GUIDELINES 2025
EUROPEAN RESUSCITATION COUNCIL

[h1] European Resuscitation Council Guidelines 2025: Ethics in Resuscitation

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Word count abstract: 176

Word count manuscript: 7933

Tables: 3

Figures: 3

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[h1] Abstract

This Guideline of the European Resuscitation Council (ERC) on Ethics in Resuscitation provides evidence-informed recommendations on the ethical considerations of resuscitation, focusing on advance care planning, the involvement of bystanders and first responders, family presence during resuscitation, termination of resuscitation, and ethical considerations for systems, training, research, and low-resource settings. The recommendations in this chapter are informed by the Consensus on Science and Treatment Recommendations (CoSTR) by the International Liaison Committee on Resuscitation (ILCOR), focused reviews by the ERC Ethics Writing Group of the ERC Guidelines 2025 on Ethics in Resuscitation, and expert consensus within the writing group.

We have emphasised considerations for out-of-hospital cardiac arrest, in-hospital cardiac arrest, and paediatric cardiac arrest throughout the chapter. These guidelines aim to ensure that resuscitation decisions are made in alignment with patient values and preferences, and they emphasise the importance of a patient-centred approach to care. The chapter also addresses the balance between beneficence and autonomy, stakeholder involvement, transparency and the use of artificial intelligence in resuscitation research, and the multiple aspects for training in ethics in resuscitation.

[h1] List of abbreviations

- European Resuscitation Council (ERC)
- International Liaison Committee on Resuscitation (ILCOR)
- Consensus on Science and Treatment Recommendations (CoSTR)
- Do-not-attempt cardiopulmonary resuscitation (DNACPR)
- Termination of resuscitation (TOR)
- Cardiopulmonary resuscitation (CPR)
- Out-of-hospital cardiac arrest (OHCA)
- In-hospital cardiac arrest (IHCA)
- End-tidal CO_2 ($ETCO_2$)
- Return of spontaneous circulation (ROSC)
- Artificial Intelligence (AI)
- Randomised controlled trial (RCT)

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[h1] Keywords:

Resuscitation, cardiopulmonary resuscitation, cardiac arrest, ethics, advance care planning, termination of resuscitation, organ donation, bystander, family involvement, low-resource setting, suicide, education and systems, research ethics

[h1] Introduction

The ethical dimensions of resuscitation have become increasingly important as the field evolves. Ethics as an integrated part of medical care involves the principles and decision-making frameworks that guide the management of patients in cardiac arrest, ensuring that interventions are aligned with the values and preferences of patients and their families. This chapter of the European Resuscitation Council (ERC) Guidelines 2025 provides evidence-informed guidelines for the ethical aspects of resuscitation and end-of-life care of adults and children.

We base these guidelines on the International Liaison Committee on Resuscitation (ILCOR) Consensus on Science and Treatment Recommendations (CoSTR), focused reviews undertaken by the Writing Group of the ERC Guidelines 2025 Ethics in Resuscitation, and expert consensus when no evidence was available. Considering the complexity of ethics, we included a patient representative and an ethicist as collaborators for the writing group to provide perspectives for the included topics, the expert consensus, and guideline text. For these guidelines, we conducted focused literature reviews on the ethical aspects for each of the topics: (1) advance care planning, (2) the ethical involvement of bystanders and first responders, (3) family presence during resuscitation, (4) termination of resuscitation (TOR), (6) uncontrolled organ donation after circulatory death, (7) suicide attempts, (9) education and systems, (10) ethical challenges in low-resource settings, and (11) resuscitation research. We did not review do-not-attempt cardiopulmonary resuscitation (DNACPR) orders as specific topic but rather considered DNACPR as a part of advance care planning. Likewise, we did not review shared decision-making as a specific topic but refer to other international guidelines on this including the 2021 ERC Ethics Guidelines.[1-4]

These guidelines were drafted and agreed upon by the Ethics Writing Group and the Guideline Steering Committee, before being posted for public comment. A total of [INSERT NUMBER] individuals from [INSERT COUNTRIES] submitted [INSERT NUMBER] comments, leading to [INSERT CHANGES] in the final version. The guidelines were presented to and approved by the ERC Board and the ERC General Assembly on [INSERT DATE]. The methodology for the guideline development is outlined in the Executive Summary.

We use ‘CPR’ in this ERC Guideline 2025 Ethics in Resuscitation as the entire procedure of resuscitation and not just in the context of chest compressions and ventilation. We used the term ‘family’ to include all significant others, close friends, or co-survivors.

