

Aspects of decisions to withhold and withdraw life-sustaining treatment in intensive care

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“Maybe you are searching in branches for what only appears in the roots.”

Rumi, 1207-1273.

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ABSTRACT

Background: End-of-life decision-making is required when the patient no longer benefits from available treatment options and there is a need to redirect medical treatment goals from cure to palliative care. End-of-life decisions are multifaceted and complicated processes for intensive care physicians.

Aim: The overall aim of the thesis was to evaluate end-of-life decision-making in Swedish intensive care units.

Method and results: Study I is a registry study from the Swedish Intensive Care Registry (SIR) with the aim of identifying independent variables that increase the odds of receiving a withhold/withdraw treatment decision. A total of 97 095 ICU admissions were analysed, and a full care group was compared with a withhold/withdraw decision group. Increasing age, female sex, and a more severe condition at admission (according to Simplified Acute Physiology Score version 3, SAPS 3) were independent factors associated with increased odds of receiving a decision to withhold or withdraw life-sustaining treatment.

Studies II and III are descriptive qualitative studies based on semi-structured interviews with 19 physicians from Swedish intensive care units. Thematic analysis was performed on the interview material.

Study II explored physicians' experiences with and attitudes about end-of-life decision-making. Intensive care physicians express that end-of-life decisions must be based on sufficient information and an unambiguous medical prognosis, and should preferably be made in consensus with the family, staff, and other physicians.

Study III is a sub-analysis of the same material as in study II and explored variability between individual Swedish intensive care physicians. Physician-related variability involved diverse assessments of patient preferences and was also related to the personality and values of the physician.

Study IV is a prospective observational pilot study performed at Sahlgrenska University Hospital in Gothenburg, Sweden, and aimed to explore whether end-of-life decision-making was made differently during the pandemic of Sars-Corona-Virus 2 disease (COVID-19). Altogether, 394 critically ill patients were analysed, 263 (67%) patients with a COVID-19 diagnosis and 131 (33%) with a diagnosis other than COVID-19. Results show that decisions to withhold or withdraw treatment were based on different variables for the COVID-19 cohort compared to the non-COVID-19 cohort.

Conclusions: Swedish intensive care physicians always strive to reach well-grounded end-of-life decisions. Older age, a more severe condition at admission, and female sex are independent factors associated with decisions to withhold and withdraw intensive care treatment. However, variability in

decision-making is confirmed in Swedish intensive care units. Interestingly, intensivists generally accept variability in end-of-life decisions. Furthermore, differences in variables predicting a decision to withhold or withdraw treatment were found between a COVID-19 patient cohort and a non-COVID-19 cohort.

Keywords: critical care, end-of-life decision-making, intensive care, life-sustaining treatment, withdraw, withhold.

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Populärvetenskaplig sammanfattning på svenska

På en intensivvårdsavdelning (IVA) vårdas de allra sjukaste patienterna, på grund av svår svikt i minst en av de vitala funktionerna; medvetande, andning eller cirkulation. Ofta är patienten nedsövd, för att minska obehag och smärta eller så medtagen, att kommunikation direkt med patienten inte är möjligt. Patientens synpunkter, önskemål och vilja rörande sin behandling måste då efterhöras i diskussion med de närmast anhöriga.

Ett beslut om behandlingsstrategi betyder att sätta mål för patientens vård. De två huvudstrategier som finns är fulla åtgärder och begränsade åtgärder. Fulla åtgärder innebär att erbjuda patienten samtliga befintliga behandlingar med mål att återkomma till samma funktionsnivå som patienten hade före intensivvården. Fulla åtgärder gäller alltid såvida inget annat har beslutats. Begränsade vårdåtgärder innebär att de medicinska åtgärder som inte längre anses vara till nytta för patienten väljs bort. Risken för förlängt lidande är större än möjlig nytta för individen om fulla insatser får fortgå.

Socialstyrelsen har gett ut föreskrifter och allmänna råd kring livsuppehållande behandling (SOFS 2011:7; Socialstyrelsens föreskrifter och allmänna råd om livsuppehållande behandling). I dessa finns föreskrifter kring hur ett beslut om vårdbegränsningar ska fattas när det inte längre är förenligt med vetenskap och beprövad erfarenhet att ge livsuppehållande behandling. Inför ett beslut om att inte inleda, eller avbryta livsuppehållande behandling **ska** den fasta vårdkontakten, eller legitimerad läkare som är delaktig i vården (om fast vårdkontakt inte är utsedd), rådgöra med minst en annan legitimerad yrkesutövare, samt bör rådgöra med andra yrkesutövare som varit involverade

i patientens vård. I journalen ska det dokumenteras på vilka grunder beslutet är fattat, vilka yrkesutövare man rådgjort med, om samråd med patienten varit möjligt eller inte, och på vilket sätt patienten/närstående har fått information samt vilken inställning patienten/närstående uttryckt.

Beslut kring att inte inleda eller avbryta livsuppehållande behandling kan fattas i samtliga steg i vårdkedjan; på vårdcentralen, på en specialistmottagning, på akutmottagningen, på vanlig vårdavdelning eller på en intensivvårdsavdelning. Beslutet bör omvärderas dagligen eller vid förändring av sjukdomstillstånd. Svenska läkaresällskapet samt svensk förening för anestesi och intensivvård (SFAI), har utgivna riktlinjer för hur beslut kring att inte inleda eller avbryta livsuppehållande behandling bör hanteras och vad som är särskilt viktigt att ta i beaktande.

Tidigare studier om hur dessa beslut fattas visar variation mellan länder, mellan regioner inom samma land, mellan sjukhus inom samma region, mellan intensivvårdsavdelningar på samma sjukhus samt även mellan olika läkare på samma intensivvårdsavdelning.

Syftet med denna avhandling är att studera beslutsfattandet om att inte inleda, eller avbryta, livsuppehållande behandling på svenska intensivvårdsavdelningar.

I de ingående studierna har registerdata och journalgranskningar kring vårdbegränsningsbeslut granskats, och intervjuer genomförts för att undersöka intensivvårdsläkares erfarenheter och upplevelser av att fatta dessa beslut.

Studie I är en registerstudie på data extraherad från Svenska Intensivvårdsregistret (SIR). I studien jämfördes patienter där beslut om

behandlingsbegränsningar registrerats, med de patienter som behandlades med fulla åtgärder. Högre ålder, svårare sjukdom vid inläggning på intensivvårdsavdelning och kvinnligt kön visade sig vara oberoende variabler som ökade sannolikheten för att få ett beslut om behandlingsbegränsning.

Studie II är en kvalitativ intervjustudie som inkluderar intervjuer med 19 intensivvårdsläkare från fem olika intensivvårdsavdelningar i Sverige. Resultatet från denna studie visade att svenska intensivvårdsläkare upplever dessa beslut som extremt viktiga, men svåra och komplexa. Intensivvårdsläkare önskar ha mer tid för att samla så mycket information som det går om patientens tidigare sjukdomar och funktionsnivå och den aktuella sjukdomens inverkan på detta. Studien visade att det finns utrymme för förbättrat samarbete och bättre kommunikation med andra specialister på sjukhuset, då perspektiven mellan olika specialister kan variera. Vidare lyfts att bristande läkarkontinuitet kan leda till fördröjda beslut och därmed förlängt lidande. Intressant var att svenska intensivvårdsläkare bekräftar, och accepterar, att det förekommer en variation kring beslut om behandlingsbegränsningar.

Studie III är en fördjupning av intervjumaterialet där faktorer associerade med den variabilitet som påvisades i studie II analyserades. Resultaten var att variabilitet i beslut om behandlingsbegränsning på svenska intensivvårdsavdelningar delvis är relaterade till intensivvårdsläkarens personlighet, värderingar och egenskaper så som inneboende beslutsamhetsförmåga.

Studie IV är en observationsstudie där syftet var att undersöka om beslut om behandlingsstrategi skiljde sig mellan intensivvårds patienter som behandlades till följd av infektion med Sars-Corona-Virus 2 (Covid-19) och patienter som behandlades på intensivvården på grund av annan orsak. Högre ålder och allvarligare sjukdom korrelerade även i denna studie till beslut om behandlingsbegränsning hos patienter som behandlas på intensivvårdsavdelning av andra anledningar än COVID-19. Däremot fanns det ingen signifikant korrelation mellan ålder och sjuklighetsgrad och beslut om begränsningar för patienter behandlade för andningssvikt på IVA till följd av COVID-19. Studien visade även att tid till beslut var längre för patienter som vårdades för COVID-19.

List of papers

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

- I- Block L, Petzold M, Syrous AN, Lindqvist B, Odenstedt Hergès H, Naredi S. Age, SAPS 3 and female sex are associated with decisions to withdraw or withhold intensive care. *Acta Anaesthesiol Scand*. 2019 Oct;63(9):1210-1215.
[https://doi: 10.1111/aas.13411](https://doi.org/10.1111/aas.13411)
- II- Nordenskjöld Syrous, A, Ågård, A, Kock Redfors, M, Naredi, S, Block, L. Swedish intensivists' experiences and attitudes regarding end-of-life decisions. *Acta Anaesthesiol Scand*. 2020; 64: 656– 662. <https://doi.org/10.1111/aas.13549>
- III- Nordenskjöld Syrous A, Malmgren J, Odenstedt Hergès H, Olausson S, Kock-Redfors M, Ågård A, Block L. Reasons for provider-caused variability in end of life decision-making in intensive care. *Acta Anaesthesiol Scand*. 2021;65:1102–1108.
- IV- Nordenskjöld Syrous A, Gudnadottir G, Oras J, Furguson T, Lilja D, Odenstedt Hergès H, Larsson E, Block L. Differences in end-of-life decision making in critically ill patients with and without COVID-19. Submitted manuscript.

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Paper I-IV

Abbreviations

BMI	Body Mass Index
CCI	Charlson Comorbidity Index
CI	Confidence Interval
COVID-19	Corona Virus Disease-19
DNAR	Do Not Attempt Resuscitation
DNI	Do Not Intubate
DNR	Do Not Resuscitate
ELDM	End-of-Life Decision-Making
ICU	Intensive Care Unit
IQR	Inter Quartile Rate
LOS	Length Of Stay
LST	Life-Sustaining Treatment
OR	Odds Ratio
QoL	Quality of Life
SAPS 3	Simplified Acute Physiology Score version 3
SIR	Swedish Intensive Care Registry
WD	Withdraw
WH	Withhold
WHO	World Health Organization

Definitions in brief

End-of-life decisions	Includes decisions regarding changing goals of treatment to a palliative direction
Life-sustaining treatment	Treatment to prolong life without reversing the underlying medical condition; includes, for example, mechanical ventilation and nutrition.
Withhold treatment	An active decision to not initiate treatment
Withdraw treatment	An active decision to discontinue a specific treatment

1 INTRODUCTION

1.1 INTENSIVE CARE

Intensive care aims to prevent and treat organ failure to reverse life-threatening conditions. Therefore, life-sustaining treatments (LST) such as mechanical ventilation, circulatory support, renal replacement therapy, and enteral nutrition are usually necessary to keep the patient alive and allow time to reverse and treat the underlying disease(1, 2).

The ultimate goal of intensive care is both survival and making it possible for the patient to return to an acceptable level of quality of life(3).

However, when this goal seems to be out of reach, when treatment is no longer considered beneficial for the patient and truly merely only prolongs unnecessary suffering, the decision to limit further LST needs to be discussed(1, 4).

1.1.1 ORGANIZATION OF INTENSIVE CARE IN SWEDEN

Sweden is divided into 21 healthcare regions, all members of the Swedish Association of Local Authorities and Regions(5). Each healthcare region may adapt health care so that it is best suited to the needs of that specific region's population. However, this must be done within the framework set by the national government. The Ministry of Health and Social Affairs needs to fulfill its political goals(6). This is done by several public agencies, such as the National Board of Health and Welfare(7, 8). The providers of health care are primary care, county hospitals, and regional university hospitals. These

regional hospitals are assigned to give their region's populations the most advanced and specialized treatments.

In a Swedish intensive care unit (ICU), a specialized intensive care team takes care of the patients and co-manages the patients' care with other relevant physicians. Patients are admitted to the ICU either directly from the emergency department or from a ward. The physicians at the ICU are available 24 hours a day and are either specialists in anaesthesiology and intensive care or residents in this specialty. The nurses on duty are specially trained critical care nurses and have nurse assistants to help them.

