokusgruppsintervjuer med anestesisjuksköterskor (n=20), medan individuella intervjuer genomfördes med anestesiologer (n=17) i Studie II. Båda dessa studier analyserades med kvalitativ innehållsanalys. I Studie III genomfördes individuella intervjuer med anestesisjuksköterskor (n=20) för att undersöka deras främsta huvudangelägenheter under extubationsprocessen. Observationer genomfördes och datainsamlingen bestod av individuella intervjuer som analyserades med Grounded Theory. I Studie IV triangulerades data från Studie I och II och analyserades med reflexiv tematisk analys. Tanners modell för Clinical Judgement användes som lins under analysen.

Resultat Resultatet visade att Anestesisjuksköterskor (Studie I) och anestesiologer (Studie II) beskrev trakeal extubation som en process som initieras vid förberedelsen av anestesin och när de möter patienten. Båda dessa professioner genomförde kontinuerliga bedömningar och noggranna förberedelser av patienten inför extubationen. För varje patient utformades en unik plan för att förhindra komplikationer under extubationen. Erfarenhet och intuition spelade en viktig roll i deras kliniska beslutsfattande, och de agerade utifrån igenkännbara mönster för att skydda patienten som var extra sårbar under extubationssituationen. Anestesisjuksköterskorna upplevde ofta ensamhet under extubationen, trots närvaron av andra yrkeskategorier i

operationssalen, medan anestesiologerna kände en starkare teamkänsla vid extubationer.

I Studie III framkom att anestesisjuksköterskornas huvudangelägenhet var att skydda patienten i en högteknologisk miljö. Detta uppnådde de genom att upprätthålla anpassningsförmåga och navigera mellan utmaningar och möjligheter. Studie IV visade att anestesisjuksköterskor och anestesiologer följde stegen i Tanners modell för kliniskt omdöme under extubationen. De noterade patientens reaktioner och igenkännbara situationer, vilka de tolkade genom ett kliniskt resonemang. Deras agerande baserades på en kombination av klinisk erfarenhet och intuition, och de reflekterade över sina handlingar både under och efter extubationen för att identifiera möjliga förbättringar.

Slutsats I extubationsprocessen integrerar anestesisjuksköterskor och anestesiologer teoretisk kunskap, klinisk erfarenhet och intuition för att fatta beslut om trakeal extubation, utifrån varje patients unika förutsättningar. Beslutsfattandet baseras inte enbart på monitorer och tekniska data, utan involverar även professionella färdigheter, kritiskt tänkande och kliniskt resonemang. För att säkerställa en patientsäker extubation behöver arbetsmiljön förbättras, så att de yrkesverksamma kan fokusera på att skydda patienten. Trots patientens sårbarhet förekommer störningar i operationssalen, och anestesisjuksköterskor och anestesiologer behöver kunna fokusera på att skydda och värna om patienten.

Original papers

This thesis is based on the following studies, referred to in the text by their Roman numerals.

I. Rönnberg, L., Nilsson, U., Hellzén, O., & Melin-Johansson, C. (2019). The Art is to Extubate, Not to Intubate—Swedish Registered Nurse Anesthetists' Experiences of the Process of Extubation After General Anesthesia. *Journal of PeriAnesthesia Nursing, 34*(4), 789-800. https://doi.org/10.1016/j.jopan.2018.11.007

II. Rönnberg, L., Nilsson, U., Hellzén, O., & Melin-Johansson, C. (2022). Beyond the monitors: Anaesthesiologists' experiences of the process of extubation. *Scandinavian Journal of Caring Sciences*, *36*, 988-996. https://doi.org/10.1111/scs.12996

III. Rönnberg, L., Melin-Johansson, C., Hellzén, O., Nilsson, U., & Häggström., M. (2022). Safeguarding the patient: a grounded theory study of registered nurse anesthetists' main concerns in the process of extubation in the anesthesia setting. *BMC Nursing*, *21*(56). https://doi.org/10.1186/s12912-022-00817-1

IV. Rönnberg, L., Brulin, E., Landstad, B.J., Melin-Johansson, C., Nilsson, U. & Härgestam, M. (Submitted for publication in Journal of Clinical Nursing). Putting the pieces together: Clinical judgment from the perspectives of registered nurse anesthetists and anesthesiologists at extubations after general anesthesia.

Preface

My interest in airway management has significantly increased since I began working as a registered nurse caring for patients with pulmonary diseases and later in acute care settings. This interest led me to become a critical care nurse and a registered nurse anesthetist (RNA). My clinical experience as an RNA performing tracheal extubations has taught me that extubations can proceed smoothly without stress or complications for the patients, and according to plan. However, extubations can also be one of the most challenging tasks during anesthesia, which I believe needs more attention. Often, I felt insecure at extubations, especially when having limited experience in anesthesia practice. This arose not from the technical aspects; removing the tube is not technically demanding. From my experience, it is evident that the complexity lies in the situational factors.

My understanding of this phenomenon, the process of the extubation of patients undergoing anesthesia, is an area well known to me because of the number of years that I have worked as an RNA, regularly performing extubations. As a researcher in these qualitative studies, I can be seen as an instrument, meaning that I may influence the research process and its outcomes. As an RNA, I have addressed my preunderstanding by being aware of my experiences related to extubation and by continuously reflecting on whether my preunderstanding affects the research. In response, I have limited my influence by gathering experiences from RNAs and ANs and focusing on their perspectives. In the studies presented in this thesis, different perspectives, methods, and the involvement of multiple researchers from both anesthesia and other specialties have been employed to incorporate various viewpoints and to reduce the impact of my pre-understanding of extubations on the research.

Introduction

This thesis is situated in the operating room (OR), focusing on the anesthetic team performing general anesthesia (GA) while patients undergo surgery. The OR is a high-risk environment where GA and surgery are administered to patients, presenting multiple risks (Jung et al., 2019). The contemporary OR demands a broad spectrum of skills and attributes from anesthesia providers to deliver complex care (Fletcher et al., 2002). In Sweden, the responsibility for extubations within the OR setting is shared between registered nurse anesthetists (RNAs) and anesthesiologists (ANs). Although these extubations can be stressful, they are a crucial phase in the recovery from GA, underscoring the significance of these roles in patient care (Schreiber & MacDonald, 2010).

The work of RNAs and ANs commences before the patient enters the OR. Effective planning of GA and extubation is crucial and demands specific skills combined with medical knowledge and clinical techniques to ensure positive patient outcomes. The ANs meet the patient before surgery to conduct a comprehensive assessment, evaluating previous illnesses and conditions that may affect anesthesia; the patient's medical history is also reviewed from medical records (Wakabayashi et al., 2023). For the RNA, patient assessment starts at the initial encounter when the patient arrives at the operating theatre and includes reviewing the patient's medical records and the AN's preoperative assessment. Anatomical variations in patients, such as having a long neck or small jaw, can affect anesthesia management. Parotto et al. (2020) highlight that recognizing anatomical limitations and physiological challenges, such as respiratory and cardiovascular instability, is essential to mitigate the risk of extubation failure.

When entering the OR, monitoring devices are attached to the patient, and the initial vital signs are documented prior to GA (Wakabayashi et al., 2023). Before the induction of anesthesia, the RNA and AN summarize and update the patient's condition and vital signs in the patient record and collaboratively determine a strategy for conducting the anesthesia, including ending anesthesia and performing tracheal extubation. Determining the optimal timing for extubation, which is crucial for ensuring a successful outcome and patient safety, can be particularly difficult. This complexity is heightened by physiological changes induced by surgery and anesthetic agents, as well as the constraints of time pressure often encountered in the OR, which differs

from the conditions that are present during the induction of anesthesia at intubation (Popat et al., 2012).

Background

This thesis focuses on a clinical skill: extubation, i.e., removing the endotracheal tube, which is performed by members of two professions: RNAs and ANs. In this chapter, the process of extubation will first be introduced, followed by a discussion on the role of each of these professions along with the theoretical approach adopted in this research.

Extubation of a patient in the anesthesia setting

At the end of the anesthesia phase, extubation occurs. The patient transitions from a controlled anesthetic state with an established airway to a less controlled situation, passing through the excitation stage (Popat et al., 2012). The excitation stage is a critical phase in which the patient is at risk of, e.g., airway obstruction or breathing difficulties. Patient safety and security are a priority at extubations, with minimal physiological changes, similar to the approach used for induction and intubation to prevent harm (Tung et al., 2020). Therefore, a plan should be established to ensure hemodynamic stability, adequate analgesia, temperature control, and the reversal of neuromuscular blockade (Benham-Hermetz & Mitchell, 2021; Wakabayashi et al., 2023).

A variety of different factors influence when and how professional clinicians decide to perform the extubation. For instance, the RNAs' and ANs' timing of the extubation is crucial, and prematurely extubating a patient can lead to severe risks. Even if a patient begins to regain consciousness and appears to be uncomfortable, it is crucial to maintain control and avoid premature extubation (Shinoura et al., 2023). Parotto et al. (2020) state that anatomical limitations and physiological difficulties, such as respiratory and cardiovascular instability, are crucial in identifying and managing to decrease the risk of extubation failure. Prior to administering GA, the patient's physical status is assessed using the ASA classification system (American Society of Anesthesiologists, 2020) (Figure 1).