[h1] Summary of key changes or new evidence

Table 1. The major changes in the ERC Guidelines 2025 Ethics in Resuscitation

Topic	2021 Guidelines	2025 Guidelines
Advance care planning	Advance care planning recommended for patients at high risk of cardiac arrest or poor outcome.	Advance care planning is recommended for patients at risk; re-assess regularly, especially when situations change. Provide patient-centred advance care planning education before initiating advance care planning discussions.
Bystanders and First Responders involvement	Bystander CPR is voluntary; no moral or legal obligation to perform. Dispatch-assisted CPR is recommended but is seen as a tool to increase bystander participation.	Maintains recommendations and adds that strategies to reduce biases in bystander CPR, such as cultural and gender sensitivity training should be introduced. Proposes post-event debriefing and support mechanisms for bystanders and first responders to mitigate moral distress.
Family presence	Offers the option for family members to be present during resuscitation, as long as it is safe, and a team member is available for support.	Recommends structured and culturally sensitive procedures for family presence during resuscitation. Recommends designating a team member to support family members during resuscitation.
Termination of resuscitation	Systems should implement criteria for termination of CPR. TOR rules may be used for all cardiac arrest patients.	TOR is a team-based decision using a holistic approach. TOR rules should only be used for adult out-of-hospital cardiac arrest patients following local validation.

		Debriefing should be sought following termination.
Uncontrolled organ donation after circulatory death	Ethical guidance for organ donation in general	Healthcare systems should assess policies, training, communication, and strategies regarding organ donation to improve organ availability and ensure that TOR practices do not conflict with possible organ donation. Transparent procedures should be accessible for uncontrolled donation.
Ethics of education and systems	Not addressed.	Emphasises integration of ethical reasoning as a core competency in resuscitation training. Standardise institutional policies and develop formal training programs to address moral distress and ethical decision-making.
Cardiac arrest as a result of a suicide attempt	The decision to withhold or withdraw CPR in suicide attempts is based on the patient's values and wishes, including advance directives.	Provide individualised, context-sensitive approaches. Start resuscitation by default whilst assessing clinical and contextual information.
Ethical considerations in low resource settings	Not addressed.	Stresses the particular importance of DNACPR in low-resource settings Emphasises that TOR rules for OHCA may be a cost-effective strategy to minimise futile transports
Resuscitation research ethics	Advocates for high-quality emergency research with emphasis	Deferred consent model expanded to include non-drug investigational

	on the necessity of pre-enrolment consent models. Recommends transparency and respect for patient dignity, with institutional ethical review committee involvement for all research.	interventions, with safeguards for patient autonomy. Calls for education of the public on applicable regulations and the necessity of deferred consent for emergency research. Addresses benefits and risks related to the use of artificial intelligence in emergency research.

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[h1] Concise guidelines for clinical practice

[h2] Advance care planning

- Healthcare systems should offer advance care planning to all patients expressing wishes to discuss goals of care.
- Decisions of DNACPR are best made in the broader context of advance care planning.
- Anticipatory decisions, whether to attempt cardiopulmonary resuscitation (CPR) or not, should be taken in all patients with a significant risk of cardiac arrest.
- Document decisions of DNACPR and on which of the three different grounds the decision is based: (1) CPR will not be appropriate since death is expected; (2) CPR not beneficial according to the patient's values; (3) or the patient does not wish to receive CPR.
- For patients with cognitive impairment, invite a substitute decision maker to ensure concordance in goals of care over time.
- Offer patient-centred education about advance care planning to patients before discussions on this topic.
- Document advance care plans in a consistent manner that is available in emergency care settings (e.g. electronic registries, standardised documentation templates).
- Use advance care planning to identify treatments and interventions that should be avoided upon hospital admission at the end of life.
- Reassess advance care plans regularly and when a patient's situation changes.
- Facilitate patient and family caregivers' understanding of their preferences, as mutual understanding can optimise the decision-making process for both.
- Organise local educational hubs focusing on skills and competencies when undertaking goals of care discussions.
- Communication skill training should be part of the continuous professional development for healthcare providers involved in advance care planning and end-of-life care.

[h2] Ethics of bystander and first responder involvement

- Ensure that bystanders are not forced or unduly compelled into performing CPR, respecting their personal autonomy in resuscitation decision-making, while acknowledging the 'duty to help'.
- Mitigate moral distress among bystanders and first responders by offering ethical guidance for navigating situations involving difficult or distressing interventions.
- Specific, actionable strategies are recommended — such as establishing post-event debriefing mechanisms or support frameworks, potentially coordinated by registered first responders or

health authorities—to ensure continued care and assistance following an out-of-hospital cardiac arrest (OHCA).