There are 83 ICUs in Sweden, and they are divided into three categories depending on the advanced monitoring and treatment options they can provide. The most advanced and specialized treatment options, such as thoracic and neuro-intensive care units, are available in category three, whereas category two has all but the most specialized treatment options. Category one has all intensive care treatment options but lacks the ability to provide more advanced intensive care and specialized treatments(9).

1.1.2 THE SWEDISH INTENSIVE CARE REGISTRY

All of the 83 ICUs in Sweden report data to the Swedish Intensive Care Registry (SIR)(10), a national quality registry supported by, and working in close cooperation with, the National Board of Health and Welfare and the Swedish Association of Local Authorities and Regions(8, 10). The primary purpose of SIR is to enhance quality and research in Swedish intensive care. SIR includes so-called national quality indicators, and one of these has the title "Life support treatment and treatment strategy". In the description of this

quality indicator it is stated that a treatment strategy can be defined as a decision to apply limitations to treatments. Intensive care can result in survival and recovery from severe medical conditions but can also cause extended suffering without recovery. Therefore, a decision on intensive care must be preceded by a medical assessment of the possibility of survival and recovery. All ICUs can report to SIR on decisions made on treatment limitations(10, 11).

1.2 END-OF-LIFE DECISIONS

The technical advancements in intensive care treatment options, mechanical support of respiration, pharmacological and mechanical support of circulation, and renal replacement therapy have made it possible to continue treatment and care of patients for more extended periods, even without any signs of improvement in patient condition. Therefore, the discussion of decisions to withhold (WH) or withdraw (WD) treatments in the ICU has increased during the last decades(12, 13). End-of-life decision-making (ELDM) refers to decisions on WH/WD treatment that include multiple aspects such as medical assessment, ethics, legislation, and communication(14-20).

Published studies from ICUs in Europe and the United States report that, during the last decades, a significantly higher proportion of deaths in ICUs occur due to limitations in LST, a finding that indicates a shift in end-of-life decisions in the ICU environment(13, 21-26).

1.2.1 WITHHOLD TREATMENT

The decision to withhold LST is an active decision not to start or increase a life-prolonging treatment. The most common WH decisions are Do Not Resuscitate (DNR), Do Not Attempt Resuscitation (DNAR), and Do Not Intubate (DNI)(21, 27, 28).

The decision of DNR, for example, may not automatically exclude interventions such as respiratory support, continuous renal replacement therapy, or circulatory support. Therefore more specified and differentiated decisions for each organ support are required(27, 29). In the ICU, the treatment options may be differentiated and adapted to serve the individual patient better. A typical example is a patient with moderate frailty and comorbidities admitted to the ICU due to exacerbation in advanced chronic obstructive pulmonary disease. This patient might benefit from non-invasive mechanical ventilation support but not coronary pulmonary resuscitation and invasive mechanical ventilation.

1.2.2 WITHDRAW TREATMENT

The decision to withdraw treatment is an active decision to stop a life-sustaining therapy(21, 27, 30). Mechanical ventilation is the most common treatment to be withdrawn in the ICU (28). The Swedish Society of Anaesthesiology and Intensive Care (SFAI) has practical guidelines for withdrawal of each treatment(27).

Full code

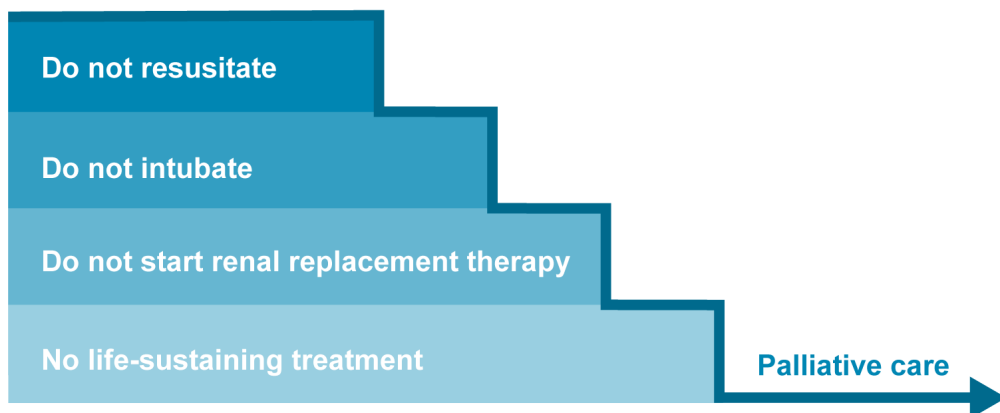


Figure 1. Example of the process of de-escalation of life-sustaining treatments.

1.2.3 ASPECTS OF WITHHOLDING TREATMENT VERSUS WITHDRAWING TREATMENT

There is no ethical difference between withholding or withdrawing treatment since death would be inevitable in each case. However, in practice, it might be psychologically more difficult to actively stop a treatment than to passively not start(31-34). Even though no ethical distinction exists between withholding and withdrawing therapies, withholding a therapy seems to be the first step and is made earlier in the decision-making(29, 35, 36).

If there is uncertainty about the patient's chances of reversing an acute life-threatening condition and more information about the patient's functional status and comorbidities is needed, ICU admission is often liberally offered, especially during on-call hours(37, 38). However, there are no defined frames, and the rate of the decision of WD in a certain ICU may be reflected by how readily patients with uncertain prospects of benefiting from advanced treatment in the ICU are admitted.

1.3 LEGAL ASPECTS

1.3.1 SWEDISH HEALTHCARE LEGISLATION

Current health and medical care legislation(39-43):

- The Health and Medical Services Act (SFS 2017:30) includes regulations on how Sweden's health and medical services are to be organized and operated and applies to all care providers, county councils, and municipalities.
- The Health and Medical Services Ordinance (SFS 2017:80) includes supplementary provisions to the Health and Medical Services Act.
- The Patient Safety Act (SFS 2010:659) ensures patient safety and aims to reduce the number of medical injuries.
- The Patient Act (SFS 2014:821) reinforces and clarifies patients' position, integrity, self-determination, and participation.

The above are framework laws; the legislator sets goals and general principles by the law and, to a lesser extent, regulates in detail what must be done. In addition, the National Board of Health and Welfare is appointed to write more detailed regulations based on the laws to facilitate interpretation and implementation(8, 44).

1.3.2 REGULATION OF END-OF-LIFE DECISIONS IN SWEDEN

Regulations and general advice on implementing and complying with the requirements from the National Board of Health and Welfare concerning ELDM, SOFS 2011:7 “Life Sustaining Treatment”, are based on the current health and medical care legislation described in section 1.3.1(45).

SOFS 2011:7, chapter 2, contains eight paragraphs about patients with life-threatening conditions needing a caregiver responsible for identifying the patient’s needs and planning further care and treatment goals. In addition, it includes the need for documentation of this planning.

SOFS 2011:7, chapter 3 (based on The Patient Safety Act, SFS 2010:659), includes the obligation of deciding to redirect the treatment goals when the treatment options are not considered beneficial for the individual patient by medical evidence or empirical experience.

Paragraph 3 in chapter 3 gives directions about clear documentation (based on the Patient Safety Act SFS 2014:821). It should contain the decision, date and time, who was consulted and involved in the decision-making, and on which grounds the judgments and decisions were made. It should also include when the decision was communicated to the patient/next-of-kin and how the information was adapted to be understood by the patient/next-of-kin, as well as the patient’s/next-of-kin’s own opinion on the matter of LST(46).

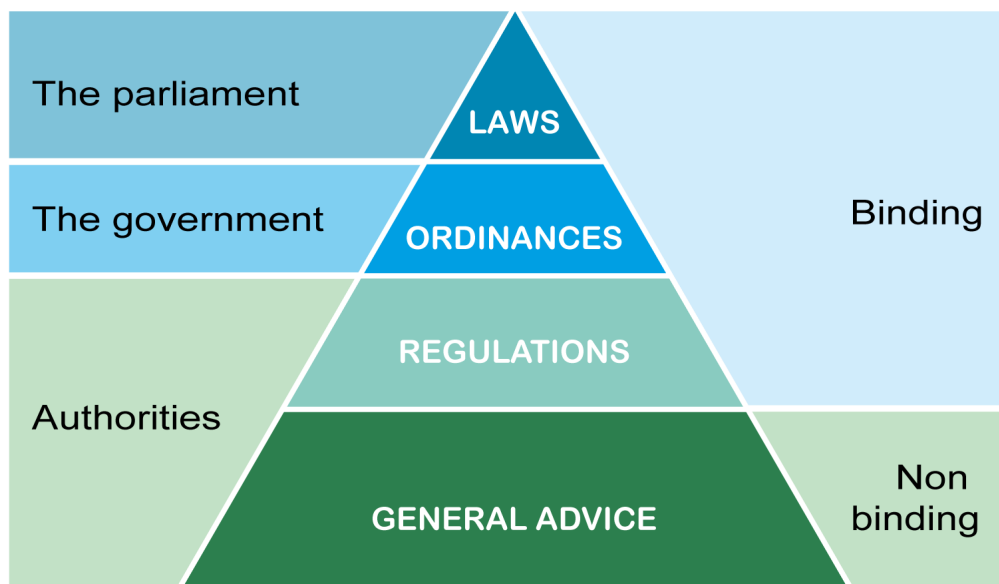


Figure 2. Swedish legislation.

1.3.3 GUIDELINES FROM MEDICAL SOCIETIES IN SWEDEN

The guidelines concerning ELDM available from the Swedish Society of Medicine are directed to all medical practitioners and are of general ethical character. The focus is on consideration and respect for the individual patient's values(47).

The Swedish Society of Anaesthesiology and Intensive Care (SFAI) focuses on the intensivists' point of view. Besides definitions and concepts, it includes guidance on the discontinuation of each organ support(27).

1.3.4 IMPORTANT DIFFERENCES IN LEGAL ASPECTS BETWEEN SWEDEN AND OTHER COUNTRIES

There are a few differences in legislation on ELDM between Sweden and other countries(48). The main differences are as follows:

Informed consent – although all decisions need to be in agreement with the patient, and physicians by law need to inform the patient about treatment options and their consequences, there is no legislation about informed consent in Sweden. Countries such as the USA, the United Kingdom, and Italy have legal requirements for signed informed consent, which is not required in Sweden(49-51).

Legal surrogacy – while in some countries surrogacy is legally applicable, there is no legal right in Sweden for the family to be a surrogate for decision-making. However, they should be involved in gathering information about the patient's wishes and have the right to be informed(42).

1.4 ETHICAL ASPECTS

1.4.1 MEDICAL ETHICS – HISTORICAL ASPECTS

From approximately 460 B.C.E., the Hippocratic Oath was the first written oath regarding medical ethics. The oath has had a considerable impact on moral guidance and ethics in the medical profession(52-54). At the end of the 19th century, the historical texts were translated and revived by Hippocratic scholars, and the tradition of best medical ethical conduct was spread in different European countries(55). The Declaration of Geneva is one of the World Medical Association's (WMA) oldest policies, adopted by the 2nd

General Assembly in Geneva in 1948. The Declaration of Geneva, which builds on the principles of the Hippocratic Oath, has been revised on several occasions; the latest version is from 2017(56). In the mid-20th century, the American Medical Association suggested a pledge based on the Hippocratic Oath. This pledge has been revised and used in a majority of the medical schools in the United States. However, there are variations, and content has been evolved and rewritten to suit the modern practice of medicine(57, 58). In the late 1960s and 1970s, changes in society gave rise to new demands to reformulate ethical aspects from a more secularized perspective and put them in print(59).

The Principles of Biomedical Ethics, first written in 1979 by Beauchamp and Childress, has shaped the field of modern biomedical ethics. The book presents a non-hierarchical order of the four principles: autonomy, beneficence, non-maleficence, and justice(60). These four principles are equally ordered and may at times compete with each other. However, some argue that autonomy should have precedence over the other three(61).

1.4.2 ASPECTS OF ETHICS IN INTENSIVE CARE

Several factors make the ICU a field in medicine where ethical dilemmas arise(1, 62, 63). An important factor is that the patient is most often unconscious or sedated in the ICU and therefore lacks the ability to communicate and express preferences and wishes. The principle of autonomy is therefore often compromised in the ICU setting. Also, there often exists a small but not negligible amount of uncertainty in the prognostication of outcome. This may lead to different perspectives between physicians with different specialties on which level of treatment would be beneficial for the

patient, and opinions may consequently differ regarding the principles of beneficence and non-maleficence. Available intensive care resources and the number of intensive care beds can influence decisions, which may call into question the principle of justice(64). For example, recent experiences from the COVID-19 pandemic, with a shortage of intensive care beds, challenged several ethical aspects(65).