ASA I	A normal healthy patient
ASA II	A patient with a mild systemic disease
ASA III	A patient with severe systemic disease
ASA IV	A patient with severe systemic disease that is a constant threat to life
ASA V	A moribund patient who is not expected to survive without the operation
ASA VI	A declared brain-dead patient whose organs are being removed for donor purposes

Figure 1. ASA, physical status classification system

Along with this risk assessment of the potential difficulties that patients might present, it is essential to evaluate the anesthetic agents used during surgery, as they have varying effects on the timing of extubation following the end of surgery (Dexter & Hindman, 2024; Vannucci et al., 2021). For example, short-acting drugs used in GA, such as propofol-based total intravenous anesthesia (TIVA), facilitate rapid recovery of consciousness and discharge from the OR after surgery (Sato et al., 2022).

Extubation has been extensively researched, however, this has primarily focused on the effect of different anesthetic agents on the time until extubation following surgery (Dexter & Hindmann, 2024; Vannucci et al., 2021). Cavallone and Vannucci (2013) and Popat et al. (2012) have proposed management strategies for difficult airway scenarios during high-risk extubations. Additionally, guidelines for the safe management of difficult extubations are provided by Popat et al. (2012). Wakabayashi et al. (2023) underscore the critical importance of extubation, emphasizing that it must be meticulously planned, carefully considered, and expertly executed. Dexter and Hindman (2024) have established that prolonged extubation is due to the characteristics of the surgery, the patient's position, and the RNA's and AN's familiarity with the surgeon. Moreover, prolonged extubation can adversely affect patient outcomes and OR efficiency. Further research has investigated the use of a train-of-four peripheral nerve stimulator to assess the depth of the neuromuscular blockade (Blobner et al., 2020) and patient recall during extubations (Shinoura et al., 2023). Studies have also explored extubations conducted in intensive care units (ICU) (Sturgess et al., 2017), and the decision-making processes related to extubation in ICU settings (Thille et al., 2013). In the ICU, the patient often has had their airway tube in place for more extended periods of time than during general anesthesia, where the tube is only in place for a limited time (Sturgess et al., 2017).

Professionals performing extubation

Professionals trained and responsible for performing extubations vary across different countries and continents. Two distinct models of anesthesia providers have been identified in Europe. In the first model, RNAs receive specialist training and are permitted to perform intubation, extubation, and maintain anesthesia under the direct or indirect supervision of an AN. This model is followed in countries such as Bulgaria, the Czech Republic, Denmark, Estonia, France, Hungary, Iceland, Lithuania, Luxembourg, The Netherlands, Norway, Poland, the Slovak Republic, Switzerland, and Sweden (Meeusen et al., 2010; Nilsson & Jaensson, 2016). The second model, practiced in countries such as Germany, Australia, and the United Kingdom, involves anesthetic nurses or circulation nurses who assist ANs but are neither trained nor authorized to monitor patients or maintain anesthesia independently.

In Sweden, the anesthesia team typically consists of one AN with medical responsibility and one or more RNAs (Søreide et al., 2010). The composition of RNAs and ANs in the anesthesia team varies between countries. In the OR, the surgical team includes a surgeon, an operating theatre nurse, other nursing staff, and often students in training. Team membership can vary and may not involve the same persons throughout anesthesia (Göras et al., 2020). During the perioperative period, the RNA and AN work together to provide safe anesthetic care for patients. Thus, conducting an anesthetic procedure involves interdisciplinary collaboration between RNAs and ANs (Aagaard et al., 2017).

Registered Nurse Anesthetists

The work of an RNA involves interaction with patients in a highly technological environment and demands their undivided attention (Aagaard et al., 2017). In Sweden, the RNAs have completed a specialized postgraduate one-year training program after three years of studies to become registered nurses. The Swedish RNAs are permitted to independently induce, administer, and conclude GA for patients classified as ASA I or II, according to the American Society of Anesthesiologists (ASA) physical status classification system (Figure 1, ASA, 2020), following specific protocols and agreements, but under the indirect supervision of an anesthesiologist (ANIVA, n.d.). For patients classified as ASA III or higher, the RNA plans and administers GA in collaboration with the AN for elective surgeries. This collaborative approach is also required for all patients (ASA I–V) undergoing

emergency surgery (ANIVA, n.d.; Lyk-Jensen et al., 2014; Nilsson & Jaensson, 2016).

Anesthetic nursing is characterized by vigilant patient monitoring, maintaining communication with the patient, and being one step ahead (ANIVA, n.d.; Nilsson & Jaensson, 2016). This involves observing, monitoring and documenting vital signs and depth of anesthesia, as well as assessing blood and fluid requirements. In the anesthesia setting, the patient and the RNA can be seen as a unit, with the patient entrusting their care to the RNA (Rudolfsson et al., 2007). During GA, while patients are unconscious and unable to care for themselves, RNAs are responsible for maintaining physiological stability and preventing adverse events throughout the procedure (Lekens et al., 2023). This role also includes safeguarding the patient's autonomy by making decisions aligned with the patient's wishes expressed before the induction of anesthesia (Sundqvist & Carlsson, 2014). Furthermore, the RNAs ensure that the patient is protected from harm, maintain proper blood and fluid balance, and shield the patient from decisions by inexperienced professionals that may compromise patient safety (Sundqvist & Carlsson, 2014).

Anesthesiologists

An AN is a certified medical doctor who has completed medical school and an internship, followed by specialized training in anesthesia and perioperative medicine (SFAI, n.d.; Sieber & Burkhart, 2017).

In Scandinavia, ANs are engaged in various medical settings, including anesthesia settings, ICU, emergency medicine, and pain management (Sieber & Burkhart, 2017). In the anesthesia setting, they share patient responsibilities with RNAs. In Sweden, ANs are often responsible for several patients simultaneously under anesthesia. Typically, they are present in the OR only during the induction and conclusion of anesthesia or if complications arise (Larsson et al., 2004). A higher ASA classification indicates that a continuous presence of AN is necessary during GA due to the increased risk of complications (American Society of Anesthesiologists, 2020). They meet the patient before administering anesthesia to establish trust and ensure person-centered care delivery. Additionally, they maintain control over the OR situation by keeping themselves informed about ongoing developments (Larsson & Holmström, 2013).

Theoretical approach

Clinical judgment (CJ) is important in understanding the decisions made in medical situations (Kienle & Kiene, 2011). In complex care, CJ refers to the healthcare professional's ability to make sound and informed decisions. It involves understanding the situation, assessing the patient's concerns, and responding to their needs (Benner, 2001). CJ is developed through accumulated experience, acquired knowledge, and ongoing critical analysis of observations and actions (Kienle & Kiene, 2011). It is a reflective and reasoning process guided by comprehensive knowledge, concluded in formulating a clinical decision (Connor et al., 2023). Groopman (2007) emphasizes the importance of critical thinking and open communication in medical decision-making.

CJ is essential in healthcare for making crucial decisions about patients under GA in the anesthesia setting of an OR (AACN, 2024). It is also vital for successful decision-making, teamwork, situation awareness, and task management during the complex and unpredictable extubation process (Fletcher et al., 2002; Flin & Patey, 2011). Professionals who provide and support anesthesia during extubation face comprehensive demands, making CJ crucial for success in the technological environment of the anesthesia setting in the OR.

The Clinical Judgment Model (CJM), as developed by Tanner (2006), is a framework that demonstrates the complexity involved in providing patient care. It involves understanding how changes in a patient's condition can affect their treatment and being able to choose an appropriate course of action. This model highlights how context, background, and relationships interact and influence each other throughout the CJ process. By integrating information from these components, informed decisions can be made, and high-quality, patient-centered care can be provided (Tanner, 2006).

The CJM has served as a base for studies examining the impact of critical thinking on CJ (Cazzell & Anderson, 2016) and as a theoretical base for investigating the development of self-confidence and clinical competence in simulation in nursing students (Blum, 2010). Grounded in Tanner's (2006) CJM, Lasater (2007) quantifies the development of CJ in nursing students and evaluates the transfer of nursing knowledge, confidence, and competence from simulation to clinical setting among nursing students. The CJM (Tanner, 2006) not only structured my research by outlining how critical decisions are made but also helped me to articulate

complex, intuitive aspects of clinical reasoning that are often difficult to verbalize.

Rationale

Tracheal extubation is critical and requires attention from the responsible professionals. Once the surgical procedure under GA concludes, the tracheal tube must be carefully removed (Onrubia & Roca de Togores, 2023). Extubation is an essential step in recovery from GA and poses risks such as aspiration, throat trauma, respiratory issues, and cardiovascular problems (Artime & Hagberg, 2014). Anesthesia providers need the necessary knowledge and training to manage these complications (Hagberg & Artime, 2019). Previous research on extubations has examined the effects of anesthetic agents on extubation (Dexter & Hindman, 2024; Vannucci et al., 2021), strategies for managing difficult airways (Cavallone & Vannucci, 2013; Popat et al., 2012), the use of train-of-four peripheral nerve stimulator to assess neuromuscular blockade (Blobner et al., 2020), and extubations in ICUs (Sturgess et al., 2017; Thille et al., 2013). However, the extubation of a patient involves more than just medical and technical aspects and more than what is visible on the monitors. It also encompasses aspects of clinical practice, such as CJ (Tanner, 2006) and non-technical skills (Fletcher et al., 2002). Learning from the experiences of the professionals who perform extubations can help us understand this complexity. It is important to include both RNAs and ANs when aiming to develop more knowledge about extubation. So far, there is a limited number of known studies about their experiences, main concerns, and use of CJ during extubations. Therefore, this thesis focuses on exploring and describing extubations from the perspectives of RNAs and ANs. Doing so highlights the importance of professional development in extubations and these professionals' roles in patient care. Current research lacks knowledge about how RNAs and ANs experience the extubation process and, more specifically, on what they base their decisions. Therefore, this qualitative thesis is essential, as it illustrates an understanding beyond the technique of performing extubations.