- Clarify legal and ethical protection for bystanders to reduce hesitation due to fear of liability or moral responsibility.
- Implement strategies to minimise the impact of biases in bystander intervention, ensuring that factors such as gender, cultural background, or the patient's social identity do not influence resuscitation decisions.
- Clearly articulate the ethical boundaries of bystander responsibility in OHCA response, carefully distinguishing between moral obligations and legal or medical duties and delineating how these distinctions can be navigated effectively within the context of the legal-moral duty to assist.
- Implement safeguards in bystander alert systems to protect patient autonomy and prevent unwanted or inappropriate resuscitation attempts, while also ensuring that the bystanders' autonomy is respected in their decision to intervene.

[h2] Family presence

- Resuscitation teams should offer the family of cardiac arrest patients the choice to be present during the resuscitation attempt.
- Healthcare systems should establish clear, contextualised, and culturally sensitive procedures for the involvement of family members.
- Healthcare systems should specifically train their teams to support family members during resuscitation.
- As far as reasonably practicable, healthcare systems should have a trained team member who can be designated to this task as part of the overall CPR strategy and choreography.

[h2] Termination of resuscitation

- Make a team-based decision to terminate resuscitation based on a holistic approach considering patient values and preferences and the combined picture of prognostic factors including duration, the absence of reversible causes, and the absence of response to advanced life support.
- TOR should be carried out in a planned manner and all team members should have the opportunity to weigh in before termination.
- The team should conduct a debriefing immediately following termination.
- TOR may be considered when the patient has persistent asystole despite 20 minutes of advanced life support in the absence of any reversible cause when no other clinical factors suggest against.

- TOR rules may be used to aid decision-making for adult patients with OHCA following local validation and considering local values and preferences.
- TOR rules should not be used for in-hospital cardiac arrest (IHCA) and for paediatric patients in any setting due to insufficient evidence.
- Persistently low end-tidal CO_2 ($ETCO_2$) is a strong prognostic marker that may be used to aid decision making on top of other factors but should not be used in isolation.
- Other factors such as cardiac ultrasound, blood gases, and pupil reactiveness are not valid factors for termination of resuscitation.

[h2] Uncontrolled organ donation after circulatory death

- Healthcare systems should assess their current policies and strategies regarding organ donation to improve organ availability while considering their sociocultural and religious context.
- Healthcare systems should invest in education and communication for both citizens and healthcare professionals.
- In healthcare systems that offer uncontrolled donation after circulatory determination of death, transparent procedures should be accessible to all those involved. These procedures should cover aspects such as donor identification, consent, organ preservation, and procurement.
- Moreover, TOR practices within these systems should be reviewed and adjusted to ensure they do not conflict with the possibility of uncontrolled organ donation after circulatory death.

[h2] Ethics of education and systems

- Establish ethical reasoning as a core competency in resuscitation training to strengthen critical thinking, ethical judgment, and decision-making that respects patient autonomy, follows medical best practices, and aligns with societal values.
- Implement simulation-based ethics training to provide healthcare professionals with hands-on experience in ethically complex resuscitation scenarios, including cases involving communication and decision-making regarding advance care planning, DNACPR decisions and TOR decisions.
- Introduce ethical preparedness training for resuscitation providers to develop strategies for managing moral distress, addressing ethical dilemmas, and overcoming institutional constraints that impact decision-making in high-pressure situations.
- Standardise institutional policies on advance care planning, DNACPR decisions, and TOR by embedding structured ethical frameworks that provide clear, legally and professionally aligned guidance for resuscitation decisions.

- Develop formal training programs to equip healthcare professionals with the skills to navigate institutional constraints, legal uncertainties, and policy inconsistencies in ethically complex resuscitation cases.
- Establish ethical oversight mechanisms within resuscitation policies to promote patient-centred, transparent, and ethically sound decision-making at institutional levels.

[h2] Cardiac arrest as a result of a suicide attempt

- In making decisions about withholding or withdrawing resuscitation in patients after attempted suicide, teams should consider various factors, such as context, patient motivations, and competing rights.
- In the existence of an advance directive, we still suggest initiating resuscitation until the context and background–clinical and ethical–of that advance directive is fully known.
- The response to the clinical situation should be tailored to the individual patient and not be dogmatic.
- If resuscitation likely results in significantly more harm than benefit, then the cause (being suicide) becomes irrelevant.