1.4.3 ASPECTS OF ETHICS IN SWEDISH HEALTHCARE LEGISLATION

1) the principle of human dignity (SFS 2017:30, 3: § 1).

– according to which all people have equal value and the same rights regardless of personal characteristics and functions in society

2) the principle of needs and solidarity (SFS 2017:30, 3: § 1).

– according to which resources should be invested where the needs are greatest, and

3) the cost-effectiveness principle (SFS 2017:30, 4: § 1).

– according to which a reasonable relationship between costs and effect, measured in health and quality of life, should be sought when choosing between different activities or measures.

The principles are ranked and must be prioritized according to the mentioned sequence, meaning that cost-effectiveness must never take precedence over human value(66-68). The National Centre for Priorities in Health continues the

work by enhancing knowledge and research on priority setting in health care and by supporting state agencies, regions, and municipalities in this field(69).

1.4.4 ASPECTS OF VARIABILITY IN ETHICAL DECISIONS

Variability in ELDM among different ICUs has been reported by several authors(21, 70, 71). In addition, factors such as geographic areas, religions, cultures, juridical matters, and the physician's personality, including attitudes, have been suggested to influence decision-making(72-74).

Different staff groups and physicians have different roles in the decision-making process and may not always assess the situation in the same way(75-78). Patient factors contributing to variability in these decisions include the patient's medical condition, diagnosis, advanced age, low functional status before admission, ethnicity, and female sex(79-83). Apart from this, there is also an aspect of resource management. Altogether, the complexity of the decision is vast and challenging(84-87). Therefore, while some variability may be inevitable, the ambition should be to reduce variability that is not medically justified or based on patient preferences(88, 89).

1.4.5 ASPECTS OF ETHICS AND RESOURCE MANAGEMENT

ICU resources may be measured as ICU beds per capita, depending on critical care staffing, intensive care physicians, registered nurses, and registered nurse assistants, along with the highly technical support and monitoring devices. The cost of care is high in the ICU, which makes resource management essential, especially considering that ICU resources need to be ready and flexible to manage fluctuations in the number of critically ill patients. The COVID-19 pandemic is an example of when the need for ICU resources has exceeded their

availability(90). The number of ICU beds per 100 000 inhabitants in Sweden in 2012 was 5.8, compared to 11.5 beds per 100 000 inhabitants on average in European countries in 2012(91). In 2020, the rate of ICU beds in Sweden was reported to be reduced to 5.0 per 100 000 inhabitants(92), and a discussion on the need for more ICU beds in Sweden has started(93).

1.4.6 ASPECTS OF ETHICS AND PRIORITIES IN INTENSIVE CARE

ICU patients are heterogeneous in age, sex, comorbidities, socioeconomic status, marital status, ethnicity, functional status before admission, admission diagnosis, and severity of illness or injury. Therefore, they have different chances of survival and recovery. While most patients medically benefit from ICU treatment, they also report cognitive, physical, and psychological symptoms such as fatigue, anxiety, depression, and post-traumatic stress after treatment(94-98). Prolonged ICU treatment that eventually results in poor outcomes and even death is poorly aligned with the principle of non-maleficence or justice(99, 100).

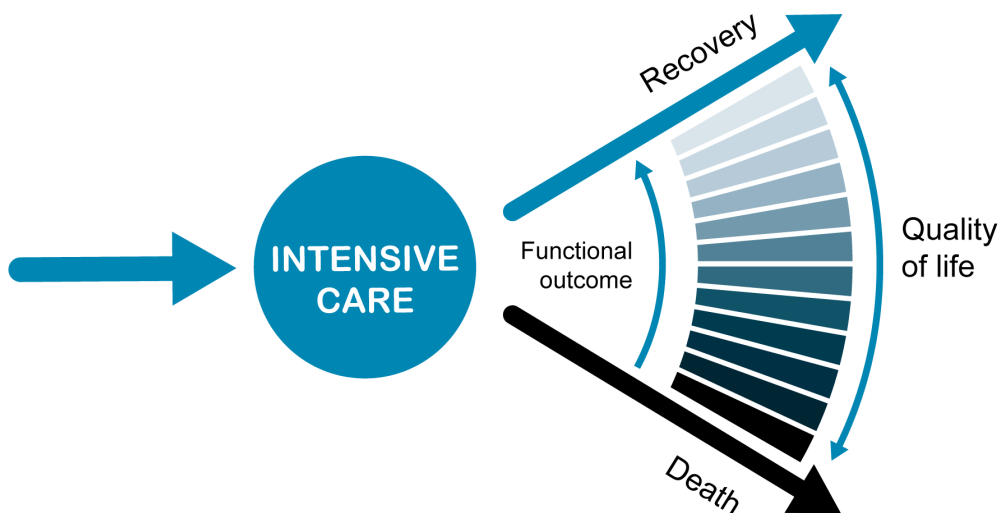


Figure 3. Intensive care patients' different chances of survival and recovery.

Currently, the most commonly used validated scoring model of severity of disease and chances of survival and recovery is the Simplified Acute Physiology Score (SAPS) based on the patient's condition on the day of admission. SAPS does not take into account the duration of an ICU admission, complications, or the severity of organ failure during the ICU treatment period(101, 102). In addition, SAPS may mainly be used for comparison of different units and for research purposes, not for clinical assessment(103).

1.4.7 ASPECTS OF ETHICS AND PRIORITIES DURING EXTRAORDINARY CONDITIONS

Due to the Corona Virus Disease (COVID-19) pandemic, the Swedish National Board of Health and Welfare published new guidelines for prioritization in May 2020(104). The guidelines opted for a situation when the ICU beds were lacking despite extensive reorganization to meet the needs. First, other parts of the healthcare system were requested to save anaesthesiologic and intensive care resources by restricting surgical interventions and relocating healthcare staff to the ICU. Second, triaging was refined for admission to ICU for the patients with a low probability of survival. Several countries, professional organizations, and critical care associations updated or created new guidelines for triaging for ICU during the pandemic in order to save and serve as many in need as possible. The triaging guidelines are primarily administrative and based on assessing higher age, comorbidities, and frailty with different models(105-109).

1.5 ADDITIONAL ASPECTS

1.5.1 ASPECTS OF COMMUNICATION OF END-OF-LIFE DECISIONS

According to the Patient Safety Act (SFS 2010:659) and regulations from the National Board of Health and Welfare (SOFS 2011:7 §3), a licensed medical doctor is responsible for making a treatment strategy decision. The decision is always made with at least one other licensed healthcare professional. The patient, or next of kin if the patient cannot be informed due to their condition, should be informed about treatment options, and the caregiver is responsible for providing comprehensible information. The decision documentation is

mandatory and must include time, participants, and reason(42, 45, 110). Further, in a published statement from the 5th International Consensus Conference in Critical Care in Brussels, Belgium, in April 2003, it was declared that an approach involving the team of caregivers and the patient/next of kin/friends in ELDM is preferable(111, 112), even though the physician, as the leader of the caregiver team, bears the responsibility for the decision. It is also utterly important that the attending physician communicates with the patient and next of kin (112). Reliable communication has a crucial role in the quality of end-of-life care.

Several reports indicate that honest and good communication with patients/next of kin increases the satisfaction and well-being of families(113-116). At the conclusion of a recently published systematic review, including recommendations from an expert panel, interprofessional shared decision-making is proposed as the model to be used(112, 117).

There are several published practical guidelines offering advice on managing family conferences and communicating care planning. The conclusions are that communication about prognostication should start at admission and regularly be updated as soon as significant changes in the patient's status occur. The conference should be planned, held undisturbed, and everyone should be seated. Patients' and families' understanding and perspectives of the current situation must be explored at the beginning of the conference. The information should be honest, timely, and delivered respectfully in a comfortable and supportive environment. Finally, the meeting should be ended by summarizing the information discussed(118-121).

1.5.2 BURNOUT SYNDROME IN ICU

Several reports describe a high correlation between futile treatment, ethical stress, and burnout syndrome in healthcare professionals in the ICU(122-124). In addition, the ethical stress may have changed character from excessive treatment to experiencing compromised patient safety and lower quality of care during the COVID-19 pandemic(125-127). Therefore, it is essential to include all the ICU intensivists and the medical team in the major steps of the decision-making process and to have a good ethical climate to reduce the risk of moral distress(128).

2 AIMS OF THE THESIS

The overall aim of this thesis was to study factors involved in end-of-life decisions in Swedish ICUs.

Specific aims in each included study:

Study I. Identify independent patient variables that increase the odds of receiving a decision to withdraw or withhold intensive care

Study II. Evaluate Swedish intensivists' experiences, beliefs, and attitudes regarding decision-making to withdraw or withhold intensive care

Study III. Investigate the contributing factors behind provider-caused variability

Study IV. Explore independent factors leading to the decision to withhold or withdraw life-sustaining treatments in patients admitted to Swedish ICUs due to COVID-19 compared to patients without a COVID-19 diagnosis

3 PARTICIPANTS, PATIENTS, AND METHODS

3.1 OVERVIEW OF THE STUDIES

Table 1. Overview of the included studies

Study	Aim	Design	Data collection	Analysis
I	Identify independent patient variables for a decision on WH/WD treatment	Registry study	97 095 ICU admissions registered in the Swedish Intensive Care Registry between 2014 and 2016	Quantitative Uni- and multivariable logistic regression analysis Mann-Whitney U Fisher's exact test
II-III	Evaluate Swedish intensivists' experiences, beliefs, and attitudes regarding EoL decision-making Investigate the contributing factors behind provider-caused variability	Semi-structured interview study	Interviews with 19 intensivists from five ICUs February-May 2017	Qualitative Thematic analysis
IV	Explore factors predicting EoL decisions in patients with and without COVID-19	Prospective observational study	Medical charts, journals, next of kin	Quantitative Uni- and multivariable logistic regression analysis Mann-Whitney U Fisher's exact test Kaplan-Meier

ICU= intensive care unit; EoL= end-of-life, WH= withhold, WD= withdraw

3.1.1 ETHICAL CONSIDERATIONS

For studies I-III, ethical approval was obtained from the Regional Ethical Review Board in Gothenburg on 2016-10-20, reference number 616-16, with an amendment T-072-17 (2017-01-31). All studies were performed according to the Helsinki Declaration.

For study I, data were extracted without personal identification numbers from SIR. Regarding SIR, all patients/next of kin were informed that data would be collected and distributed to the registry, and that they can retract their data at any time without explanation.

For studies II-III, the audio files and transcribed interviews were saved through a secure firewall cloud managed by Gothenburg University.

For study IV, approval was obtained from the Swedish Ethical Review Authority on 2019-12-13, reference number 2019-05010. Approval for amendment for a time extension was obtained on 2020-10-20, reference number 2020-04985. All personal data were anonymized and coded. The coded sheets were protected with passwords known only to the research group.

3.1.2 STUDY I

Study design

This is a registry study based on extracted data from a national quality registry, the Swedish Intensive Care Registry (SIR)(10, 129).

Participants

This is a registry cohort study based on extracted data, 97 095 ICU admissions, from SIR between 2014 and 2016.

Data collection and variables

Data from the group of patients with reported LST limitation decisions were compared to the group without reported decisions regarding treatment strategy. Data concerning sex, age, primary ICU diagnosis, ICU mortality, and 30-day mortality were extracted. The critical condition at admission was assessed by SAPS 3(102). SAPS 3 uses admission data and was developed to evaluate the patient's condition at admission in order to predict ICU outcome(101). The model includes a few comorbidities, cause for admission, and physiological and laboratory data at admission(101, 102).

Statistical analyses

Fisher's exact test was used for the dichotomous variables, Mann-Whitney U was used for non-parametric variables, and univariate and multivariable logistic regression analyses were used for identifying independent variables predicting an ELDM.

3.1.3 STUDY II

Study design

This study is a descriptive, qualitative study based on semi-structured interviews conducted from February 1st to May 31st, 2017.

Participants and data collection

Interviews were conducted with 19 Swedish intensivists. The inclusion criteria for the participating interviewed physicians were: a Swedish specialist licence in anaesthesiology and critical care and currently working in an ICU at a

Swedish hospital. In addition, we aimed to achieve a representative mix of ages and genders and a range of experiences from five different Swedish hospitals. Included were three ICUs from university hospitals and two ICUs from county hospitals.