Aim

To describe and explore registered nurse anesthetists' and anesthesiologists' experiences of tracheal extubation in the anesthesia setting.

Specific aims for each study:

I. to describe registered nurse anesthetists' experiences of the process of the extubation of the endotracheal tube in patients undergoing general anesthesia.

II. to describe Swedish anaesthesiologists' experiences of the extubation process in the anaesthesia setting.

III. to obtain a deeper understanding of registered nurse anesthetists' main concerns and how they resolve these in the process of extubation when caring for a patient during general anesthesia.

IV. to explore clinical judgment at extubations from the perspectives of registered nurse anesthetists and anesthesiologists.

Methods

Because the number of research studies describing and exploring extubations from RNAs' and ANs' perspectives is limited, a qualitative design was considered relevant for addressing the purpose of this thesis. The studies included here focused on participants' experiences, main concerns, and the use of CJ within the natural context in which they perform extubations on a daily basis. The qualitative design is suited to achieving the aims of this thesis by providing an understanding of how the participants construct reality within their context (Polit & Beck, 2021), particularly relating to extubations in anesthesia settings.

This thesis comprises four studies (I, II, III, and IV); see Table 1. These studies build on each other based on the knowledge gained and new questions raised by each preceding study. Studies I and II aimed to describe RNAs' (I) and ANs' (II) experiences of the extubation in the anesthesia setting. In these two studies, the focus lay on how they experienced extubation. In Study III, grounded theory (GT) was used, focusing on the extubations as a process, as described in Studies I and II. RNAs reflected upon patient needs and their own actions when deciding when to extubate in Study III. From these insights, Tanner's (2006) CJM was used as a lens to further explore the perspectives of RNAs and ANs in Study IV.

Study setting

The settings in Studies I–IV were anesthesia departments at public hospitals in Sweden. The studies included hospitals from two administrative regions that differed in size and were geographically separate. Both county and university hospitals were included in the thesis. Except for Study IV, the participants only participated in one study each. One county hospital was included in Studies I, II, and III, but with different participants.

All studies included anesthesia departments, various surgical specialties were represented, and patients of different ages were cared for during the data collection.

Study designs and research methods

The studies used various data collection methods, and their analysis methods also differed (see Table 1). The methods relative to each of the four studies are presented below.

Table 1. Overview of Studies I–IV.

Study	Participants	Data collection (year)	Data analysis
I	Registered Nurse Anesthetists (*n*=20) from one University hospital and one county hospital	Focus-group interviews (2014)	Qualitative manifest content analysis
II	Anesthesiologists (*n*=17) from three county hospitals	Individual interviews (2017)	Qualitative manifest content analysis
III	Registered Nurse Anesthetists (*n*=17) from one University hospital and two county hospitals	Field notes and individual interviews (2020)	Grounded theory
IV	Registered Nurse Anesthetists (*n*=20) from Study I and Anesthesiologists (*n*=17) from Study II	Focus group and individual data (2014 & 2017)	Triangulation and Reflexive thematic analysis

Study I

In this first study, the aim was to describe RNAs' experiences in the process of extubation of the endotracheal tube in patients undergoing GA.

Participants
RNAs from two geographically separate hospitals in Sweden were invited to participate in the study. Those with multiple surgical specialties and various working experiences as RNAs were included to ensure homogeneity across groups (Krueger & Casey, 2015). A total of 20 RNAs (15 women and 5 men) participated: 11 from a university hospital and nine from a county hospital. The RNAs had between 18 months and 24 years of working experience (mean 8 years) as RNAs, and all had experience in performing extubations. Their ages ranged from 30 to 63 years (mean 43 years).

Procedures
Before starting data collection, the directors of each anesthesia department granted permission for the RNAs to participate in focus group interviews during their working hours. About two weeks before the interviews, I provided verbal and written information about the study's purpose and the participants' rights. A consecutive sampling strategy was chosen to recruit as many RNAs as possible to participate in the data collection days. Before the focus group interviews, those included were asked to reflect on three situations: a normal, a difficult, and a well-managed extubation. When constructing groups, the person in charge of organizing the work at the anesthesia departments assisted in this process and was instructed to ensure that each group included RNAs of various genders and length of work experience.

Data collection
Focus group interviews were chosen to gather participants' perceptions about the area of interest through group discussions and interactions (Krueger & Casey, 2015). The interviews were led by a moderator and an observer, ensuring that all participants could share their experiences.

Six focus groups were conducted: three at each hospital, with three to four participants in each group. To address the topic and encourage the RNAs to share their experiences regarding extubations, the focus group moderator asked them to: *Tell me about …* referring to the situations they had been encouraged to reflect upon before the start of the data collection. Follow-up questions, such as *How did you feel?* and *What did you think at the time?* were asked. The observer ensured that everyone in the group could share their experiences and focused on the interaction between the RNAs while keeping track of time (Krueger & Casey, 2015). The focus groups were conducted between February and April 2014. They were held in Swedish, were digitally recorded, and lasted between 50 and 80 minutes.

Data analysis
A qualitative content analysis method, focusing on the manifest content of the text (Graneheim & Lundman, 2004), was used to analyze the data. This systematic approach to analyzing qualitative data offers opportunities to analyze manifest and descriptive content in textual data (Graneheim et al., 2017; Graneheim & Lundman, 2004). The interviews were transcribed in Swedish verbatim. To understand the content in the data and the RNAs' experiences, the interviews were listened to, read, and reread several times. Following Graneheim and Lundman (2004), with the aim of the study in focus, the data unit was divided into meaning units, which comprised excerpts from the text. These meaning units were condensed into words or phrases describing the content of the text and were abstracted and labeled with codes. The codes were then compared and sorted by similarity (Graneheim & Lundman, 2004), creating four categories and eight subcategories (Graneheim et al., 2017; Graneheim & Lundman, 2004).

Study II

This second study concerned the ANs' experiences of the extubation process in the anesthesia setting.

Participants
In this study, the term AN includes both anesthesiologists and anesthesia residents.

Seventeen ANs (5 women and 12 men) from one university hospital and two county hospitals in Sweden participated. Their mean age was 45 (range 32–64), and they had between one and 40 years of experience working as ANs. They were recruited via consecutive sampling, a strategy used to promote the possibility of including as many participants as possible within a given period of time (Polit & Beck, 2021), that is to say, those scheduled to work on the days that data collection took place. The participants had different levels of working experiences, aiming to capture a variety of perspectives on the research question (Patton, 2015). Assuming they worked on the days of data collection, they were invited to individual semi-structured interviews during their working hours. The participants were recruited for this study between August and September 2017.

Procedure
After obtaining permission from the directors of the anesthesia units in the included hospitals, the anesthesiologists were informed verbally and

in writing. Similar to Study I, before taking part in the interviews, those invited were asked to reflect on three situations: a normal, a difficult, and a well-managed extubation they had handled. The interviews took place in the anesthesia units in a room separate from the other staff. The interviews encouraged them to share their experience of the three situations upon which they had been asked to reflect. Prompt questions were asked to follow up on their responses (Brinkmann & Kvale, 2015).

Data collection
Semi-structured interviews were conducted to gather data from anesthesiologists regarding extubations to describe participants' experiences of a phenomenon (Kvale, 2014). The interviews focused on the specific situations that the anesthesiologists were asked to reflect upon when recruiting for the study. A total of 17 interviews were conducted in three county hospitals: four, eight, and five in each hospital, respectively. I conducted all interviews in Swedish between September and October 2017 and digitally recorded them, and these lasted between 28 and 52 minutes.

Data analysis
The data were analyzed using qualitative content analysis, focusing on the text's manifest content, as Graneheim and Lundman (2004) describe. This method addresses what is explicitly stated in the text and what the text communicates concerning the study's aim (Downe-Wamboldt, 1992). Systematically, patterns and variations in the participants' descriptions are searched for during the analysis, resulting in categories (Graneheim & Lundman, 2004; Graneheim et al., 2017). The interviews were transcribed verbatim. To gain a comprehensive understanding of the ANs' experiences of the extubation process, the transcripts were read, and the interviews were listened to multiple times. During analysis, the data were organized and structured using QSR NVivo 10©. The text was divided into meaning units, which were then condensed to describe the content and abstracted and labeled with codes in the next step. These codes were compared and grouped by similarity into sub-categories and categories. To ensure credibility, selecting the most appropriate meaning units and preserving the text's meaning during condensation and abstraction is essential (Graneheim & Lundman, 2004). To achieve this, all researchers in the study continuously discussed the analysis to ensure that the categories accurately reflected the data, thereby enhancing the trustworthiness of the results.

Study III

This study aimed to obtain a deeper understanding of RNAs' main concerns and how they resolve these during extubation when caring for a patient during GA.

A Classic Grounded Theory (GT) design was used in this study. This approach employs a constant comparative method, where data from one interview are compared with others (Glaser, 1978). This means that data collection and analyses occur simultaneously across the three phases: the open, selective, and theoretical phases. Therefore, the presentation of procedure, data collections, and analysis for Study III are described for each phase (see Figure 2, published in Rönnberg et al., 2022b). The section concludes with a more detailed description of the participants.