[h2] Resuscitation research ethics

- Systems should support the delivery of high-quality emergency research, as an essential component of optimising patient-centred cardiac arrest outcomes.
- Regulatory and procedural barriers to high-quality emergency research related to consent models should be minimised by legal improvements. For example, clear legal support for deferred consent may be extended to non-drug investigational interventions to minimise any pertinent ambiguity, while still maintaining adequate safeguards for patient and family autonomy, dignity and privacy.
- For observational research (e.g. in the context of registry data collection and/or DNA biobank data sampling and analyses) we suggest consideration of a deferred consent model, with concurrent implementation of appropriate safeguards aimed at preventing data breaches and patient reidentification.
- Researchers should involve patients, and members of the public as community advisors, throughout the research process, including design, delivery and research dissemination.
- Systems should promote education of the public regarding applicable regulations and the necessity of using deferred consent for emergency research. This initiative may enhance willingness for research participation.

- The use of a core outcome set, along with standardised corresponding terminology, should be harmonised across studies investigating long-term outcomes.
- Communities or populations in which research is undertaken and who bear the risk of research-related adverse events, should be given the opportunity to benefit from its results.
- Researchers should comply with best practice guidance to ensure integrity and transparency of research, including study protocol registration, prompt reporting of results, allocation of authorship according to international criteria for authorship, and data sharing.
- Policies of governments, public health bodies, international societies, and non-profit organisations should aim to ensure that funding for cardiac arrest research is sufficient to effectively address the high societal burden caused by cardiac arrest-associated morbidity and mortality.
- Health authorities should augment systems' resilience to pandemic-associated (or other calamity-induced) disruption of resuscitation research by cost-effective use of available computer and telecommunication/telemedicine technology and infrastructure, and other occasion-specific measures, such as personal protection and widespread/prompt vaccination.
- Use of artificial intelligence (AI) in research should be regulated according to rigorous ethical and scientific safeguards for beneficence, autonomy/privacy and justice. As an example, development of new AI algorithms should be based on broad datasets from the general population, rather than datasets from socioeconomically privileged groups.

253 **Table 2.** ERC Guidelines 2021 consensus definitions and statements.[2] Adopted and modified by the
254 Writing Group ERC Guidelines 2025 Ethics for Resuscitation

Definitions and statements related to advance directive(s)	
Advance directive	An instrument that relays information concerning an individual's preferences and goals regarding medical procedures and treatments, especially those used for end-of-life care. Advance directives are intended to extend the patient's autonomy to situations in which he/she is unable to express his/her preferences regarding treatment decisions. They reflect a patient's individual moral, cultural, and religious attitudes. They are represented in three formats: Living will (or instruction directive), appointment of a healthcare proxy (or proxy directive), and legal status of preferences.
Advance directives criteria	Advance directives must fulfil three criteria: Existence, validity (partly realised through periodic review), and applicability.
Definitions and statements related to advance care planning	
Advance care planning	A process that enables individuals to define goals and preferences for future medical treatment and care, to thoroughly discuss these goals and preferences with family and healthcare professionals, and to record and review these preferences if appropriate. The main objective is to help ensure that people receive medical care consistent with their values, goals, and preferences during serious, chronic, and/or acute/life-threatening illness.
Advance care plans	Plans that should be updated or re-reviewed, considering the availability of new and improved therapies that might affect patient preferences. Patient preferences may also evolve over time independently of available treatment options.
Definitions and statements related to shared decision-making	
Shared decision-making	A collaborative process that enables patients, or their surrogates, and a multidisciplinary team of healthcare professionals to reach consensus on treatment strategies and interventions that align with the patient's values, goals, and preferences. This process includes life-support limitation and palliative care, taking the best available scientific evidence into account, and fostering trust and partnership between patient/surrogate(s) and clinician(s).

255 **[h1] The evidence informing the ethics in resuscitation guidelines**

[h2] Advance care planning

An international consensus defined advance care planning *as a process that supports adults at any age or stage of health in understanding and sharing their personal values, life goals, and preferences regarding future medical care. The goal of advance care planning is to help ensure that people receive medical care that is consistent with their values, goals and preferences during serious and chronic illness. For many people, this process may include choosing and preparing another trusted person or persons to make medical decisions in the event the person can no longer make his or her own decisions*.[5] The ERC Ethics Writing Group recognises that the definition only considers adults but we reviewed evidence and provide recommendations for both adults and children.