Methods of analysis

Interviews were transcribed verbatim and were read in full by all authors several times. The interview contents were analysed based on principles for thematic analysis(22-24). During the coding process, the authors searched for and coded informative data related to the aim. Throughout the coding, the data were reread repeatedly to refine the analysis. Differences in interpretations of the text were critically discussed and considered in open dialogue on several occasions until consensus was reached.

3.1.4 STUDY III

Study design

This study is a secondary subanalysis of the data obtained in study II. Participants and data collection are the same as those described for study II.

Methods of analysis

As previously described, interviews took place between February 1st, 2017 and May 31st, 2017. As the primary analysis revealed considerable variability based on intensivists' traits, the collected data were reanalysed, and the thematic analysis focused on provider-caused variability. All the authors read and reread the transcribed interviews. Meaning units related to provider-caused

variability were grouped, coded, and condensed into themes by two authors, the first author and the last author. The established codes and themes were then discussed with the whole group of authors in several meetings until a consensus was achieved.

3.1.5 STUDY IV

Study design

This study is a prospective observational pilot study based on data from patients admitted to the general ICU at Sahlgrenska University Hospital, Gothenburg, Sweden, from October 2020 to March 2021.

Data collection and variables

Patients admitted to the ICU with a primary diagnosis of respiratory insufficiency due to COVID-19 or admission due to other causes were compared.

Data were collected from medical charts and records. The collected variables were: age, sex, BMI, diagnosis, living at home, Charlson Comorbidity Index (CCI), clinical frailty scale (CFS) score(130, 131), and SAPS 3. These were analysed for correlation with the decision to limit LST(132). CCI is a summarized index of 10-year mortality based on the patient's age and diagnosis(133). CFS is a 9-point scale with which frailty is assessed(130). In addition, data on ICU mortality and the mortality rate for 30 days and 90 days were collected.

Statistical analyses

For the test between two groups, Fisher's exact test was used for dichotomous variables, Mantel-Haenszel Chi-square trend test for ordered categorical variables, Chi-square test for non-ordered categorical variables, and Mann-Whitney U-test for continuous variables. The correlation between an end-of-life decision and chosen variables was studied using univariate and multivariable logistic regression analysis with non-COVID-19 and COVID-19 patients.

3.2 COMMENTS ON METHODOLOGY

3.2.1 QUANTITATIVE STUDIES

Study I

Using registry data for research is feasible since a large amount of data is readily available. However, it also means that the study is bound to the data assembled by the registry and to the quality of the reported data. Further, a large amount of data may give spurious correlations, and causality must be scrutinized.

During the period studied, 2014-2016, 52 out of 78 (67%) SIR-affiliated ICUs reported treatment limitations to SIR. The high rate of reporting ICUs implies that the analysed data represent the intensive care admissions during the period.

Study IV

This prospective observational pilot study was planned to explore predicting variables for an end-of-life decision. Data collection started just before the COVID-19 pandemic. However, the cohort of patients was changed very quickly when the ICUs were suddenly filled with COVID-19 patients in need of intensive care. Several changes were made to meet the high demand for intensive care beds, including the procedures around the admission and distribution of COVID-19 patients to different ICUs in the Region Västra Götaland. All elective surgery was cancelled, and staff – including intensive care physicians, anaesthesiology and intensive care nurses, and nurse assistants – were relocated, forming new caregiver teams who did not know each other but had to work together and make a variety of decisions. The change in circumstances and the change of the patient cohort required reformulation of the research question.

The data collection period was extended due to the high admission rate of patients to the ICU.

The aspects mentioned above must be considered when the results of this study are analysed and interpreted.

3.2.2 QUALITATIVE STUDIES

Studies II and III

The qualitative methodology aims to capture the unique experience of individuals in as rich detail as possible in a well-described context(134). ELDM may be challenging to explore, capture, and fully grasp by only quantitative methods because of the subject's multiple-layer nature, which includes national laws, cultures, organizational guidelines, and medical professionals' assessments and values. Qualitative methods may be best suited to address these complexities since they may encounter inherent contradictions and capture the experience and interpretation of events by individuals with different stakes and roles(135).

There are several qualitative research methods and several theoretical frameworks for understanding and focusing on different areas of inquiry (Table 2). Examples of the theoretical framework used in quantitative research are hermeneutics, phenomenology, ethnography, and grounded theory(136-139). These methods have different scientific roots, such as pedagogics, social sciences, anthropology, psychology, and philosophy.

Table 2. Theoretical frameworks and their fields of origin

	Domain	Field
Discourse analysis	Human communication	Linguistics
Ethnography	Culture	Anthropology
Grounded theory	Social interactions	Sociology
Hermeneutics	Meaning understanding	Philosophy
Narrative analysis	Making sense of stories	Trans-disciplinary
Phenomenography	Human learning	Pedagogics
Phenomenology	Individual experiences	Philosophy/psychology

Data collection and analysis

Data collection in qualitative methods may be done in several different ways, depending on the question; examples are focus groups, in-depth interviews, and field studies(140).

Data gathering and analysis may cohere between the different methods(141), even though some methodological frameworks mentioned above have specific stepwise analysis methods. The term “saturation” describes the point at which respondents have no more variation in their responses, which is central to transferability.

The quality of the research is measured by the four concepts of trustworthiness, which include confirmability (objectivity), credibility (validity), dependability (reliability), and transferability (generalizability) in all methods. To assess whether the findings are true, consistent, neutral, and applicable to other contexts, methods such as inter-rater reliability and respondent validation are used(142).

Thematic analysis

Thematic analysis is not bound to any particular theoretical framework(143) and is therefore suitable for use in different areas, including health care. Also, the analysis process is more flexible and suggested to be suitable for researchers new to the qualitative method(134, 144). The approach may be inductive (without a prior theory or hypothesis about the observation) or deductive (with a formulated theory or hypothesis about the observation tested). This usually depends on how specific the research question is, even though in qualitative research, the more commonly inductive approach is applicable(145). The data are analysed by finding meaning units that form patterns presented in categories or themes(144).

4 RESULTS

4.1 STUDY I

Of the 97 095 admissions, 47% were 61-80 years old, 42% were women, and 58% were men.

Altogether, 14 996 (15.4%) were allocated to the group with a decision to WH or WD decision, and 82 149 (84.6%) were allocated to the full care group. The group with decisions to WH or WD treatment was significantly older ($P < 0.001$) and had significantly higher SAPS 3 ($P < 0.001$) and significantly higher mortality ($P < 0.001$) (Table 3).

Table 3. Significant differences in variables between the group of patients with a decision to withhold/withdraw treatment compared to full care group

Variable	WH/WD treatment	Full care	Significance
Age median (IQR)	75 (67-82)	63 (45-73)	$P < 0.001$
SAPS 3 median (IQR)	70 (61-79)	50 (40-61)	$P < 0.001$
30-day mortality %	66.6	11.1	$P < 0.001$

IQR = Interquartile rate, WH/WD = withhold/withdraw

Variables associated with increased odds of a decision to WH/WD treatment were higher age, higher SAPS 3, and female sex. Compared to patients who were 16-20 years old, those who were 61-80 years old had 5.3 times higher odds, and those over 81 years old had 11 times higher odds of receiving a decision to WH/WD intensive care. Higher SAPS 3 (continuous) increased the odds ratio for receiving a decision to withdraw or withhold intensive care by 1.085 (CI 1.084-1.087). Female sex increased the odds of receiving a decision to WH or WD intensive care by 18% (odds ratio [OR] 1.18; CI 1.13-1.23) after adjustment for SAPS 3 and age (Table 4).

Table 4. Result of multivariable logistic regression regarding receiving a decision to withdraw or withhold intensive care

Variable	Covariate	OR (95% CI)	Significance
Sex	Male	1	
	Female	1.18 (1.13-1.23)	P < 0.001
Age (years)	16-20	1	
	21-40	1.58 (1.10-2.65)	P = 0.013
	41-60	2.96 (2.09-4.19)	P < 0.001
	61-80	5.28 (3.74-7.45)	P < 0.001
	>81	11.0 (7.76-15.5)	P < 0.001
SAPS 3		1.08 (1.07-1.08)	P < 0.001

OR = Odds Ratio, CI = Confidence Interval

The three most common diagnoses in the group of patients with a decision to WH or WD intensive care were: 1. cardiac arrest, 2. respiratory insufficiency, and 3. septic shock/severe sepsis. The three most common diagnoses in the full care group were: 1. postoperative care, 2. respiratory insufficiency, and 3. multiple trauma.

An interesting observation was that women with a decision to WH/WD treatment had significantly lower 30-day mortality (63.7%) compared to men with a decision to WH/WD treatment (68.9%), $p < 0.001$.

4.2 STUDY II

Out of 19 respondents, 17 had completed their medical education in a Scandinavian country. The participants' median age was 43 (range 35-61) years and their median length of experience as intensivists was 8.5 (range 1-27) years.

Intensive care physicians prefer to have as much information as possible about a patient's function, medical status and preferences before ICU admission to assess the beneficence. One of the main concerns of the respondents was whether a life-sustaining treatment could benefit an individual patient. Another recurrent opinion emerging from the interviews was that the intensivists and physicians responsible for the patient outside the ICU should equally share responsibility for decisions about life-sustaining treatment. Moreover, it was suggested that external physicians, such as surgeons and cardiologists, could be more proactive in the ELDM. However, information and the possibility to share responsibility are often lacking in acute situations, especially during on-call hours. All of the respondents experienced considerable variability in the decision-making process. This variability seems to be due to several reasons: patient-related, physician-related, and circumstance-related.

4.3 STUDY III

A majority of the respondents stated that the individual intensivist's personality and values significantly contribute to variability in ELDM. The respondents described personality in terms of differences in how pragmatic intensivists were and how they differed concerning decisiveness and certainty regarding end-of-life decision-making. These personality traits were not automatically linked to professional experience. Many respondents feared that their assessments would be criticized. Respondents also pointed out that different physicians have different interpretations of a patient's outcome in terms of quality of life after intensive care. What seemed an acceptable outcome for one physician was not acceptable for another. Other significant contributing factors were avoidance of conflict and criticism by colleagues and conflicts with family. Also, some feared being subjected to legal challenges. In general, it could be stated that making decisions to withdraw or withhold intensive care is demanding and can create emotional stress and anxiety among intensivists. The burden of responsibility for the consequences of such a decision can be challenging to handle.

4.4 STUDY IV

A total of 394 patients were included, 263 patients admitted due to COVID-19 and 131 patients due to other causes. The basic characteristics of both cohorts are presented in Table 5.

Table 5. Basic characteristics of included patients in both cohorts

	Non-COVID-19	COVID-19	p-value
Age years median(range)	75(65-91)	73 (65-90)	0.0016
Sex n(%)			0.05
Female	52(39.7)	78(29.7)	
Male	79(60.3)	185(70.3)	
BMI median(range)	25(17-55)	28(19-60)	0.0002
Living at home n(%)	115(87.8)	256(97.3)	0.0003

BMI = Body Mass Index

A decision of WH/WD occurred for 41 (31.3%) patients in the non-COVID-19 cohort and 77 (29.3%) in the COVID-19 cohort ($p=0.73$).

In the univariate logistic regression analysis, age, SAPS 3, and CFS significantly correlated with a decision of WH/WD in the non-COVID-19 group. In the multivariable logistic regression analysis, age and SAPS 3 maintained significance in the non-COVID-19 group. The univariate analysis found that age, SAPS 3, and CCI significantly correlated with a decision of

WH/WD in the COVID-19 group. However, the multivariable logistic regression analysis resulted in CCI maintaining significance in the COVID-19 group (Table 6).

Table 6. Results from univariate and multivariable logistic regression analysis for the Non-COVID-19 cohort.

Variable	Non-COVID-19			
	Univariate		Multivariable	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Age (years)	1.12 (1.05 - 1.20)	<.001	1.10 (1.03 - 1.19)	0.009
Sex (Male/Female)	1.21 (0.57 - 2.59)	0.62		
CCI	1.15 (0.98 - 1.36)	0.10		
CFS≥4	1.27 (0.57 - 2.83)	0.56		
SAPS 3	1.07 (1.04 - 1.10)	<.001	1.06 (1.03 - 1.10)	<.001

Age and CCI = Charlson Comorbidity Index, analysed by 1 unit increase. CFS = Clinical Frailty Scale, cut off above 4. SAPS = Simplified Physiology Score.