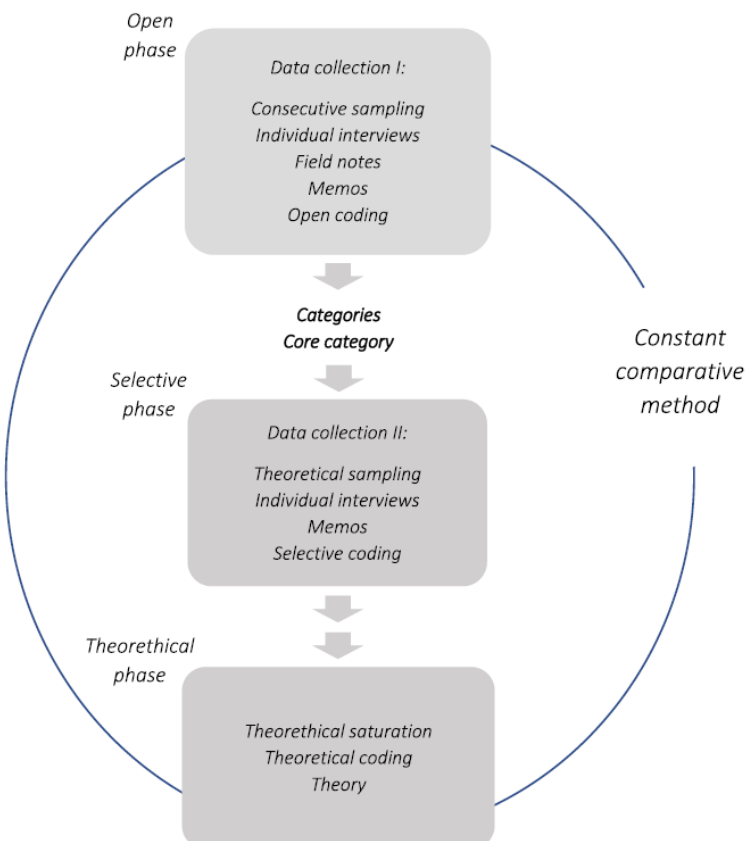

Figure 2. A visual overview of the constant comparative method of GT was devised during Study III (Rönnberg et al., 2022b).

Procedures, data collections and analysis
The data were collected on two separate occasions. RNAs from three hospitals (A, B, C) were included. After obtaining permission from the directors of the anesthesia departments to conduct the research, all RNAs were informed about the study, both in staff meetings and via e-mail.

Open phase: In the open phase, data were collected through interviews with seven RNAs at one university hospital (A) and five RNAs at one county hospital (B), recruited via a consecutive sampling method. I followed and observed the RNAs, one at a time, from when they started to prepare the patient for GA until the patient was transmitted to a postoperative unit. A video recording was made during the patient's time in the OR. In both hospitals, a photographer assisted with placing the camera. Field notes were taken during the entire observation process. The RNAs were interviewed individually after the patients were transmitted to the postoperative unit. The RNAs and I viewed the video recording together, and they were encouraged to reflect upon their main concerns, actions, and behaviors concerning the extubation. The interviews were audio recorded and lasted as long as the duration of the video recordings, between 75 and 155 minutes. The interviews included open-ended questions focusing on their main concerns and reflections on their actions in the extubation process. Questions, for example, "Please reflect upon your concerns regarding this extubation" or "How did you handle that?" were asked. The field notes guided the interviews and contributed to the data analysis. All interviews were transcribed verbatim before being analyzed. After each interview, memos were written to document evolving codes and the RNAs' discussions about what they experienced as being the main concerns and how they addressed them in practice. Memos are reflective, interpretive, and intuitive; they allow the researcher to document ideas and events and follow their thoughts during the research process (Birks & Mills, 2015). The data were initially labeled in an open coding process, based on how their characteristics associated with the main concerns or how to solve them. The data were broken down into smaller segments, such as words or phrases (Glaser, 1978). The labels that were found to repeat themselves were then given a code, representing concepts of patterns in the data. The developing categories were formed around core concepts, and the core category was created, representing what solves the main concern.

Selective phase: In the selective phase of data collection, five RNAs (from one county hospital (C)) were included in individual interviews via

a theoretical sampling method to collect additional data (Birks & Mills, 2015). They were chosen due to their theoretical relevance (Glaser, 1978), that is to say, their experience and knowledge about extubations, by following cues and leads that arose during the analysis in the open phase and by allowing the emerging theory to guide which data to collect next and with whom (Glaser & Strauss, 2017). Due to the COVID-19 pandemic, these interviews were held via the video conferencing suite, Zoom (Lobe et al., 2020). Even in this phase, all interviews were audio recorded and transcribed verbatim, and memos were written. During the selective coding phase, only data related to the core category were collected and analyzed. This core category frequently recurred in data and relates to the other categories (Glaser, 1978). The interviews aimed to gather additional information to further develop the analysis, identify any data gaps, and create categories (Chun et al., 2019). Questions such as: "What's important for you to be able to safeguard the patient in the process of extubation?" derived from the analysis concerning the core category were asked. The interviews lasted between 15 and 30 minutes.

Theoretical phase: During the theoretical phase of the analysis, the constant comparison process continued until the content of one source was compared to the content of all other data sources (Polit & Beck, 2021). Theoretical saturation is achieved when no new concepts emerge in the analysis (Glaser & Holton, 2007). Searching for patterns and connections between categories continued in the theoretical coding process. This involved integrating the theory and using cause-effect code families to understand the relationships between categories better (Glaser, 1978). By integrating and connecting categories, the theory is generated. Theoretical saturation means that the theory may explain most of the new codes. Throughout all phases, memos were written to capture and preserve ideas, describe patterns in the data, and reflect upon these patterns and the relationships between categories (Glaser, 1978).

Participants

In total, 17 RNAs (nine women and eight men) from three hospitals were included. In the open phase, twelve RNAs (six women and six men) were recruited via consecutive sampling from two hospitals (seven from one university hospital (A) and five from one county hospital (B)). In the selective phase, five RNAs were recruited from another county hospital (C) in a theoretical sample.

Study IV

This study explored CJ during extubations from the perspectives of RNAs and ANs by employing a triangulation of the data (Patton, 2015). Data utilized for the triangulation included the material from Studies II and III.

Participants
RNAs and ANs from two earlier studies, that is to say, Studies I and II (Rönnberg et al., 2019, 2022a), were included in this study. For information about the participants, see the information presented above for Studies I and II.

Procedure
In this study, triangulation was used to explore the use of CJ during extubations. The two datasets were combined and acted as one unit of analysis.

Data collection
The data for this study comprised the original transcripts from the focus groups and individual interviews. It combined the six focus groups with 20 RNAs (Study I) and 17 individual interviews with anesthesiologists (Study II) to form one dataset.

Data analysis
New research questions and additional methods not initially included in the primary analysis were applied in analyzing the two datasets combined (Szabo & Strang, 1997). A triangulation process was used, which involves analyzing data from multiple sources and perspectives (Patton, 2015) to investigate the viewpoints of RNAs and ANs on CJ during extubations. Tanner's (2006) CJM was used as a lens, and multiple researchers were involved in the analysis and interpreting the findings, thus employing investigator triangulation to validate and enhance an understanding of the phenomenon (Denzin & Lincoln, 2018).

The data were analyzed using Reflective Thematic Analysis (RTA) (Braun & Clarke, 2022), focusing on the concepts of Noticing, Interpreting, Responding, and Reflecting, as defined in Tanner's (2006) CJM, as themes to understand extubations. In RTA, coding and analysis are rarely combined into a single approach; more often, the process involves a combination of both (Braun & Clarke, 2013, 2019, 2021).

Collaboration among researchers enhances the analysis rather than aiming for a single correct answer.

The analysis process here was not linear; a back-and-forth process occurred during the six steps of RTA described by Braun and Clarke (2013, 2019, 2021). The themes were chosen to represent Tanner's CJM concepts. The transcripts were read and re-read to allow me to become familiar with the content and context. Preliminary notes answering the aim were taken to identify potential patterns in the data. Considering the study aim, relevant concepts, phrases, or words were identified and labeled according to meaningful data, and initial codes were generated. After all data had been coded, codes were grouped into sub-themes based on similarity and patterns. Sub-themes took form and were sorted under the themes: Noticing, Interpreting, Responding, and Reflecting. A continuous return to the original data was made to ensure validity; the themes were checked according to this data and the initial groups of codes to confirm that they represented the data. Next, the themes and sub-themes were described, and sub-themes were named based on their content, answering the themes and aim of the study. The results of this RTA were synthesized and presented as the findings, which include four themes and eight sub-themes. Throughout the analytical process, all authors regularly discussed the analysis and results.

Ethical considerations

The studies in this thesis followed the Declaration of Helsinki (WMA) and were approved by the Regional Ethical Board in Umeå (Dnr: 2014-19-31M, 2016-475-32M, 2021-04931).

The research followed the main advice provided by the Swedish Research Council (Vetenskapsrådet, 2002). When recruiting participants, verbal and written information about the study's aim and the participant's role in the research process was provided beforehand. Those who were available and interested in participating in focus groups during the data collection days were asked to complete a written consent form and were included in the study. The participants were informed that their participation was voluntary and that they could withdraw at any time. They were also informed that the data would be presented in such a way that it would prevent them from being identified or recognized in reports or publications relating to the research. Each participant was informed that all sensitive personal information data would be treated confidentially. To assure anonymity, the participants were given an identifying code. Additionally, no names or places were transcribed or revealed when reporting the studies' results. All electronic copies of recorded interviews and transcripts were kept on a password-protected server, and any printed copies were kept in a locked filing cabinet.