Advance care planning takes a holistic, patient-centred approach, incorporating clinician-led discussions about limitation in life-sustaining treatment. Healthcare professionals and patients are more likely to encounter a DNACPR decision than an IHCA, as observational studies show that only about 3-8% of patients who die in the hospital actually receive CPR.[6,7] Further, about one in ten of acutely admitted patients receives a DNACPR decision.[8] Yet, a recent scoping review has demonstrated more barriers than facilitators of good practice of DNACPR decisions, barriers relate to timing, time-pressure, communication and ethical uncertainty.[9] Studies have shown that inappropriate or absent documentation of DNACPR decisions can result in either unwanted attempts of CPR or moral injury among staff, who may hesitate or delay resuscitation efforts due to uncertainty.[10,11] Findings from two 2024 scoping reviews[9,11] align with a systematic review from 2014,[12] highlighting the need for education and attention to DNACPR in guidelines. The rationale for a DNACPR decision can be divided in three categories[13,14]

(1) CPR is not appropriate because the patient is dying from an irreversible condition irrespective of the outcome of CPR,

(2) CPR is not considered beneficial after a balance against its burdens, meaning that this is not solely a clinical decision since resuscitation may result in survival, but the associated complications do not align with the patients values and preferences,

(3) CPR is not aligned with the patient's will even after a clarifying discussion of consequences including death if CPR is not performed.

The two latter grounds underline the integration of DNACPR decisions within advance care planning. Further, CPR can be conditioned. An example of a conditional decision is to initiate CPR and give up to three defibrillations in the case of a shockable initial rhythm, but not to prolong treatment if the arrhythmia is refractory and to withhold CPR in the case of a non-shockable initial rhythm.[15,16] This kind of conditional decision might be of relevance in the elderly in-hospital population, where survival differs between 3% and 41% based on the initial rhythm.[17]

Advance care planning training can be provided as a single session delivered by healthcare professionals or trained facilitators using a physical booklet or computer assistance.[18,19] A meta-analysis showed that video decision aids reduce patient preferences for life-prolonging care, CPR and intubation while increasing patients' willingness to discuss goals of care.[20] Recent reviews emphasise that single consultations and repeated sessions might help family involvement[21] and underscore an active nurse role instead of serving as intermediaries between doctors, patients and family.[22] A systematic review suggested that communication training increases comfort, self-efficacy, and preparedness of healthcare professionals to deliver end-of-life care.[23] Likewise, systematic continuous professional development might reduce barriers to patient understanding. [22] Studies found that documentation of advance care planning in electronic health care records being available at the point of care improved completion of DNACPR orders and patient engagement. [24]

Across multiple systematic reviews, advance care planning has been associated with more treatment consistent with patients' wishes,[25] decreased use of life-sustaining treatment,[26] prevention of hospitalisation,[25-27] higher likelihood of dying in nursing homes,[25] lower healthcare costs[25,28] improved quality of life, and reduced symptom burden. [28] Further, advance care planning is linked to increased palliative care use [27,28] resulting in increased patient and caregiver satisfaction.[28] Likewise, advance care planning increases the patient-preferred place of death,[27] while evidence for better dying experiences is lacking.[19] There are conflicting results on the use of resources including hospices.[25,26,28,29] One meta-analysis found that among older people in the community, advance care planning decreased the incidence of CPR, use of nasogastric lavage and in-hospital mechanical ventilation but reported no difference for place of dying.[30] In patients with cancer, advance care planning reduced chemotherapy, ICU admissions, hospital admissions, hospice use, and hospital deaths compared with cancer patients without advance care planning.[31]

Two systematic reviews on end-of-life care in children showed that parents try to protect children by avoiding discussions about death and medical personnel delay discussions until death is imminent. However, the patients themselves want to be informed about their prognosis, and siblings express a desire to be involved.[32,33] Moreover, a systematic review has shown that children with heart disease benefit from involvement of paediatric palliative care specialists through increased documentation of advance care planning including resuscitation decisions while relieving parental stress.[34]

Advance care planning is associated with increased caregiver-patient congruence in end-of-life care preferences, improved satisfaction with healthcare quality and communication and partly associated with improvements in caregivers' depressive symptoms.[18] Among people living with dementia, advance care

planning involving substitute decision makers is a method to maintain concordance of goals over time. However, there is no evidence supporting that people living with dementia make the decisions themselves or that decisions taken by a substitute align with the patient's own values. Further, there is a lack of evidence demonstrating a patient preference for making these decisions in earlier or later stages of dementia.[35]

A systematic review on palliative care showed that preferences and priorities for care between patients and family caregivers were aligned for pain and symptom management but not for other types of care.[36] Family caregivers tended to favour more active treatments, while patients worried about burdening family caregivers. To optimise the decision-making process, the review advocated for strategies that increase patient and family caregiver understanding of each other's preferences.