Length of Stay in ICU (LoS ICU) was significantly longer for the COVID-19 cohort, with a median of 13 days (range 1-67), compared to the median of 3 days (range 1-31) in the non-COVID-19 cohort, $p < .0001$. Time from admission to ICU and a decision on WH/WD treatment was significantly longer in the COVID-19 cohort, a median of 9 (range 0-40) days vs. a median of 1 (range 0-27) day for the non-COVID-19 cohort, $p < .0001$. There was a significant difference in the ICU mortality rate (non-COVID-19 13.7% vs. COVID-19 27.4%, $p=0.02$) and the 30-day mortality rate between the two cohorts (non-COVID-19 41.2% vs. COVID-19 29.7%, $p=0.04$). However, these significant differences did not remain in the 90-day mortality rates.

Table 7. Results from univariate and multivariable logistic regression analysis for the COVID-19 cohort.

Variable	COVID-19			
	Univariate		Multivariable	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Age (years)	1.07 (1.01 - 1.12)	0.01	1.03 (0.97 - 1.09)	0.31
Sex (Male/Female)	0.99 (0.55 - 1.76)	0.96		
CCI	1.35 (1.16 - 1.56)	<.001	1.26 (1.07 - 1.49)	0.006
CFS≥4	1.64 (0.96 - 2.79)	0.07	1.25 (0.69-2.25)	0.46
SAPS 3	1.03 (1.00 - 1.06)	0.02	1.01 (0.98- 1.04)	0.57

Age and CCI = Charlson Comorbidity Index, analysed by 1 unit increase. CFS = Clinical

Frailty Scale, cut off above 4. SAPS = Simplified Physiology Score.

5 DISCUSSION

5.1 INDEPENDENT VARIABLES FOR RECEIVING A DECISION OF WITHHOLD OR WITHDRAW INTENSIVE CARE TREATMENT

The main findings in study I are that increasing age, higher SAPS 3 scores, and female sex are independent factors predicting the decision to WH or WD intensive care.

That increasing age and SAPS 3 score, as a marker for severity of disease, influence end-of-life decisions are findings that are in line with several previous studies(25, 79, 146-148). However, the result that female sex was an independent variable for a decision of treatment limitation was unexpected. Studies on the influence of sex on treatment limitations in intensive care are scarce. In a study of patients with sepsis, it was reported that women received more treatment limitations than men(149). A study on elderly patients, >70 years old, could not find any gender differences in decisions regarding WH/WD treatment in intensive care, even though more men were intubated and received renal replacement treatment and more vasoactive drugs compared to women(150). A study assessing gender and long-term survival after intensive care could not reveal any differences between male and female patients(151). Several studies in other fields of medicine have, however, reported differences in medical treatment between male and female patients, such as that male patients receive more advanced and invasive treatment options(80).

In a recently published systematic review and meta-analysis on sex differences in intensive care patients, the result was that women were less likely than men to receive mechanical ventilation or renal replacement therapy. The conclusion was that although the studies are heterogeneous, with different designs and aims, the consistency in the aggregated result demands further research(148).

5.2 PHYSICIANS' EXPERIENCES AND ATTITUDES TOWARDS ELDM

This study illuminated several factors causing the complexity of ELDM in the Swedish ICUs. The challenges, variability, and complexity have been described in many earlier reports(112, 124, 152). In this study, Swedish intensivists confirmed the importance and complexity of ELDM and expressed the need for some improvements.

One of the major areas for improvement in the ELDM concerned the lack of information about patients' preferences and functional status before admission to the ICU. Time and energy were therefore needed to find out more about each patient.

The greatest ethical concern for the physicians included in the study, independent of their level of clinical experience, was prognostic uncertainty and whether the patient benefited from the LST. The diagnostic uncertainty, or potential for reversibility of illness, is a justification for a continuation of treatment. The existing illness severity scores do not help in prognostication for individual patients, and prognostic uncertainty is a well-known cause of postponing decisions(78, 153).

A major area of improvement identified by the intensivists in our study concerned cooperation in ELDM with physicians from other specialties outside the ICU. Intensivists' opinions and those of other physicians could often conflict. Unrealistic expectations of intensive care treatments, disagreements on prognosis, and a focus on narrow physiologic parameters on a specific organ without recognition of a patient's overall condition were given as reasons for postponing ELDM. This is in line with earlier findings(154). Generally, a described lack of responsibility in decision-making from physicians other than intensivists was considered frustrating. Some of the respondents explained that this was caused by a lack of time, and competing tasks, such as surgery, were also given as causes of delay in ELDM.

There was an awareness of professional and local guidelines, but generally these were used very little in daily clinical practice. The reason that some physicians deviate from guidelines, or do not incorporate them in their practice, have been explored in other settings(155-157). Lastly, all respondents agreed that variability in ELDM is also due to physicians' values and beliefs. This variability was accepted since it was considered a balancing factor in the ICUs' favourable ethical discussion climate.

In this study, the intensivists confirmed that physician-related variability in ELDM may be explained by differences in communication skills and clinical competence, but this was considered to be less significant than the personal values, experiences, and fears of the physician.

The probability of different physicians making the same decision about a patient was considered high by the respondents, but they indicated that the path

to that decision and the time taken to arrive at it varied. This difference in the ELDM process was described as varying with the individual physician's decisiveness and determination of poor outcomes. While some intensivists need to exhaust all treatment options and are more driven by the fear of missing a chance of recovery for the patient, other intensivists may be more prone to avoid futile treatment. This was not clearly associated with the intensivist's level of experience but rather communication skills, willingness to initiate conversation about ELDM with family, and earlier experiences of ELDM.

The fear of "making the wrong decision", that is, of missing something treatable or of limiting life-sustaining treatment for a patient who might survive, was greater, especially among less experienced intensivists, than concerns about doing harm. There were also fears of conflict with family, criticism from colleagues, and liability.

Factors causing physician-related variability are described in earlier studies, and our findings are in line with those results(83, 88, 158-161). While some factors causing variability are more often described, such as cultural and religious beliefs, some are less explored, such as interpersonal conflicts and specific fears of the physician. However, religion, which has been suggested to be one of the main factors causing physician-related variability, was not confirmed by the respondents in our study, which may be explained by a high level of secularization in Swedish society.

5.3 ASPECTS OF ELDM DURING EXTRAORDINARY CONDITIONS

In the context of the pandemic and scarcity of ICU resources, a new disease with an unknown course, and earlier described significant variation among intensivists in assessing ELDM(79, 162), we hypothesized a variability in ELDM between patients admitted due to COVID-19 and a critically ill cohort of patients admitted due to other causes.

The results of this study confirmed our hypothesis. However, the cohorts differed in their basic characteristics. In our two patient cohorts, the COVID-19 patients were younger, had higher BMI, were less frail, had fewer comorbidities, had lower SAPS 3, and had longer LoS.

Several organizational changes described in section 3.2.1 may have made the ELDM even more challenging during this period. One of the changes mentioned above was the pandemic-related restrictions on visiting families, and all communication needed to be by phone or video calls, which may have affected the process of reaching consensus with families(128, 163). Age and SAPS 3 were expected variables to predict ELDM, as they are risk factors for poor outcomes in both critically ill non-COVID-19 and COVID-19 patients(164, 165). However, this was confirmed by the results for critically ill non-COVID-19 patients, whereas for critically ill COVID-19 patients, neither independently predicted an end-of-life decision. Instead, the CCI was an independent predictor of ELDM in the COVID-19 cohort. The rate of decisions to limit LST did not differ significantly between the two groups, even though the non-COVID-19 cohort had a much higher SAPS 3 at admission and was significantly older than the COVID-19 group. This might reflect that COVID-

19 has a long natural course in which patients slowly or irregularly worsen over time. Whether SAPS 3 is a suitable outcome parameter for COVID-19 patients is still a matter of investigation(166, 167). Several studies have reported comorbidities that have led to more poor outcomes after COVID-19. These comorbidities are included in the CCI score, and thus CCI as a predictor of ELDM in the COVID-19 cohort is in line with earlier reports(168). Surprisingly, CFS was not one of the predictors significantly and independently associated with ELDM in any of our cohorts.

6 CONCLUSION

Study I concluded that age, more severe condition at admission as assessed by SAPS 3, and female sex are independent variables predicting decisions to withdraw or withhold intensive care.

Study II concludes that Swedish intensivists wish to make end-of-life decisions with high certainty based on patients' preferences and unambiguous medical prognoses. Swedish intensivists confirm and accept variability in ELDM.

Study III concluded that physician-related variability in ELDM was due to intensivists' personalities, thinking patterns, and values. In addition, there was a fear of criticism.

Study IV concluded that independent predictive factors for the decision of limitation of LST in the ICU during the pandemic were age and SAPS 3 in the non-COVID-19 cohort, while CCI was found to be a predictive factor for COVID-19 patients. The decision to withdraw or withhold LST took significantly longer for patients with COVID-19.

7 FUTURE PERSPECTIVES

It is important to regularly repeat study I in order to assess any structural changes in variables predicting ELDM. Since 2021, CFS has been added to the data reported to SIR. It would be interesting to investigate the impact of frailty on ELDM and whether an association of female sex, if it still exists, may be explained and understood by the functional status of the patients.

Study II revealed the complexity and experienced perceptual factors causing variability in terms of the patients, care providers, and circumstances that affect the process of ELDM in Swedish ICUs today. Lack of important information about the patient, such as preferences and functional status before ICU admission, could be points of improvement and may be further explored. The lack of knowledge about patients' preferences is a challenging subject since preferences are dynamic and change over time. Very few would accept a vegetative state, but there is undoubtedly a difference in individual preferences regarding the range of survival and quality of life that may be accepted. How, when, and with whom these preferences should be discussed and documented is something to elaborate on.

Some environmental factors, including continuity, physicians' workload, and competing tasks, are challenges for healthcare leaders to solve.

There are no prognostic tools today to use in predicting the best outcome for each individual patient, and some uncertainty is always inherent in ELDM. The traditional way for medical professionals to make predictions for patients has been based on their past experience. The scoring models available, such as SAPS 3, estimating a mortality rate based on vital parameters on admission

and some comorbidities, don't include frailty, which has been shown to be a major predictor of outcome. Machine learning algorithms, already shown to outperform the existing scoring models(169-171), should include aspects of frailty and quality of life.

An evident continuation of study III would be to minimize unwanted variability based on physicians' personal experiences and preferences. Communication in more complex situations has already been added to the curriculum of physicians training to become intensive care specialists. However, there are no structured courses on ethical decision-making, prognostication, or legal aspects. Therefore, a more thorough education on every aspect of ELDM is suggested.

Study IV would probably take more time to reproduce since there are fewer patients in need of the ICU due to COVID-19 now. However, challenges remain in assessing long-term mortality and functional outcomes in critically ill patients. A sound triage system is necessary to make optimal use of the ICU resources. In addition, investigating the prediction of quality of life after ICU for a specific patient would provide insights into anticipating this aspect. To assess the appropriateness of ICU admission and treatment for each patient, it is necessary to weigh the pros and cons. In patients with a suspected low probability of survival, a decision to provide full care in the intensive care unit for a short and limited time, for example, 48 hours, is often applied.

Therefore, improving knowledge at the level of the patient, healthcare professionals, and organizational leaders and investigating opportunities for facilitating this process is warranted.