The data collection performed during working hours took place in rooms at the anesthesia units, separate from other colleagues. Due to the COVID-19 pandemic, the interviews in the second phase of data collection in Study III took place after working hours to ensure that patient care was not compromised.

In Study III, video recordings were made in the OR. The patients were provided with detailed information about the research before being asked to provide their consent to be recorded, and all personnel were informed prior to the data collection days about the recordings. In addition, a note was placed at the entrance to the OR, saying 'Ongoing video recording'. Only the observed RNA and I viewed the respective video recordings. After the interviews, the video file was erased immediately to protect the patient's identity and the RNAs' anonymity.

Given the vast amount of data collected in Study I and Study II, and because the participants expressed difficulties articulating their actions

during extubations, these datasets were analyzed using CJM as a lens in Study IV. This decision was also motivated by a desire to triangulate and combine perspectives. Participants in both studies were informed, prior to giving consent, that the data would be used to present results and that the aim was to gather their experiences. Thus, performing further analysis of the combined datasets fulfilled an ethical obligation to the participants in presenting a deeper understanding of their experiences and avoiding the trap of over-collecting and under-analyzing data.

Participating in interviews may affect both the interviewer and the interviewees by evoking thoughts, experiences, and feelings (Patton, 2015). Therefore, the participants were also given contact information for the researcher responsible for conducting the studies if they had any concerns about their participation.

Results

This thesis includes four studies that aim to describe and explore extubations from RNAs' and ANs' perspectives.

The findings are presented study by study.

Study I

From the RNAs' experiences, the extubation was described within four categories and eight subcategories (see Table 2).

Table 2. Categories and sub-categories in Study I

Category	**Sub-category**
To be a step ahead	Assess and prevent
	Prepare and reconsider
To be on my toes	Recognize patterns
	Establish a connection
To use situation awareness	Rely on a feeling
	Lean on experience
To be alone in a critical moment	On their own in a team
	Protect and advocate

The first category, *To be a step ahead*, involved how the RNAs assess, prevent, prepare, and reconsider extubations. Before inducing anesthesia and GA for the patient, the RNAs assessed and predicted potential risks for extubation failure. They identified physical or anatomical limitations and reviewed the patient's medical history. They adopted this proactive approach with the intention of preventing complications during the extubation process. Emphasizing the importance of anticipating any potential complications, RNAs checked to ensure the availability of safety equipment and specific drugs for unexpected events such as laryngospasm and hypoxia during extubations. Additionally, they knew the importance of being prepared to request for assistance and remaining open to reconsidering their decisions as circumstances evolve. They also had alternative plans for how to act during extubation failures.

In the category, *To be on my toes*, the RNAs remained attentive. They used pattern recognition and established relationships with the patient, to exchange information and build trust before the GA began. During extubations, they were focused and alert to the patient's reactions and changes in their condition. Drawing on their previous clinical experiences, RNAs could anticipate the progress of the extubation. They recognized, recalled, and applied knowledge from patients and situations they had experienced during extubations.

The category, *To use situation awareness*, concerns how RNAs rely on feelings and lean on their experience during extubations. From the data, it became clear that they lacked guidance on the timing of extubation. They relied on their clinical intuition and experience to determine when to extubate the patient. However, relying on intuition requires experience. The RNAs shared how they felt frustrated when they were told to trust their intuition during extubations when they were new to the role and starting to learn this process. They also described relying on their gut feelings, but this only came with experience. Combining clinical experience and theoretical knowledge enabled them to make informed extubation decisions. They also described how experience increased their confidence and ability to remain calm during the extubation. Less experienced RNAs followed a predetermined process and often sought confirmation from others, whereas more experienced RNAs adapted their decisions to the current situation, relied on intuition, and found it challenging to articulate their actions.

To be alone in a critical moment, the final category, involves how the RNAs feel lonely during the extubation and how they protect and advocate for the patients while they are in a very vulnerable state. While the RNAs concentrated on the patient during extubations, other OR team members responsible for the surgical procedure began wrapping up their tasks, handling surgical instruments, preparing for the next patient, making phone calls, and completing paperwork in the OR. The RNAs knew the importance of creating a quiet environment and wanted to focus entirely on the patient during extubation. Unlike the atmosphere during the intubation process, where silence and minimal patient contact were observed, at extubation, they experienced increased noise levels and the physical manipulation of the patient by other team members. This lack of respect for their work and the patient's safety was a common concern among RNAs. Although another RNA or an anesthesiologist might be present, they rarely discussed or planned the extubation collaboratively. RNAs consistently emphasized the critical role of ensuring patient safety and advocating for the patient during

anesthesia. They felt a profound responsibility for the patient and perceived themselves as the patient's advocate to act on their behalf while they were not able to articulate their wishes or desires.

Study II

The ANs' experiences of extubations were described in two categories and seven sub-categories (Table 3).

Table 3. Categories and sub-categories in Study II

Category	**Sub-category**
To assemble sensibilities	Be receptive to inputs
	Create tailored plans
	Guided by emotions and experiences
	Sense the atmosphere
To stay focused	Be prepared and prepare
	Be calm and strategic
	Trust the RNAs

In the category, *To assemble sensibilities*, the ANs relied on information gathered via their senses and experience of similar situations to make informed decisions about extubations. Similar to the practices of the RNAs in Study I, The ANs created a customized plan for each patient, continuously adjusting it based on their reactions to anesthesia and overall condition. They remained attentive to ensure patient safety during extubations. Whether they were physically present in the OR or utilizing information provided by the RNAs caring for the patient in the OR, they perceived that they were involved in the planning for extubation. When in the OR, they observed the environment and sensed the atmosphere. They could detect issues and identify any rising occurrences of stress by observing the behaviors of others in the OR. The ANs perceived that they set the tone for the atmosphere in the OR and recognized the importance of maintaining silence in the OR for the patient as the end of anesthesia approached. If they engaged in conversation, others followed suit, but if they remained silent, this silence was respected by the other professionals. Therefore, the ANs understood that maintaining silence during the extubation was their responsibility, just as it was during the intubation when silence was

always respected. Similar to the experiences described by the RNAs in Study I, the ANs also described how they were frustrated when more experienced colleagues advised them to rely on their instinct or gut feelings for performing the extubation. As they gained experience of extubations, they learned to trust their instincts and maintain a sense of calm when something felt wrong. Due to the unpredictable nature of extubations, the ANs described how they have had to learn to remain focused and humble during extubations.

The second category, *To stay focused*, relates to how the mental state of the ANs affects their decision-making practices during extubations. Feeling stressed could lead to ANs being unfocused and less receptive. This affected them negatively, but they knew the importance of staying calm and making strategic decisions despite the pressures of coping with a stressful situation. Prior to extubation, the ANs took precautions when dealing with patients who were obese or affected by gastroesophageal reflux, anticipating any related complications. They also considered the patient's condition, vital parameters, and the RNA's prior experience of handling complications during extubations. When complications were expected, they preferred to be in the OR, either performing the extubation themself or assisting with it. Drawing from previous experiences with difficult extubations, the ANs understood the necessity of being prepared for expected and unexpected complications and made sure that drugs and safety equipment were present.

The ANs also emphasized the importance of observing the entire picture rather than relying solely on monitors. Despite feeling stressed while the patient experienced airway difficulties, they knew the importance of remaining calm and strategic during the extubation process. Their calm manner influenced the team, promoting attentiveness, collaboration, and focus on ensuring patient safety. The ANs perceived that the teamwork around the patient forms part of a larger dynamic that influences their decision-making practices. The ANs stressed the need to trust the RNAs, relying on them to call for assistance if complications were anticipated or if urgent intervention was needed during extubations. As they are responsible for multiple patients simultaneously, the ANs frequently experience a loss of control. The ANs accepted that they could not be in all ORs simultaneously, spending only a few minutes with each patient while relying on others to maintain patient safety.

Study III

The findings of this study illustrate how the RNAs' main concern was *Safeguarding the patient in a highly technological environment*, which they resolved by maintaining adaptability while moving between facilitators and challenges. During extubations, the RNAs resolved this main concern by *Maintaining adaptability*, representing the core category. The RNAs oscillated between facilitators and challenges while constantly reaching to meet the emerging theory of *Safeguarding the patient in the process of extubation*. As illustrated by the line in Figure 3, the range of the RNAs' focus moves between two opposing poles: facilitators and challenges. On one end, the RNA could fully concentrate on the patient and the task, develop a clear plan, get into the right mindset, observe and act upon the patient's reactions, and utilize their experience from similar situations to inform the current extubation. Conversely, on the other end, their focus was hindered by uncertainty, external pressures to perform extubation when it is unsafe for the patient, or interruptions from other professionals.