[h2] Ethics of bystander and first responder involvement

The ethical complexities surrounding bystander, lay rescuer, and first responder decision-making during OHCA have been extensively examined in international resuscitation guidelines and systematic reviews. This topic has not been reviewed by ILCOR. Equity concerns persist, particularly in lower bystander CPR rates observed in women and socioeconomically disadvantaged individuals. Concerns over physical contact, social norms, and perceived appropriateness contribute to hesitancy in performing CPR, reinforcing implicit biases in emergency response.[37,38] The 2021 ERC Guidelines emphasised structured ethical frameworks that balance public health benefits with respect for individual autonomy in CPR decision-making.[2]

Dispatch-assisted CPR is recognised as an effective mechanism to increase intervention rates, yet ethical concerns exist regarding potential undue influence, particularly when bystanders' express reluctance to intervene.[39] Ethical considerations related to bystander hesitation and willingness to intervene have been widely explored. Fear of causing harm, lack of confidence, and emotional distress in high-pressure situations are consistently reported as key psychological barriers.[40] Cultural and legal contexts further influence bystander decision-making, with CPR being less socially accepted in certain regions or legally ambiguous, reinforcing disparities in interventions.[41] Concerns over physical contact, social norms, and perceived appropriateness contribute to hesitancy in performing CPR, particularly when the victim is female.[38] Moral distress is commonly reported among bystanders who feel obligated to intervene despite personal hesitation, with the psychological burden of resuscitation efforts, particularly in ethically complex cases involving children or family members, contributing to long-term avoidance of future interventions. This distress underscores the importance of reducing moral distress through structured debriefing and

providing mental health resources for both bystanders and first responders to mitigate the long-term psychological impact.[42]

Legal considerations play a crucial role in CPR decision-making. While Good Samaritan laws are designed to protect bystanders, their impact is inconsistent, and uncertainty about these protections remains a deterrent in jurisdictions where legal frameworks are unclear.[43] Scoping reviews emphasise that bystanders are more likely to intervene when legal protections are clearly communicated, underscoring the importance of effective public messaging about liability and protections.[39,44]

First responders, particularly community-based volunteers, face additional ethical challenges. Role ambiguity and lack of institutional recognition contribute to moral distress, particularly when responders are pressured to continue resuscitation despite clear indicators of medical futility.[45] The ethical dilemmas surrounding professional recognition, expectations for prolonged intervention, and psychological distress underscore the need for structured support mechanisms for first responders. The recommendations emphasise ethical transparency in bystander intervention, ensuring individuals are not coerced into performing CPR but are supported in ethical decision-making.[39] Legal and ethical clarity in public messaging, alongside cultural and gender-sensitive CPR training, is necessary to promote equitable resuscitation and ensure ethical consistency in prehospital emergency care.[38] Based on expert consensus, the ethics writing group recommends that safeguards should be implemented within bystander alert systems to protect patient autonomy and prevent unnecessary or inappropriate resuscitation attempts, provided that the autonomy of bystanders in their decision to intervene is also respected.[2] Addressing these challenges is essential to fostering informed, confident, and ethically guided decision-making.

[h2] Family presence

The sudden death of a person is a distressing event that can have a long-lasting impact on the biopsychosocial health of those close to the victim. The suddenness of the event increases the risk of complicated grief and post-traumatic stress disorder symptoms, especially for parents losing a child.[46,47] Allowing relatives to be present during resuscitation efforts can help alleviate these effects but is only a small part of a much-needed bereavement counselling strategy.

The concept of allowing relatives to be present during a resuscitation attempt has received significant attention in recent years. Following the literature search for the 2021 ERC Guidelines,[2] two ILCOR systematic reviews and one Cochrane review were published.[46,48,49] Current guidance further integrate findings from by two umbrella reviews[50,51] 11 additional reviews[52-62] two simulation randomised controlled trials (RCTs) [63,64] and 32 recent observational studies, most of which were survey-based. [65-96] Eleven

additional papers provided relevant background information, despite being outside the primary search criteria.[47,97-106]

Regardless of religious, cultural, or educational background, most patients and family members support the idea of family presence during resuscitation, even if they acknowledge potential risks. Many resuscitation experts and scientific societies strongly advocate for family presence during resuscitation based on ethical arguments, as part of a patient-centred healthcare paradigm shift. The evidence indicates no clear negative impact on patient resuscitation outcomes and suggests potential improvements in biopsychosocial outcomes of family members. However, concerns primarily revolve around healthcare professionals' well-being and the resuscitation team's performance.