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REFERENCES

1. Truog DR, Campbell LM, Curtis RJ, Haas EC, Luce MJ, Rubenfeld DG, et al. Recommendations for end-of-life care in the intensive care unit: A consensus statement by the American College of Critical Care Medicine. *Critical Care Medicine*. 2008;36(3):953-63.
2. Bersten AD, Soni N, Oh TE. *Oh's intensive care manual*. 6th ed. / edited by Andrew D. Bersten, Neil Soni. ed. Oxford]: Oxford : Butterworth-Heinemann; 2009. s.26
3. Flaatten H, Kvåle R. Survival and quality of life 12 years after ICU. A comparison with the general Norwegian population. *Intensive care medicine*. 2001;27(6):1005-11.
4. Angus DC. Admitting Elderly Patients to the Intensive Care Unit—Is it the Right Decision? *JAMA : the journal of the American Medical Association*. 2017;318(15):1443-4.
5. Swedish Association of Local Authorities and Regions. <https://skr.se/skr/englishpages.411.html>. Last accessed 20220811.
6. Ministry of Health and Social Affairs. <https://www.government.se/government-of-sweden/ministry-of-health-and-social-affairs/>. Last accessed 20220811.
7. The Government Offices. <https://www.government.se/government-agencies/#2078>. Last accessed 20220811.
8. The National Board of Health and Welfare. <https://www.socialstyrelsen.se/en/about-us/organisation/>. Last accessed 20220811.
9. The Swedish Society of Anesthesiology and Intensive Care, SFAI. <https://sfai.se/riktlinje/organisatoriska-rad-och-riktlinjer/intensivvardsorganisation/riktlinjer-for-svensk-intensivvard/> Lasta accessed 220920.
10. The Swedish Intensive Care Registry. <https://www.icuregswe.org/en/about-sir/organization/> Last accessed 20220811.
11. SIR. <https://www.icuregswe.org/en/quality-indicators/national-quality-indicators/>. Last accessed 20220813.
12. Prendergast TJ, Puntillo KA. Withdrawal of Life Support: Intensive Caring at the End of Life. *JAMA : the journal of the American Medical Association*. 2002;288(21):2732-40.
13. Sprung CL, Ricou B, Hartog CS, Maia P, Mentzelopoulos SD, Weiss M, et al. Changes in End-of-Life Practices in European Intensive Care Units from 1999 to 2016. *JAMA - Journal of the American Medical Association*. 2019;322(17):1692-704.
14. Wunsch H, Harrison DA, Harvey S, Rowan K. End-of-life decisions: a cohort study of the withdrawal of all active treatment in intensive care units in the United Kingdom. *Intensive Care Med*. 2005;31(6):823-31.
15. Clermont G, Angus DC, DiRusso SM, Griffin M, Linde-Zwirble WT. Predicting hospital mortality for patients in the intensive care unit: a comparison of

- artificial neural networks with logistic regression models. *Critical care medicine*. 2001;29(2):291-6.
16. Siegel MD. End-of-Life Decision Making in the ICU. *Clinics in Chest Medicine*. 2009;30(1):181-94.
17. Moselli N, Debernardi F, Piovano F. Forgoing life sustaining treatments: differences and similarities between North America and Europe. *Acta anaesthesiologica scandinavica*. 2006;50(10):1177-86.
18. Reynolds S, Cooper AB, McKneally M. Withdrawing life-sustaining treatment: ethical considerations. *Surgical Clinics*. 2007;87(4):919-36.
19. Levin TMBBS, Moreno BMA, Silvester WMBBS, Kissane DWMD. End-of-life communication in the intensive care unit. *General hospital psychiatry*. 2010;32(4):433-42.
20. Detsky ME, Harhay MO, Bayard DF, Delman AM, Buehler AE, Kent SA, et al. Discriminative accuracy of physician and nurse predictions for survival and functional outcomes 6 months after an ICU admission. *Jama*. 2017;317(21):2187-95.
21. Sprung CL, Cohen SL, Sjøkvist P, Baras M, Bulow H-H, Hovilehto S, et al. End-of-Life Practices in European Intensive Care Units: The Ethicus Study. *JAMA*. 2003;290(6):790-7.
22. Esteban A, Gordo F, Solsona L, Alía I, Caballero J, Bouza C, et al. Withdrawing and withholding life support in the intensive care unit: a Spanish prospective multi-centre observational study. *Intensive care medicine*. 2001;27(11):1744-9.
23. Ferrand E, Robert R, Ingrand P, Lemaire F. Withholding and withdrawal of life support in intensive-care units in France: a prospective survey. *The Lancet*. 2001;357(9249):9-14.
24. Angus DC, Barnato AE, Linde-Zwirble WT, Weissfeld LA, Watson RS, Rickert T, et al. Use of intensive care at the end of life in the United States: an epidemiologic study. *Crit Care Med*. 2004;32(3):638-43.
25. Meissner A, Genga KR, Studart FS, Settmacher U, Hofmann G, Reinhart K, et al. Epidemiology of and factors associated with end-of-life decisions in a surgical intensive care unit. *Critical care medicine*. 2010;38(4):1060-8.
26. Flaatten H, Guidet B, de Lange DW, Beil M, Leaver SK, Fjølner J, et al. The importance of revealing data on limitation of life sustaining therapy in critical ill elderly Covid-19 patients. *Journal of critical care*. 2022;67:147-8.
27. The Swedish Society of Anesthesiology and Intensive Care, SFAI. Treatment Strategies for Life Support in Intensive Care, 2012. https://sfai.se/wp-content/uploads/files/22-2%20Treatment_strategy.pdf. Last accessed 20220814.
28. Luce JM. Withholding and withdrawal of life support: ethical, legal, and clinical aspects. *New Horizons (Baltimore, Md)*. 1997;5(1):30-7.
29. Vincent J-L. Withdrawing may be preferable to withholding. *Critical Care*. 2005;9(3):1-4.
30. Downar J, Delaney JW, Hawryluck L, Kenny L. Guidelines for the withdrawal of life-sustaining measures. *Intensive care medicine*. 2016;42(6):1003-17.
31. Sprung CL, Truog RD, Curtis JR, Joynt GM, Baras M, Michalsen A, et al. Seeking worldwide professional consensus on the principles of end-of-life care

- for the critically ill. The Consensus for Worldwide End-of-Life Practice for Patients in Intensive Care Units (WELPICUS) study. *Am J Respir Crit Care Med*. 2014;190(8):855-66.
32. Gedge E, Giacomini M, Cook D. Withholding and withdrawing life support in critical care settings: ethical issues concerning consent. *Journal of medical ethics*. 2007;33(4):215-8.
 33. Bandrauk N, Downar J, Paunovic B. Withholding and withdrawing life-sustaining treatment: The Canadian Critical Care Society position paper. *Canadian journal of anaesthesia*. 2017;65(1):105-22.
 34. Strand L, Sandman L, Tinghög G, Nedlund A-C. Withdrawing or withholding treatments in health care rationing: an interview study on ethical views and implications. *BMC medical ethics*. 2022;23(1):63-.
 35. Mockford C, Fritz Z, George R, Court R, Grove A, Clarke B, et al. Do not attempt cardiopulmonary resuscitation (DNACPR) orders: a systematic review of the barriers and facilitators of decision-making and implementation. *Resuscitation*. 2015;88:99-113.
 36. Melltorp G, Nilstun T. The difference between withholding and withdrawing life-sustaining treatment. *Intensive care medicine*. 1997;23(12):1264-7.
 37. Neuman MD, Allen S, Schwarze ML, Uy J. Using time-limited trials to improve surgical care for frail older adults. *Annals of surgery*. 2015;261(4):639.
 38. Quill TE, Holloway R. Time-limited trials near the end of life. *Jama*. 2011;306(13):1483-4.
 39. The Government Offices of Sweden. The Swedish Code of Statutes(SFS). <https://svenskforfattningssamling.se/english.html>. Last accessed 20220814.
 40. The Government Offices of Sweden. The Swedish Code of Statutes(SFS). The Health and Medical Services Ordinance. <https://rkrattsbaser.gov.se/sfst?bet=2017:80>. In Swedish. Last accessed 20220814.
 41. The Government Offices of Sweden. The Swedish Code of statutes. The Health and Medical Services Act (SFS 2017:30) <https://rkrattsbaser.gov.se/sfst?bet=2017:30>. In Swedish. Last accessed 20220814.
 42. The Government Offices of Sweden. The Swedish Code of statutes. The Patient Safety Act (SFS 2010:659) <https://rkrattsbaser.gov.se/sfst?bet=2010:659>. In Swedish. Last accessed 20220814.
 43. The Government Offices of Sweden. The Swedish Code of Statutes(SFS). The Patient Act (SFS 2014:821). <https://rkrattsbaser.gov.se/sfst?bet=2014:821>. In Swedish. Last accessed 20220814.
 44. The National Board of Health and Welfare publication. <https://www.socialstyrelsen.se/en/publications/> Last accessed 20220814.
 45. The National Board of Health and Welfare's regulations and general advice on life-sustaining treatment. SOSFS 2011:7. <https://www.socialstyrelsen.se/kunskapsstod-och-regler/regler-och-riktlinjer/foreskrifter-och-allmanna-rad/konsoliderade-foreskrifter/20117-om-livsuppehallande-behandling/> Last accessed 20220814.

46. The National Board of Health and Welfare's regulations and general advice on life-sustaining treatment. SOSFS 2011:7. HSLF-FS 2017:26. <https://www.socialstyrelsen.se/globalassets/sharepoint-dokument/artikelkatalog/foreskrifter-och-allmanna-rad/2017-3-37.pdf>. Last accessed 20220814.
47. The Swedish Society of Medicine. https://www.sls.se/globalassets/sls/etik/dokument/sls_ssf_riktlinjer_avbryta_avsta_2018.pdf Last accessed 20220814. 2018.
48. Avidan A, Sprung CL, Schefold JC, Ricou B, Hartog CS, Nates JL, et al. Variations in end-of-life practices in intensive care units worldwide (Ethicus-2): a prospective observational study. *The Lancet Respiratory Medicine*. 2021;9(10):1101-10.
49. Phua J, Joynt GM, Nishimura M, Deng Y, Myatra SN, Chan YH, et al. Withholding and Withdrawal of Life-Sustaining Treatments in Intensive Care Units in Asia. *JAMA Internal Medicine*. 2015;175(3):363-71.
50. Park SY, Phua J, Nishimura M, Deng Y, Kang Y, Tada K, et al. End-of-life care in ICUs in East Asia: a comparison among China, Korea, and Japan. *Critical Care Medicine*. 2018;46(7):1114-24.
51. El Jawiche R, Hallit S, Tarabey L, Abou-Mrad F. Withholding and withdrawal of life-sustaining treatments in intensive care units in Lebanon: a cross-sectional survey of intensivists and interviews of professional societies, legal and religious leaders. *BMC medical ethics*. 2020;21(1):1-11.
52. Askitopoulou H, Vgontzas AN. The relevance of the Hippocratic Oath to the ethical and moral values of contemporary medicine. Part I: The Hippocratic Oath from antiquity to modern times. *European spine journal*. 2017;27(7):1481-90.
53. Holmboe E, Bernabeo E. The 'special obligations' of the modern Hippocratic Oath for 21st century medicine. *Medical education*. 2014;48(1):87-94.
54. Riddick JFA. The code of medical ethics of the american medical association. *The Ochsner journal*. 2003;5(2):6-10.
55. Smith DC. The hippocratic Oath and modern medicine: The hippocratic oath. *Journal of the history of medicine and allied sciences*. 1996;51(4):484-500.
56. World Medical Association, Declaration of Geneva. <https://www.wma.net/what-we-do/medical-ethics/declaration-of-geneva/> Last accessed 220822.
57. Berdine G. The Hippocratic Oath and Principles of Medical Ethics. *The Southwest respiratory and critical care chronicles*. 2015;3(9):28-32.
58. Askitopoulou H, Vgontzas AN. The relevance of the Hippocratic Oath to the ethical and moral values of contemporary medicine. Part II: interpretation of the Hippocratic Oath—today's perspective. *European spine journal*. 2018;27(7):1491-500.
59. Beauchamp T, Childress J. Principles of Biomedical Ethics: Marking Its Fortieth Anniversary. *American journal of bioethics*. 2019;19(11):9-12.
60. Beauchamp TL. Principles of biomedical ethics. Eighth edition ed. Childress JF, editor: New York, NY : Oxford university press; 2019.