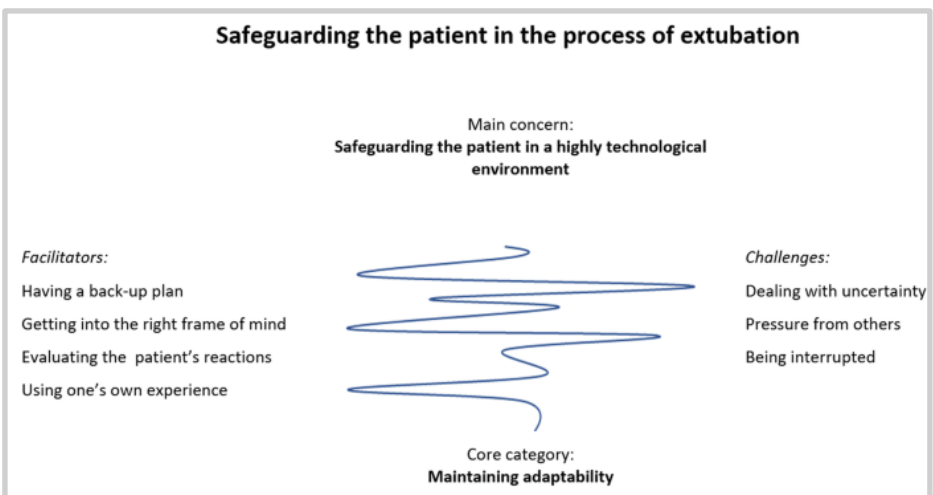

Figure 3. Illustration of the main concern and core category from Study III (Rönnberg et al., 2022b)

Facilitators:
To ensure patient safety, RNAs found it beneficial to have a backup plan for managing acute events during extubations. Having another RNA or AN to call for assistance if needed made them feel calm and able to focus during the extubation process. The RNAs highlighted the importance of maintaining the right mindset to safeguard patients. Remaining adaptable and prepared for potential complications was essential for ensuring the patient's safety throughout the process. The RNAs' safety practices involved interactions with and assessing patients' reactions to stimuli and anesthetics. They used each patient's responses to determine the best time for extubation and continuously evaluated their actions. They emphasized the importance of being focused to maintain attentiveness and ensure the patient's safety. The experiences of RNAs enhanced their ability to maintain adaptability when safeguarding the patient. They used their prior knowledge to make informed decisions. With experience, they built up the courage to instruct others to be quiet during critical procedures such as extubation, based on their understanding of the potential for complications to develop due to noise in the OR.

Challenges:
The RNAs sometimes faced challenges when deciding when to extubate due to uncertainty, lack of experience, and unfamiliarity with OR cultures. This affected their ability to safeguard the patient and maintain adaptability. Inexperienced RNAs lacked alternative plans and struggled to predict when to prepare for the end of anesthesia, as it is not always easy to know or predict when the surgical procedure nears its end. Facing pressure from other professionals in the OR was a common challenge for the RNAs. They struggled to maintain adaptability in these moments and felt pressured to rush the extubation process, negatively impacting their focus and decision-making plans. In the OR, RNAs often face interruptions that can compromise patient safety. These interruptions, such as phone calls and requests to fetch equipment, lead to a loss of focus on the patient and can result in a need to alter the extubation plan. Often, they chose not to share the plan with others, despite recognizing the advantage of doing so. Additionally, ANs sometimes disrupt their plans by coming into the OR and making changes without consulting them, which further jeopardizes patient safety.

Study IV

This study considered the combined perspectives of RNAs and ANs to explore CJ during extubations. The analysis revealed an overarching theme, where RNAs and ANs alike described how they put pieces together like a puzzle to create a comprehensive picture of extubations by noticing, interpreting, responding, and reflecting (Table 4).

Table 4. Overarching theme, themes and sub-themes in Study IV

Overarching theme	Theme	Sub-theme
Putting the pieces together	Noticing	Observing reactions from the patient
		Recognizing the situation
	Interpreting	Using experience in clinical reasoning
		Making sense of observations
	Responding	Relying on clinical experience
		Acting upon intuition
	Reflecting	Evaluating clinical actions
		Contemplating for improvement

The theme, *Noticing*, included how the RNAs and ANs observed patient reactions and recognized situations. They explained how their previous experiences with extubation influenced them, enhancing their knowledge and skills. The RNAs and ANs enrolled their expectations of the situation when they identified, recognized, and assembled pieces for the extubation picture.

RNAs and ANs continuously assessed the patients by monitoring their vital parameters and the adequacy of the anesthesia. They also evaluated physical cues, such as eye movements, pupil reactions, and skin color, to guide them during extubations. When observing, they stayed close to the patient; they were vigilant, focused, and attentive to avoid challenges with the extubation. They used their senses and perceptions to comprehensively understand and customize their plan to each patient's needs. Drawing on experience, they recognized situations during extubations and were able to identify patterns, helping them to prevent errors. They recognized situations in which maintaining a calm environment during extubations contributes to patient safety.

The theme of *Interpreting* deals with how the RNAs and ANs used experience in clinical reasoning and in making sense of observations. The pieces they collected started to make sense and were built together to form the picture of extubation.

RNAs and ANs clinically reasoned about physical signs, patient reactions, and pattern recognition. RNAs and ANs use clinical reasoning to decide the point at which it is safe to extubate a patient, and this is based on their observations of measurements, patient reactions, medical records, and input from other professionals. The main goal is to ensure that the patient can protect their airway independently and has fully recovered normal respiration, circulation, and neuromuscular function. In clinical reasoning, experience plays a key role. The inexperienced described a struggle to predict the outcome of extubations, while experienced RNAs and ANs have a better sense of when to extubate. Inexperienced RNAs and ANs also found it challenging to interpret complex situations, whereas experienced RNAs and ANs described how they are able to quickly recognize and act on patterns. Their experience helps them accurately assess when to extubate despite challenges with time pressures and disturbances. With experience, they learn to look beyond the monitors as a patient-centered approach, focusing on the entire patient, not only on measurements or physical signs.

In the theme of *Responding*, the RNAs and ANs base their extubation decisions on clinical experience, measurements, and intuition. They act upon the picture of the extubation they created, responding to their interpretation. They must often act quickly during extubation to ensure patient safety based on intuition and grounded in clinical experience. Communication regarding extubation is rare unless the patient is a child or the extubation is considered high-risk. So, often, they do not share their decision on when to extubate with others; they act upon interpretations of the patient's reactions and the situation. One key difference between the two groups is that RNAs felt alone in the OR team regarding extubations and pressured to hasten the process, whereas ANs felt as though they were working as one in a team. In addition, despite having others present in the OR, the RNAs rarely discussed their decisions, unlike ANs, who felt immediately integrated into the team upon entering the OR. This contrast highlighted the RNAs' sense of isolation compared to the collaborative environment experienced by ANs. RNAs and ANs both experience disturbances and noise in the OR during extubations; however, this leads them to alter their decisions on when to extubate and has the potential to jeopardize patient safety.

The theme, *Reflecting*, involves evaluating clinical actions and how RNAs and ANs critically analyze how they can be improved. When reflecting on the actions taken during extubations, they considered different aspects involved in the process.

Reflecting on their actions enabled both groups of professionals to strengthen their skills, broaden their clinical skills, and enhance future practices. Both RNAs and ANs faced challenges when the OR environment was not conducive to the patient's need for reduced stimuli or when they needed to focus on extubation. RNAs, in particular, reported frequent interruptions from other healthcare professionals during the patient's emergence from anesthesia. Both RNAs and ANs recognized the importance of interacting with other professionals in the OR, noting that different roles required focused attention at various times during the perioperative phase. Both groups of professionals reflected upon and desired better communication and joint planning of extubations but acknowledged that this was rarely practiced.

Discussion

The main findings of the four studies included in this thesis will be combined in the following discussion: the responsibility for the patient, the impact of experience, and work environment factors.

The responsibility for the patient

In all four studies in this thesis, the RNAs (I, II, IV) and ANs (II, IV) maintained focus and attention during extubations. They were prepared for potential complications to ensure patient safety. In the anesthesia setting, patients transfer their responsibility for themselves to another person (Rudolfsson et al., 2007). The relationship with the patient is central in the role of being the patient advocate (Petersen et al., 2024). The RNAs and ANs take responsibility for another person and create a relationship with the patient despite often only meeting them briefly before the GA. According to Løgstrup (1997), we have an ethical obligation when encountering another person because we hold some aspect of their life in our hands. The care of another demands an ethical and professional sensibility, described by intensive care nurses as 'practical wisdom', involving attentiveness to changes in the patient's condition and efficient task prioritization (Sørensen et al., 2013).

The RNAs (I) established a connection with the patient prior to the induction of anesthesia, building trust and exchanging information. During GA, the relationship evolves into non-spoken communication. In Study III, the RNAs' main concerns were safeguarding the patient, as described, for example, in how RNAs perceived advocacy as a moral commitment to provide safe and dignified care (Sundqvist et al., 2014). The ANs (II) learned to know the patient by being receptive to reactions in a relationship that was described as emerging beyond the monitors. In all studies, decisions were made, and actions were taken to protect the patient during extubations. However, both RNAs (I) and ANs (II) found it challenging to articulate and express what they based their decisions on in performing extubations. The decisions were often described as being based on a feeling or intuition and the notion that there is more to the extubation than measurements and technique. These practices resemble what Aristotle referred to as phronesis (Flaming, 2001). This can be understood as practical wisdom or sound CJ, but these skills are challenging to teach or verbalize. These practices deal with pre-understanding and are rooted in interpersonal relationships. In Study

IV, the RNAs' and ANs' managing of extubations was explored and understood by employing Tanner's (2006) CJM as a conceptual lens. When caring for a patient at extubations, RNAs (I, IV) and ANs (II, IV) acted upon sensibilities; they observed, assessed, and identified measurements. They shared how challenging it was to describe and put their actions and thoughts about extubations into words. In all studies (I–IV), the RNAs and ANs continuously analyzed and responded to patients' needs to prevent the patient from harm. By carefully observing and interpreting the patient's condition, healthcare professionals can identify risks and prevent potential problems and safety (Tanner, 2006), which is crucial for adequate care and patient safety.

Because GA is not a treatment but a prerequisite for performing specific surgical procedures, minimizing the risk of complications caused by anesthesia is especially important. The RNAs (I) and ANs (II) strive for a safe extubation outcome by safeguarding the patient. In the extubation process, the RNAs and ANs act upon sensibilities when making unique decisions for each patient. This plan is based on gathered information and risk assessments made throughout GA, similar to Tanner's (2006) concept of noticing and interpreting in CJ.