As noticeable gap exists between expert advice in favour of family presence during resuscitation and actual daily practice in most hospitals worldwide, even when official policies are in place.[2] The implementation of family presence during resuscitation is frequently hampered by medicolegal or safety concerns, fear of miscommunication, behavioural disturbances and complaints, a lack of resources or space in the resuscitation room, and most importantly, fear of patient harm due to impaired team performance and skewed clinical decision-making in the presence of relatives.

A significant worry is the role of the family member present as surrogate decision maker. Family members present during resuscitation may experience intense emotional distress, potentially impairing their ability to represent the patient’s end-of-life preferences accurately. It is therefore crucial to emphasise that the withdrawal of life-sustaining treatments is a medical team's decision, based on assessing the individual patient's values and preferences and balancing the benefits and harms. Clear and unequivocal informed consent should be reached with the present relatives.

Effective implementation of family presence during resuscitation requires assigning specifically trained team member to support family members during resuscitation,[46,62] to address the emotional, physical, and informational needs of relatives. Their role includes assessing the suitability of these relatives for safe observation, providing clear and appropriate explanations, responding to their questions, and offering comfort measures without giving false hope. Adequate training, which includes theoretical knowledge, communication skills training, and performance training through simulations, is essential to successfully fulfil this role.[69,99]

[h2] Termination of resuscitation (TOR)

TOR is an ethical decision considering patient interests and values, including considerations of harm outweighing potential benefits, safety for the healthcare professionals, and medical futility.[2]

Disagreements regarding TOR are frequent during resuscitation,[107] and resuscitation attempts can affect healthcare professionals psychologically.[108] Therefore, TOR should be a team decision where the ongoing resuscitation effort should be summarised and all team members should be able to weigh in prior to termination. A 'hot debriefing' immediately after resuscitation attempts should be sought to identify providers in need of emotional support and address ethical concerns.[108]

Various methods have been proposed to determine medical futility, including TOR rules,[109,110] different physiologic markers,[111-113] and several other unvalidated factors that healthcare professionals sometimes use.[114] The use of physiologic markers and TOR rules should be weighed in terms of potential benefits and harms. No single factor can accurately predict futility in cardiac arrest patients including TOR rules. [2,109-112] However, physicians are also unable to predict survival outcomes [115] and there is a large heterogeneity between physicians in terms of TOR practices,[116] reports of unvalidated factors used in decision-making,[9] and possibly premature TOR by clinicians in some cases.[117] Thus, TOR rules and physiologic markers may be serve as aids to support clinicians and ensure that all patients get a fair chance prior to TOR.

An ILCOR review on TOR rules for IHCA identified no sufficiently reliable TOR rule for IHCA which resulted in a strong recommendation against the use of TOR rules for IHCA.[110] In contrast, for OHCA, ILCOR identified numerous TOR rules derived from historical cohort studies of which several performed well - although none perfectly - in avoiding TOR of patients who could survive.[109,118] Accordingly, ILCOR made a conditional recommendation for the use of TOR rules in adult OHCA.[109,118]

Notably, different TOR rules have variable performance across different cohorts and decreasing performance with improving survival rates and therefore they should be validated locally prior to being used.[109,119] A major limitation of some TOR rules is the challenge of applying them prospectively. Many rely on factors such as absence of shock delivery and lack of prehospital return of spontaneous circulation (ROSC), which perform well in retrospective analyses but are dependent on the duration of prehospital CPR—making them difficult to apply in real-time decision-making.[120]

Moreover, it should be noted that in places where TOR rules have been applied, patients have often been transported in spite of the TOR rule recommending to stop[121] and some of these patients may survive, particularly patients with PEA, shorter transport time, and younger age, in spite of a TOR rule suggesting futility.[122]

Recent studies have evaluated existing TOR rules for paediatric patients as well as deriving new TOR rules for paediatric patients.[123-127] Overall, performance varied and ILCOR found that the evidence seems yet insufficient to recommend application of any TOR rule in paediatric patients. To be consistent with previous guidelines, we nevertheless suggest that the ERC rule of 20 minutes of asystole in spite of

advanced life support and no reversible causes to correct may be considered for termination across all age groups.