61. Bioethics Co. Guide on the decision-making process regarding medical treatment in end-of-life situations [internet]. strasbourg: council of europe; 2014 May [cited 20. 12. 2017].
62. Rubenfeld GD, Curtis J. Beyond ethical dilemmas: improving the quality of end-of-life care in the intensive care unit. *Critical Care*. 2002;7(1):1-3.
63. Spoljar D, Curkovic M, Gastmans C, Gordijn B, Vrkic D, Jozepovic A, et al. Ethical content of expert recommendations for end-of-life decision-making in intensive care units: A systematic review. *Journal of critical care*. 2020;58:10-9.
64. Lobo SM, Creutzfeldt CJ, Maia IS, Town JA, Amorim E, Kross EK, et al. Perceptions of Critical Care Shortages, Resource Use, and Provider Well-being During the COVID-19 Pandemic: A Survey of 1,985 Health Care Providers in Brazil. *Chest*. 2022;161(6):1526-42.
65. Sprung CL, Joynt GM, Christian MD, Truog RD, Rello J, Nates JL. Adult ICU triage during the coronavirus disease 2019 pandemic: who will live and who will die? Recommendations to improve survival. *Critical care medicine*. 2020;48(8):1196.
66. Sveriges-riksdag. Prioriteringar inom hälso och sjukvård 5.2 etska grunder. 1997.
67. Rönnerberg L. Hälso- och sjukvårdsrätt. Femte upplagan ed: Lund : Studentlitteratur; 2020.
68. Linköping University. National Center For Priorities in Health Care. <https://liu.se/en/article/why-priority-setting-in-health-care>. Last accessed 20220814.
69. Linköping University. National Center For Priorities. <https://liu.se/en/research/national-centre-for-priority-setting-in-health-care>. Last accessed 20220814.
70. Mark NM, Rayner SG, Lee NJ, Curtis JR. Global variability in withholding and withdrawal of life-sustaining treatment in the intensive care unit: a systematic review. *Intensive Care Med*. 2015;41(9):1572-85.
71. James FR, Power N, Laha S. Decision-making in intensive care medicine – A review. *Journal of the Intensive Care Society*. 2018;19(3):247-58.
72. Azoulay E, Metnitz B, Sprung CL, Timsit JF, Lemaire F, Bauer P, et al. End-of-life practices in 282 intensive care units: data from the SAPS 3 database. *Intensive Care Med*. 2009;35(4):623-30.
73. Long AC, Brumback LC, Curtis JR, Avidan A, Baras M, De Robertis E, et al. Agreement With Consensus Statements on End-of-Life Care: A Description of Variability at the Level of the Provider, Hospital, and Country. *Crit Care Med*. 2019;47(10):1396-401.
74. Myburgh J, Abillama F, Chiumello D, Dobb G, Jacobe S, Kleinpell R, et al. End-of-life care in the intensive care unit: Report from the Task Force of World Federation of Societies of Intensive and Critical Care Medicine. *Journal of Critical Care*. 2016;34:125-30.
75. Yadav KN, Josephs M, Gabler NB, Detsky ME, Halpern SD, Hart JL. What's behind the white coat: Potential mechanisms of physician-attributable variation in critical care. *PloS one*. 2019;14(5):e0216418.

76. Curtis JR, Engelberg RA, Teno JM. Understanding variability of end-of-life care in the ICU for the elderly. *Intensive Care Medicine*. 2017;43(1):94-6.
77. Hart J, Kerlin MP. Interpreting "Do Not Resuscitate": A Cautionary Tale of Physician Influence. *Annals Of The American Thoracic Society*. 2017;14(4):491-2.
78. Jensen H, Ammentorp J, Johannessen H, Ørding H. Challenges in End-of-Life Decisions in the Intensive Care Unit: An Ethical Perspective. *Journal of Bioethical Inquiry*. 2013;10(1):93-101.
79. McPherson K, Carlos WG, 3rd, Emmett TW, Slaven JE, Torke AM. Limitation of Life-Sustaining Care in the Critically Ill: A Systematic Review of the Literature. *J Hosp Med*. 2019;14(5):303-10.
80. Fowler R, Sabur N, Li P, Juurlink D, Pinto R, Hladunewich M, et al. Sex- and age-based differences in the delivery and outcomes of critical care. *Canadian Medical Association Journal*. 2007;177(12):1513-9.
81. Samuelsson C, Sjöberg F, Karlström G, Nolin T, Walther SM. Gender differences in outcome and use of resources do exist in Swedish intensive care, but to no advantage for women of premenopausal age. *Critical care (London, England)*. 2015;19(129):129.
82. Kelley AS, Ettner SL, Morrison RS, Du Q, Wenger NS, Sarkisian CA. Determinants of medical expenditures in the last 6 months of life.(Original Research)(Author abstract). *Annals of Internal Medicine*. 2011;154(4):235.
83. Barnato EA, Herndon BM, Anthony LD, Gallagher MP, Skinner SJ, Bynum PWJ, et al. Are Regional Variations in End-of-Life Care Intensity Explained by Patient Preferences?: A Study of the US Medicare Population. *Medical Care*. 2007;45(5):386-93.
84. Mentzelopoulos SD, Slowther A-M, Fritz Z, Sandroni C, Xanthos T, Callaway C, et al. Ethical challenges in resuscitation. *Intensive Care Medicine*. 2018;44(6):703-16.
85. Curtis, Jr., Engelberg R. What Is the "Right" Intensity of Care at the End of Life and How Do We Get There? *Annals Of Internal Medicine*. 2011;154(4):283-W90.
86. McKenzie MS, Auriemma CL, Olenik J, Cooney E, Gabler NB, Halpern SD. An observational study of decision making by medical intensivists. *Critical Care Medicine*. 2015;43(8):1660-8.
87. Chen TD, Werhane HP, Mills EA. Role of organization ethics in critical care medicine. *Critical Care Medicine*. 2007;35(2 Suppl):S11-S7.
88. Wilkinson DJC, Truog RD. The luck of the draw: Physician-related variability in end-of-life decision-making in intensive care. *Intensive Care Medicine*. 2013;39(6):1128-32.
89. Valley TS, Admon AJ, Zahuranec DB, Garland A, Fagerlin A, Iwashyna TJ. Estimating ICU Benefit: A Randomized Study of Physicians. *Critical care medicine*. 2019;47(1):62-8.
90. SIR. Annual Report 2021.

91. Rhodes A, Ferdinande P, Flaatten H, Guidet B, Metnitz PG, Moreno RP. The variability of critical care bed numbers in Europe. *Intensive care medicine*. 2012;38(10):1647-53.
92. SIR. Annual Report 2020 [Available from: https://www.icuregsws.org/globalassets/arsrapporteur/analyserande_arsrapport_2018.pdf.
93. Zimmerman JJ, Harmon LA, Smithburger PL, Chaykosky D, Heffner AC, Hravnak M, et al. Choosing Wisely For Critical Care: The Next Five. *Critical Care Medicine*. 2021;49(3).
94. Malmgren J, Waldenström A-C, Rylander C, Johannesson E, Lundin S. Long-term health-related quality of life and burden of disease after intensive care: development of a patient-reported outcome measure. *Critical Care*, 2021, Vol 25, Iss 1. 2021;25(1).
95. Brown SM, Bose S, Banner-Goodspeed V, Beesley SJ, Dinglas VD, Hopkins RO, et al. Approaches to addressing post-intensive care syndrome among intensive care unit survivors A Narrative Review. *ANNALS OF THE AMERICAN THORACIC SOCIETY*. 2019;16(8):947-56.
96. Brown SM, Dinglas VD, Akhlaghi N, Bose S, Banner-Goodspeed V, Beesley S, et al. Association between unmet medication needs after hospital discharge and readmission or death among acute respiratory failure survivors: the addressing post-intensive care syndrome (APICS-01) multicenter prospective cohort study. *Critical care (London, England)*. 2022;26(1):6-.
97. Wade D, Hardy R, Howell D, Mythen M. Identifying clinical and acute psychological risk factors for PTSD after critical care: a systematic review. *Minerva anesthesiologica*. 2013;79(8):944-63.
98. Myers EA, Smith DA, Allen SR, Kaplan LJ. Post-ICU syndrome: Rescuing the undiagnosed. *Journal of the American Academy of PAs*. 2016;29(4):34-7.
99. Beumeler L, van Wieren A, Buter H, van Zutphen T, Bruins N, de Jager C, et al. Patient-reported physical functioning is limited in almost half of critical illness survivors 1-year after ICU-admission: A retrospective single-centre study. *PloS one*. 2020;15(12):e0243981-e.
100. Nates JL, Nunnally M, Kleinpell R, Blosser S, Goldner J, Birriel B, et al. ICU Admission, Discharge, and Triage Guidelines: A Framework to Enhance Clinical Operations, Development of Institutional Policies, and Further Research. *Critical care medicine*. 2016;44(8):1553-602.
101. Metnitz P, Moreno R, Almeida E, Jordan B, Bauer P, Campos R, et al. SAPS 3—From evaluation of the patient to evaluation of the intensive care unit. Part 1: Objectives, methods and cohort description. *Intensive Care Medicine*. 2005;31(10):1336-44.
102. Moreno RP, Metnitz PG, Almeida E, Jordan B, Bauer P, Campos RA, et al. SAPS 3—From evaluation of the patient to evaluation of the intensive care unit. Part 2: Development of a prognostic model for hospital mortality at ICU admission. *Intensive care medicine*. 2005;31(10):1345-55.

103. Strand K, Flaatten H. Severity scoring in the ICU: a review. *Acta Anaesthesiologica Scandinavica*. 2008;52(4):467-78.
104. The National Board of Health and Welfare. <https://www.socialstyrelsen.se/globalassets/sharepoint-dokument/dokument-webb/ovrigt/nationella-prioriteringar-intensivvarden.pdf> Last accessed 20220813.
105. Sprung CL, Joynt GM, Christian MD, Truog RD, Rello J, Nates JL. Adult ICU Triage During the Coronavirus Disease 2019 Pandemic: Who Will Live and Who Will Die? Recommendations to Improve Survival. *Critical care medicine*. 2020;48(8):1196-202.
106. Morrow BM, Gopalan PD, Joubert, Paruk F, Pope A. Critical care triage during the COVID-19 pandemic in South Africa: A constitutional imperative. *South African medical journal*. 2020;110(12):1176-9.
107. Aziz S, Arabi YM, Alhazzani W, Evans L, Citerio G, Fischkoff K, et al. Managing ICU surge during the COVID-19 crisis: rapid guidelines. *Intensive care medicine*. 2020;46(7):1303-25.
108. Sprung CL. Reassessing Cardiopulmonary Resuscitation in Hospitalized Patients With Coronavirus Disease 2019. *Critical care medicine*. 2021;49(6):988-93.
109. Netters S, Dekker N, van de Wetering K, Hasker A, Paasman D, de Groot JW, et al. Pandemic ICU triage challenge and medical ethics. *BMJ supportive & palliative care*. 2021;11(2):133-7.
110. SFS. Hälso- och sjukvårdslag (2017:30).
111. Thompson BT, Cox PN, Antonelli M, Carlet JM, Cassell J, Hill NS, et al. Challenges in end-of-life care in the ICU: statement of the 5th International Consensus Conference in Critical Care: Brussels, Belgium, April 2003: executive summary. *Critical care medicine*. 2004;32(8):1781-4.
112. Carlet J, Thijs LG, Antonelli M, Cassell J, Cox P, Hill N, et al. Challenges in end-of-life care in the ICU. *Intensive care medicine*. 2004;30(5):770-84.
113. Graw JA, Spies CD, Wernecke K-D, Braun J-P. Managing end-of-life decision making in intensive care medicine--a perspective from Charité Hospital, Germany. *PloS one*. 2012;7(10):e46446-e.
114. Curtis JR, Wenrich MD, Carline JD, Shannon SE, Ambrozy DM, Ramsey PG. Understanding physicians' skills at providing end-of-life care: perspectives of patients, families, and health care workers. *Journal of general internal medicine*. 2001;16(1):41-9.
115. Cohen S, Sprung C, Werdan K, Bulow H-H, Woodcock T, Sjökvist P, et al. Communication of end-of-life decisions in European intensive care units. *Intensive care medicine*. 2005;31(9):1215-21.
116. Oczkowski SJW, Chung H-O, Hanvey L, Mbuagbaw L, You JJ. Communication tools for end-of-life decision-making in the intensive care unit: a systematic review and meta-analysis. *Critical Care*. 2016;20(1):97.
117. Michalsen A, Long AC, Ganz FD, White DB, Jensen HI, Metaxa V, et al. Interprofessional shared decision-making in the ICU: a systematic review and recommendations from an expert panel. *Critical care medicine*. 2019;47(9):1258-66.