The impact of experience

The RNAs and ANs in all studies (I–IV) highlighted that their working experience affected them during extubations. In CJ, an initial grasp of the situation is shaped by expectations from understanding the specific patient and typical responses, clinical experience with similar cases, and theoretical knowledge (Tanner, 2006). The RNAs' and ANs' working experience and feelings were topics that featured prominently in the data in all four studies included in this thesis. These processes reflect CJ and decision-making, integrating analytical and intuitive components (Tanner, 2006). In Tanner's (2006) CJM, personal experience is vital in clinical decision-making. It influences how clinicians perceive and interpret patient situations, allowing for more intuitive and adequate decision-making in patient care. For the RNAs and ANs (I–IV), it also became clear that their experiences reached beyond just a moment; the actuation or at least the plan and preparation for extubations started well before the induction of GA. The studies also showed similarities in how the two professions experience extubations, even though their roles differ. The studies themselves can be seen as pieces of a puzzle, contributing to an understanding of extubations from the perspective of those who perform them in their natural context, just like Tanner's

(2006) CJM, which involves gathering different pieces of information and fitting them together to see the complete picture of the patient's condition.

In all studies (I–IV), it can be understood that combining their experience and recognizable patterns gives them expectations and intuition to safeguard the patient. Using situation awareness and finding patterns they recognize, they gather information and create a picture of the extubation. This finding is consistent with the Anesthesiologist's Non-Technical Skills (ANTS) framework outlined by Flin and Patey (2011) and nurse anesthesia (NANTS) Lyk-Jensen et al. (2014). Decision-making is essential in ANTS and NANTS, involving identifying and selecting options, conducting risk assessments, and continuously re-evaluating decisions, similar to Tanner's (2006) components in CJ. In Study IV, the RNAs and ANs described how their decision on when to extubate depends on the context in which the extubation will be performed and the nature of the surgical procedure. According to Tanner (2006), knowledge, experience, and recognition are essential parts of CJ that are being brought into the situation. These parts of CJ became important in RNAs' and ANs' plans for extubations, using their expectations of the situation to piece together a picture of the extubation. The RNAs (I, III) and ANs (II) discussed how extubations can be challenging and unpredictable. In challenging cases, Biro et al. (2020) describe how the challenge often lies in lacking information and that clinical decision-making begins with seeking information and is influenced by professional expertise, experience, and work environment. Similar to Tanner's (2006) CJM, the decision requires gathering relevant information, interpreting it based on experience and expertise, and making decisions accordingly.

Inexperienced RNAs (I) and ANs (II) expressed frustration about being told how to perform extubations without having much experience. They shared stories of being told by tutors or more experienced colleagues that they relied on a feeling when performing extubations, a feeling they did not yet have. They saw this lack of intuition as a limitation in their decision-making practices. To develop from being a novice, inexperienced nurse to attaining the expert stage requires gaining experience by being clinically active for an extended period of time in the same field and through contact with many patients (Nilsson & Pilhammar, 2009). An experienced and competent practitioner learns and develops by repeatedly acting, according to Schön (2017). The experienced nurse compares the current situation with similar situations, changes, deviations, and signs to inform these decision-

making practices. The RNAs and ANs (I, II, IV) highlighted the importance of being ready to reconsider existing plans; also, when reflecting on the situation in action, the RNAs' and ANs' (IV) decisions were often reconsidered due to the patient's individual needs. At extubations, a decision must be made quickly and revised just as quickly (Smith & Arfanis, 2013). In anesthetic nursing, being one step ahead includes having evidence-based and clinical knowledge, the necessary skills, and the ability to maintain situational awareness to be alert for changes and react immediately (Nilsson & Jaensson, 2016). In being prepared, both the RNAs (I, III) and ANs (II) are ready to call in additional assistance or use the other professionals in the OR if they need assistance or when something unfavorable occurs. Further, their ability to be guided by intuition enables them to trust their feelings when they notice something is wrong. This finding aligns with the notion of a sixth sense described by Smith and Arfanis (2013), where experienced clinicians feel that something is 'not right' but cannot express what it is in words. Along with recognizing and responding to enhance patient safety (Robben et al., 2024), emphasize the importance of combining measurements and evidence-based practice with worry or clinical intuition.

The working environment

In all studies of this thesis (I–IV), disturbances in the RNAs' and ANs' work environment at extubations were identified. This does not align with effective teamwork. The expectation that the OR should be calm and quiet during extubations is similar to the ethical obligation to ensure patient safety in the complex, often distracting OR environment (Göras et al., 2017). Lam et al. (2018) describe how the anesthesia team works in a complex and unpredictable environment that requires effectiveness at unexpected moments. This is supported by Göras et al. (2017, 2020), who identified that the OR team frequently faced multitasking and interruptions, affecting patient safety, an element which they found could be improved in OR settings. While the RNAs and ANs focus on ensuring a smooth and calm emergence from anesthesia, the activities of other professionals in the OR may cause disturbances. Such interruptions can disrupt effective teamwork and negatively impact patient safety (Göras et al., 2017). When comparing extubations with intubation, the atmosphere shifts in contrast between these two situations, although dealing with the same patient, from being a calm and compassionate time for the patient and the whole team in the OR at intubation to disorder at extubation (Wakabayashi et al., 2023). This

shift in atmosphere aligns with how the RNAs in Study III moved between two opposite poles of being facilitators and facing challenges when safeguarding the patients during extubations. Due to this disorder in the OR, the RNAs and ANs in all studies (I–IV) were concerned for the patient, who, at extubations, was in a more vulnerable state than at intubation, facing the risk of severe complications. A study by Rydenfält et al. (2019) highlighted that teamwork involves more than just individuals working together; it necessitates a collective dedication to a common goal. To support RNAs and ANs in managing safety in complex situations, Olin et al. (2023) highlighted the importance of adequate resources, stable team compositions, and clear practice boundaries as prerequisites for safe care. Professionals in the OR must cope with disturbances, complexity, and unexpected events (Göras et al., 2017). With experience, RNAs and ANs become adept at predicting when complications during extubation will occur'. In the OR, with different professionals, all caring for the same patient but with different focuses, for the professional in charge of anesthesia and extubations, it is important to include how surgical procedures progress in their judgment. Biro et al. (2020) emphasize the variability in anesthesia providers' willingness to communicate with surgeons, noting that this variability is linked to provider roles. Such hierarchical dynamics within the OR significantly influence teamwork and communication.

For the most part, the experiences of RNAs (I) and ANs (II) during extubations were similar, though two notable differences in perspectives were identified. To begin with, the findings reveal that their roles differ, as the RNAs are situated in the OR, while the AN works mostly outside of the OR. As such, they need to trust each other. The AN needs to be ready to assist if the RNAs are calling for them, and, conversely, the AN needs to trust the RNAs to inform them when help is needed. Another difference is that the RNAs (I) often felt isolated during extubations despite the presence of other professionals in the OR. These other professionals typically shifted their focus away from the patient, concentrating instead on cleaning the OR and preparing for the next case. In contrast, ANs reported feeling included, even when they were not physically present in the OR. When they entered the OR during extubations, they felt they were part of the team and contributed to the overall atmosphere (Study II). RNAs frequently felt pressured by other OR professionals to extubate earlier than planned. This pressure sometimes arose from the surgical procedure ending earlier than anticipated, without the RNAs or ANs being informed, or from delays in extubation due to the patient's condition. CJ is context-dependent and influenced by the clinical environment and prior knowledge and

experience. In line with Tanner's (2006) CJM and Biro et al.'s (2022) findings, the RNAs and ANs emphasize a dynamic and context-sensitive approach to decision-making in clinical practice.

Disturbances in the OR during extubations affected the RNAs (III) when trying to safeguard the patients. RNAs and ANs (I, II, IV) shared their frustration of being interrupted and disturbed during extubations. Ensuring patient safety during anesthesia, even when being disturbed, is critical when RNAs hold the patient's life in their hands (Sundqvist et al., 2014). In this not-so-favorable environment, the RNAs (I, III) acted as the patient's advocate and safeguarded them. The ANs (II) employed strategies to be humble during each extubation; they stayed focused and calm. Similarly, Larsson and Holmström (2013) described how ANs' work is patient-centered and how they stay calm and focused in critical situations.

The RNAs and ANs play a pivotal role in the entire process of extubations, using CJ from the first grasp of the situation to reflecting upon and learning from previous experiences. This CJ process involves interpreting patients' needs and deciding on the appropriate action, which is a crucial aspect of their professional role at extubations. Extubations in the anesthesia context can be seen as assembling a puzzle for the RNAs and ANs. Some pieces they bring with them into the situation involve their expectations for the extubation based on experience, considering the unique patient. Pieces are collected by assessing, measuring, and staying attentive and present with the patient. They measure vital signs, observe how the patient reacts, and identify signs and clues that may indicate difficulties with extubation. While the patient undergoes GA, the puzzle begins to take shape; the various pieces are interpreted and sorted to fit together. The more pieces are gathered, and the closer they get to extubation, the more complete the puzzle becomes. Sometimes, pieces are missing, and it may not be easy to see the entire picture of the extubation. When reflecting on extubations upon action, more pieces are added to complete the puzzle, building experience and creating expectations for future extubations. Extubations are an iterative process where pieces are added, replaced, clarified, adjusted to fit, and viewed from different angles and dimensions. The process of assembling the puzzle systematically builds up a picture by continuously improving and refining the work through each extubation phase. This aligns with how Tanner (2006) described the CJM. Like in a puzzle, each step requires attention to detail, experience, and sometimes trying different solutions before finding the right one. It is a dynamic

process where each piece of information is essential in understanding and managing the patient's care needs.