118. Curtis JR, White DB. Practical Guidance for Evidence-Based ICU Family Conferences. *Chest*. 2008;134(4):835-43.
119. Bülow HH, Petersen H, Benbenishty J, Sprung CL. Hints and advice on end-of-life communication in the ICU, also during pandemics. *Acta anaesthesiologica Scandinavica*. 2021;65(8):1143-6.
120. Becker C, Lecheler L, Hochstrasser S, Metzger KA, Widmer M, Thommen EB, et al. Association of Communication Interventions to Discuss Code Status With Patient Decisions for Do-Not-Resuscitate Orders: A Systematic Review and Meta-analysis. *JAMA Network Open*. 2019;2(6):e195033-e.
121. Fahner JC, Beunders AJM, van der Heide A, Rietjens JAC, Vanderschuren MM, van Delden JJM, et al. Interventions Guiding Advance Care Planning Conversations: A Systematic Review. *Journal of the American Medical Directors Association*. 2019;20(3):227-48.
122. Moss M, Good VS, Gozal D, Kleinpell R, Sessler CN. An Official Critical Care Societies Collaborative Statement: Burnout Syndrome in Critical Care Healthcare Professionals: A Call for Action. *Critical care medicine*. 2016;44(7):1414-21.
123. Piers RD, Azoulay E, Ricou B, Ganz FD, Decruyenaere J, Max A, et al. Perceptions of Appropriateness of Care Among European and Israeli Intensive Care Unit Nurses and Physicians. *JAMA*. 2011;306(24):2694-703.
124. Benoit D, Jensen H, Malmgren J, Metaxa V, Reyners A, Darmon M, et al. Outcome in patients perceived as receiving excessive care across different ethical climates: a prospective study in 68 intensive care units in Europe and the USA. *Intensive Care Medicine*. 2018;44(7):1039-49.
125. Bergman L, Falk AC, Wolf A, Larsson IM. Registered nurses' experiences of working in the intensive care unit during the COVID-19 pandemic. *Nursing In Critical Care*, 2021, Vol 26, Iss 6, pp 467-475. 2021;26(6):467-75.
126. Azoulay E, De Waele J, Ferrer R, Staudinger T, Borkowska M, Povoas P, et al. Symptoms of burnout in intensive care unit specialists facing the COVID-19 outbreak. *Annals Of Intensive Care*, 2020, Vol 10, Iss 1. 2020;10(1).
127. Azoulay E, Cariou A, Bruneel F, Demoule A, Kouatchet A, Reuter D, et al. Symptoms of anxiety, depression, and peritraumatic dissociation in critical care clinicians managing patients with COVID-19. A cross-sectional study. *American journal of respiratory and critical care medicine*. 2020;202(10):1388-98.
128. Catalisano G, Ippolito M, Marino C, Giarratano A, Cortegiani A. Palliative care principles and anesthesiology clinical practice: current perspectives. *Journal of multidisciplinary healthcare*. 2021;14:2719-30.
129. Swedish_National_Quality_Registries. <https://www.kvalitetsregister.se/en/kvalitetsregister/omnationellakvalitetsregister.52218.html>. 2022.
130. Rockwood K, Song X, MacKnight C, Bergman H, Hogan DB, McDowell I, et al. A global clinical measure of fitness and frailty in elderly people. *Cmaj*. 2005;173(5):489-95.
131. Rockwood K, Theou O. Using the clinical frailty scale in allocating scarce health care resources. *Canadian Geriatrics Journal*. 2020;23(3):210.

132. Zeng A, Song X, Dong J, Mitnitski A, Liu J, Guo Z, et al. Mortality in Relation to Frailty in Patients Admitted to a Specialized Geriatric Intensive Care Unit. *The journals of gerontology Series A, Biological sciences and medical sciences*. 2015;70(12):1586-94.
133. Charlson M, Pompei P, Ales K, MacKenzie R. Charlson comorbidity index. *J Chronic dis*. 1987;40(5):373-83.
134. Braun V. *Successful qualitative research : a practical guide for beginners*. 1. ed. ed. Clarke V, editor: Thousand Oaks, CA : SAGE Publications; 2013.
135. Caronna CA. *The SAGE Handbook of Qualitative Methods in Health Research*. 2010 2022/07/11. London: SAGE Publications Ltd. Available from: <https://methods.sagepub.com/book/sage-hdbk-qualitative-methods-in-health-research>.
136. Thiselton AC. *Hermeneutics: an introduction*: Wm. B. Eerdmans Publishing; 2009.
137. Giorgi A, Giorgi B. *Phenomenology*: Sage Publications, Inc; 2003.
138. Brewer J. *Ethnography*: McGraw-Hill Education (UK); 2000.
139. Walker D, Myrick F. Grounded theory: An exploration of process and procedure. *Qualitative health research*. 2006;16(4):547-59.
140. Kelly. *The SAGE handbook of qualitative methods in health research, qualitative interviewing techniques and styles*. Choice Reviews Online. 2011;48(09):Chapter 16, 307-27.
141. Giacomini M. *The SAGE Handbook of Qualitative Methods in Health Research*. 2010 2022/07/11. London: SAGE Publications Ltd. Available from: <https://methods.sagepub.com/book/sage-hdbk-qualitative-methods-in-health-research>.
142. Graneheim UH, Lundman B. Qualitative content analysis in nursing research: Concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today*. 2004;24(2):105-12.
143. Nowell LS, Norris JM, White DE, Moules NJ. Thematic Analysis: Striving to Meet the Trustworthiness Criteria. *International journal of qualitative methods*. 2017;16(1):1-13.
144. Braun V, Clarke V, Hayfield N, Terry G. Thematic Analysis. In: Liamputtong P, editor. *Handbook of Research Methods in Health Social Sciences*. Singapore: Springer Singapore; 2019. p. 843-60.
145. Morse JM, Mitcham C. Exploring qualitatively-derived concepts: Inductive—deductive pitfalls. *International journal of qualitative methods*. 2002;1(4):28-35.
146. Adamski J, Weigl W, Musialowicz T, Lahtinen P, Reinikainen M. Predictors of treatment limitations in Finnish intensive care units. *Acta anaesthesiologica Scandinavica*. 2022;66(4):526-38.
147. Skjaker SA, Hoel H, Dahl V, Stavem K. Factors associated with life-sustaining treatment restriction in a general intensive care unit. *PLoS One*. 2017;12(7):e0181312.

148. Modra LJ, Higgins AM, Abeygunawardana VS, Vithanage RN, Bailey MJ, Bellomo R. Sex Differences in Treatment of Adult Intensive Care Patients: A Systematic Review and Meta-Analysis. *Critical Care Medicine*. 2022;50(6):913-23.
149. Pietropaoli AP, Glance LG, Oakes D, Fisher SG. Gender differences in mortality in patients with severe sepsis or septic shock. *Gend Med*. 2010;7(5):422-37.
150. Wolff G, Wernly B, Flaatten H, Fjølner J, Bruno RR, Artigas A, et al. Sex-specific treatment characteristics and 30-day mortality outcomes of critically ill COVID-19 patients over 70 years of age—results from the prospective COVIP study. *Canadian Journal of Anesthesia/Journal canadien d'anesthésie*. 2022;1-9.
151. Hollinger A, Gayat E, Féliot E, Paugam-Burtz C, Fournier M-C, Duranteau J, et al. Gender and survival of critically ill patients: results from the FROG-ICU study. *Annals of intensive care*. 2019;9(1):1-8.
152. Sprung CL, Woodcock T, Sjøkvist P, Ricou B, Bulow HH, Lippert A, et al. Reasons, considerations, difficulties and documentation of end-of-life decisions in European intensive care units: the ETHICUS Study. *Intensive Care Med*. 2008;34(2):271-7.
153. Bouch DC, Thompson JP. Severity scoring systems in the critically ill. *Continuing education in anaesthesia, critical care & pain*. 2008;8(5):181-5.
154. Coombs MA, Addington-Hall J, Long-Sutcliffe T. Challenges in transition from intervention to end of life care in intensive care: a qualitative study. *International journal of nursing studies*. 2012;49(5):519-27.
155. Cabana MD, Rand CS, Powe NR, Wu AW, Wilson MH, Abboud P-AC, et al. Why don't physicians follow clinical practice guidelines?: A framework for improvement. *Jama*. 1999;282(15):1458-65.
156. Shah SD, Cifu AS. From guideline to order set to patient harm. *JAMA*. 2018;319(12):1207-8.
157. Shaughnessy AF, Cosgrove L, Lexchin JR. The need to systematically evaluate clinical practice guidelines. *The Journal of the American Board of Family Medicine*. 2016;29(6):644-8.
158. Wilson M, Rhudy L, Ballinger B, Tescher A, Pickering B, Gajic O. Factors that contribute to physician variability in decisions to limit life support in the ICU: a qualitative study. *Intensive Care Medicine*. 2013;39(6):1009-18.
159. De Boer M, Reimer-Kirkham S, Sawatzky R. How nurses' and physicians' emotions, psychosocial factors, and professional roles influence the end-of-life decision making process: An interpretive description study. *Intensive and Critical Care Nursing*. 2022;103249.
160. Frost DW, Cook DJ, Heyland DK, Fowler RA. Patient and healthcare professional factors influencing end-of-life decision-making during critical illness: a systematic review. *Crit Care Med*. 2011;39(5):1174-89.
161. Garland A, Connors AF. Physicians' influence over decisions to forego life support. *J Palliat Med*. 2007;10(6):1298-305.
162. Nordenskjöld Syrous A, Agard A, Kock Redfors M, Naredi S, Block L. Swedish intensivists' experiences and attitudes regarding end-of-life decisions. *Acta Anaesthesiol Scand*. 2020;64(5):656-62.

163. Tabah A, Elhadi M, Ballard E, Cortegiani A, Cecconi M, Unoki T, et al. Variation in communication and family visiting policies in intensive care within and between countries during the Covid-19 pandemic: The COVISIT international survey. *Journal of critical care*. 2022;71:154050-.
164. Block L, Petzold M, Syrous AN, Lindqvist B, Odenstedt Herges H, Naredi S. Age, SAPS 3 and female sex are associated with decisions to withdraw or withhold intensive care. *Acta Anaesthesiol Scand*. 2019;63(9):1210-5.
165. Zettersten E, Engerström L, Bell M, Jäderling G, Mårtensson J, Block L, et al. Long-term outcome after intensive care for COVID-19: differences between men and women—a nationwide cohort study. *Critical Care*, 2021, Vol 25, Iss 1. 2021;25(1).
166. Aziz F, Reisinger AC, Aberer F, Sourij C, Tripolt N, Siller-Matula JM, et al. Simplified Acute Physiology Score 3 Performance in Austrian COVID-19 Patients Admitted to Intensive Care Units with and without Diabetes. *Viruses*. 2022;14(4):777.
167. Kurtz P, Bastos LS, Salluh JJ, Bozza FA, Soares M. SAPS-3 performance for hospital mortality prediction in 30,571 patients with COVID-19 admitted to ICUs in Brazil. *Intensive Care Medicine*. 2021;47(9):1047-9.
168. Tuty Kuswardhani RA, Henrina J, Pranata R, Anthonius Lim M, Lawrensia S, Suastika K. Charlson comorbidity index and a composite of poor outcomes in COVID-19 patients: A systematic review and meta-analysis. *Diabetes & metabolic syndrome clinical research & reviews*. 2020;14(6):2103-9.
169. Awad A, Bader-El-Den M, McNicholas J, Briggs J. Early hospital mortality prediction of intensive care unit patients using an ensemble learning approach. *International journal of medical informatics*. 2017;108:185-95.
170. Awad A, Bader-El-Den M, McNicholas J, Briggs J, El-Sonbaty Y. Predicting hospital mortality for intensive care unit patients: time-series analysis. *Health informatics journal*. 2020;26(2):1043-59.
171. Holmgren G, Andersson P, Jakobsson A, Frigyesi A. Artificial neural networks improve and simplify intensive care mortality prognostication: a national cohort study of 217,289 first-time intensive care unit admissions. *Journal of intensive care*. 2019;7(1):1-8.

APPENDIX



SAHLGRENSKA ACADEMY, INSTITUTE OF CLINICAL SCIENCES, DEPARTMENT OF ANESTHESIOLOGY AND INTENSIVE CARE

Interview guide- template

- ⚡ **What are your general thoughts on end-of-life decision-making in the ICU?**
 - You mentioned x, can you please evolve..
 - What do you think of situations like the one you just mentioned..
 - Can you comment further on..
 - What do you think affects ..

 - ⚡ **Can you tell about how decisions to withhold life-sustaining treatments are made for patients at the ward? How does it differ from when patients are in the ICU?**
 - You mentioned x, can you please evolve..
 - What do you think of situations like the one you just mentioned..
 - Can you comment further on..
 - What do you think affects..

 - ⚡ **Can we talk a bit about the process on how decisions to withdraw or withhold life sustaining treatments is made in your ICU?**
 - You mentioned x, can you please evolve..
 - What do you think of situations like the one you just mentioned..
 - Can you comment further on..
 - What do you think affects ..

 - ⚡ **What factors influence end-of-life decision-making?**
 - You mentioned x, can you please evolve..
 - What do you think of situations like the one you just mentioned..
 - Can you comment further on..
 - What do you think affects..
- In a similar manner, with follow-up questions for each topic:
- ⚡ **What is your opinion on end-of-life decision-making concerning**
 - Biases and values
 - Conflicts
 - Education on end-of-life decision-making
 - Religious beliefs
 - etcetera..

 - ⚡ **Is there anything else you wish to talk about?**