Methodological considerations

A qualitative approach was used in all four studies (I–IV) included in this thesis, focusing on the experiences of RNAs and ANs at extubations. The chosen design was considered relevant for its specific aims as it included individuals' experiences within their contexts (Patton, 2015; Polit & Beck, 2021). According to the naturalistic paradigm, qualitative methods are suitable for understanding how the participants construct reality within their context (Polit & Beck, 2021). In qualitative paradigms, studies are conducted in participants' natural settings to interpret the phenomena of interest (Creswell, 2013; Denzin & Lincoln, 2018). Various data collection methods were utilized to investigate the phenomenon of extubations comprehensively. The intention was to gather experiences of extubation in the first two studies, separating the two groups of professionals in each study. Then, to further reveal the extubation process, the third study focused on the main concerns of RNAs through observations and interviews. The fourth study focused on CJ at extubations from the perspectives of RNAs and ANs. Using diverse methods helps to gain a deeper understanding of research inquiries and enhances the study's overall trustworthiness (Polit & Beck, 2021).

To achieve trustworthiness in this thesis, the studies aimed to achieve the criteria of credibility, transferability, dependability, and confirmability (Lincoln et al., 1985). A variety of different data collection methods were used from multidisciplinary experiences to contribute to credibility and trustworthiness, offering the possibility of triangulation (Lincoln et al., 1985; Shenton, 2004). The thesis provides detailed information about the specific area of focus, including the setting, context, participants, and sample method. This comprehensive information enhances the trustworthiness of the research by enabling transferability and allowing readers to determine whether the findings could be applied to similar settings or situations (Shenton, 2004). Moreover, it ensures the research meets the dependability criteria, as the studies can be replicated based on the clearly described research design and implementation (Lincoln et al., 1985). The fourth criterion, confirmability, involves ensuring that the findings reflect the participants' experiences and are not just influenced by the researcher (Patton, 2015). In qualitative studies, the researcher acts as the data collection instrument, meaning that the data are filtered through the researcher, making the researcher's role crucial in the data collection process (Denzin & Lincoln, 2018). To achieve confirmability, the method was clearly described and validated through various data-gathering

methods. Participants were recruited from university and county hospitals in different geographical areas and from various professional groups involved in anesthesia and extubation. The diversity of this approach to recruitment may improve confirmability and lead to a wide range of participant experiences. In the naturalistic paradigm, it is assumed that there are multiple interpretations of reality. Researchers aim to understand how individuals create their reality within their unique context (Polit & Beck, 2021). Also, to enhance trustworthiness throughout the research process, ongoing discussions were held among the authors with diverse methodological expertise, aligning with Creswell and Poth's (2016) emphasis on the value of multiple perspectives to ensure credibility and rigor in qualitative research. By incorporating multiple perspectives and methods, triangulation contributed to the overall trustworthiness and validity of the thesis, providing a more robust and credible analysis that captured a fuller picture of the research problem.

The choice to conduct focus group interviews with RNAs (Study I) was partly driven by the number of RNAs available for participation during working hours. Also, focus groups provide the opportunity to collect rich and detailed data, as group discussions can uncover deeper insights and nuanced perspectives (Morgan et al., 1998). Focus group interviews were impossible due to the low numbers of ANs at county hospitals, so individual interviews were performed instead. In Study III, RNAs were included for observations and interviews of the process, from preparing the patient for GA until the point of extubation, when the patient was then handed over to the postoperative unit. In Study IV, datasets from Studies I and II were integrated to triangulate interviews with RNAs and ANs with a focus on CJM, according to Tanner's (2006) CJM.

Determining an appropriate sample size was guided by information power (Malterud et al., 2016) in Studies I and II. This helps determine the number of participants needed based on the amount of information generated by the sample. Fewer participants are needed when the sample contains more information. The appropriate number of participants depends on the specificity of the participants' experiences, the breadth of the aim, whether an established theory is applied, as well as the quality of the dialogue and the chosen analysis strategy (Malterud et al., 2016). The aims of Studies I and II were narrow, and the participants were familiar with the extubations. However, because the approach was inductive (I, II) and because I, as a researcher, did not have prior experience of performing qualitative interviews, the sample size eventually included 20 RNAs in Study I and 17 ANs in Study II. A

consecutive sampling strategy was chosen as it adequately recruits participants over a specific time interval (Polit & Beck, 2021). In Study III, the sample composition was determined by applying a constant comparative method until data reached saturation in the development of categories (Chun Tie et al., 2019). Consecutive sampling was used in Study I–III; the RNAs and ANs who worked on the days on which the data collection took place were included to participate in the data collection. In Study IV, the data set, comprised of two previous data collections, was considered sufficiently comprehensive and diverse to achieve thematic sufficiency, as outlined by Braun and Clarke (2006, 2019). This approach ensured that the data were rich enough for meaningful patterns to emerge and be analyzed concerning the research objectives and pre-determined themes. According to Braun and Clarke (2006, 2019), thematic analysis prioritizes depth of analysis over sample size, focusing on the richness of data to generate insightful themes rather than adhering to rigid rules of saturation.

A limitation of the choice of method might be that only qualitative designs were adopted. Nevertheless, given the lack of research on how extubations are experienced and their critical nature, qualitative methods were considered to be more suitable than quantitative ones. These methods allow for rich, detailed data collection, which is essential for understanding the subjective experiences of those performing extubations in their natural work environment.

A strength and a limitation in the studies (I–IV) and this thesis is my experience of working as an RNA, performing extubations. This pre-understanding of the area could be considered a limitation and may have affected how the data were interpreted. However, it can also be regarded as a strength to be familiar with and understand the context in which data are collected. Furthermore, my research group consisted of supervisors of varying backgrounds; some who did have anesthetic experience and some who did not. We continuously had critical discussions about the results during the data analysis. It is also important to note that I was unfamiliar with any of the participants, nor had I previously worked at any of the included hospitals. In classic GT, the researcher needs to balance openness to data with their experience. It is often suggested that pre-understanding should be held back to let the theory emerge from the data. However, prior knowledge enhances theoretical sensitivity and recognizes essential patterns (Glaser, 1978). During the observation, my experience was seen as a strength, as I was able to identify actions that were important for the extubation process. During the interviews, the focus was placed on RNAs' reflections about

their main concerns. The field notes were used as complementary questions to clarify the RNAs' actions or reflections. In RTA (in Study IV), it is crucial for the researcher to be aware of their pre-understanding and to engage reflexively and creatively in interpreting data and developing themes. Before conducting the RTA, it was determined that the themes would be labeled according to Tanner's (2006) CJM concepts for data relating to CJ.

Conclusion

The studies presented in this thesis provide insight into the perspectives of RNAs and ANs on the extubation of patients after general GA. The extubation process was described as being an art form from the RNAs' perspectives, while anesthesiologists emphasized the importance of looking beyond the monitors. This knowledge indicates that the decision to extubate involves a specific skill beyond values and measurements. Extubation should be performed in a way that ensures patient comfort with minimal physiological changes to prevent harm, comparable to how induction and intubation are conducted. Tanner's (2006) conceptualization of CJ made the process easier to understand and express. There is a lack of research in this area, making this knowledge vital in clinical education and training future RNAs and anesthesiologists. Moreover, this thesis can help to place greater attention on maintaining patient safety during extubation. Furthermore, recognizing the importance of maintaining a silent environment in the operating room can improve focus and enhance patient safety during this critical moment.

RNAs and ANs share the journey with the patient through the anesthetic period, guiding them safely from induction to recovery. During extubation, which requires technical skill and professional growth, RNAs and ANs combine measurable data with perceptual insights, looking beyond monitors to safeguard the patient. They remain focused, are adaptable, and present, piecing together information to navigate the uncertainties of extubation. Although challenges may arise, each experience informs future practices, making the anesthetic journey collaborative to ensure patient safety and professional development.

Clinical implications

Focusing on the experiences of those who perform and make decisions about extubations in clinical practice can help us better understand this critical moment. This knowledge is essential in clinical education and in training future RNAs and ANs to promote clear and focused communication in this critical moment. The findings can be applied to inform education programs and support new colleagues by emphasizing the importance of minimizing disruptions during extubation. Ensuring silence in the operating room is crucial, especially during the patient's vulnerable wake-up phase. These insights underscore the need for a calm environment that allows anesthesia professionals to maintain focus. Concentration is improved by fostering a quiet atmosphere around the patient and the anesthesia team during extubation, ultimately enhancing patient safety. It may also contribute to a cultural change in the operating room during extubation. The results of these studies have the potential to promote a greater understanding between different professional groups, highlighting both shared and unique challenges. This awareness and understanding can ultimately improve patient safety and person-centered care by reducing the risk of complications related to the extubation process. Understanding the importance of clinical training and sharing experiences with colleagues is crucial.

Future research

Further investigation of the complex yet crucial communication dynamics within ORs is an essential area for future research. Understanding how RNAs and ANs communicate and collaborate during critical phases such as extubation could reveal strategies for enhancing patient safety. This research could focus on how these communication practices impact decision-making, adaptability, and the ability to anticipate and manage complications, ultimately contributing to the development of best practices that ensure both effective teamwork and positive patient outcomes.

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