End-tidal CO_2 ($ETCO_2$) may correlate with CPR quality and survival outcomes during adult CPR.[111] Various cut-offs, durations, and trends for $ETCO_2$ and medical futility have been proposed.[111,128,129] Single measurements of $ETCO_2$ are likely an insufficient marker of mortality in both adults and children,[128,130] but persistently low $ETCO_2$ measurements over at least 20 minutes is a marker of very low chance of survival in adult cardiac arrest.[111,129] The ILCOR review identified that an $ETCO_2$ <10 mmHg after 20 min of CPR is associated with a 0.5% likelihood of ROSC for adult cardiac arrest.[111]

Reviews by ILCOR and others on cardiac standstill during CPR found that cardiac standstill is a snapshot of the heart being associated with worse survival outcomes but remains a poor predictor of no chance of survival.[112,131] The studies used various timings of ultrasound with various definitions of wall motion.[112] Furthermore, the interrater reliability for identifying cardiac standstill is poor.[132]

Other non-validated factors have been considered to determine futility during CPR, e.g. neuron specific enolase measurements, regional cerebral oxygen saturation, pupillometry, blood gas measurements, patient age, and certain comorbidities.[113,114,133] Because there is insufficient evidence for the ability of these factors to predict survival, they should not be used for TOR.

[h2] Uncontrolled organ donation after circulatory death

Despite a general societal acceptance of organ donation as a concept, provided it is conducted in a trustworthy manner, there remains a significant shortage of donor organs. The reasons for that are varied and complex.[134]

ILCOR has published a scientific statement on organ donation, recommending that all health systems should develop, implement, and evaluate protocols designed to optimise organ donation opportunities for patients who have an OHCA and failed attempts at resuscitation.[135] The primary aim of resuscitation is to benefit the individual victim. However, there may be value in prolonging resuscitation to allow for organ perfusion and subsequent organ donation. Organ donation following sudden cardiac arrest –provided short no-flow times and adequate CPR – will significantly increase the number of available organs and thus improve outcomes for patients currently on the transplant waiting list. Despite an elevated risk of primary non-function of the transplanted organs, outcomes of uncontrolled organ donation after circulatory death have proven to be acceptable. Importantly, while withdrawing resuscitation prehospitally may appear ethically justified for various reasons, this practice may keep deceased patients from becoming organ

476 donors. Although the actual organ donation process cannot be initiated prehospitally, the resuscitation
477 team is responsible for allow it to happen subsequently.

478 Since conducting the literature search for the 2021 ERC Guidelines,[2] we have identified three additional
479 narrative reviews[134,136,137], an ILCOR scientific statement [135], and three observational studies.[138-140] To
480 further inform current guideline, we also considered 17 background papers -not strictly on topic or other
481 publication type - that offered valuable supplementary information and insights.[141-157]

482 This guideline focuses specifically on uncontrolled organ donation after circulatory death Maastricht
483 category II (unsuccessful CPR: witnessed OHCA with unsuccessful CPR),[158] acknowledging that there are
484 obviously other pathways to organ donation, each with their own, sometimes overlapping, procedural and
485 ethical issues.

486 Various strategies such as communication programs or 'opt out' legislation have been implemented in
487 different countries to expand the pool of potential deceased donors. However, uncontrolled organ
488 donation after circulatory death is a recent approach and is not permitted in all jurisdictions. Even where
489 permitted, uptake remain low due to sociocultural, religious, logistical, and legal barriers. Many
490 misconceptions and concerns persist among both public and healthcare professionals. Enhanced
491 education and transparent communication about uncontrolled organ donation after circulatory death may
492 help address these changes.

493 One ethical concern is that clinical may be perceived as prioritising organ retrieval over patient
494 resuscitation. To prevent such perception, the resuscitation team should be distinct from the team
495 responsible for decisions regarding uncontrolled organ donation after circulatory death. At every stage,
496 regardless of a country's opt-in or opt-out policy, families must retain the freedom to make fully informed
497 and independent decisions. Importantly, healthcare professionals should always approach the family of a
498 potential donor. While many families may decline uncontrolled organ donation after circulatory death,
499 failing to engage families removes their opportunity to make an autonomous decision and potential
500 benefits from the experience of honouring the patient's wish or finding meaning in the loss. The timing of
501 this conversations is crucial, as premature discussions may cause distress.

502 A second concern involves the concept of death. For non-living donations, the donor must be legally and
503 ethically dead – a principle known as the 'dead donor rule'. With the advent of intensive care medicine,
504 death has been defined as the irreversible cessation of brain functions, although this definition can yield
505 false positives and negatives. Given the potential benefit for both organ recipients and the donor's family,
506 and considering ethical principles such as justice, equity and autonomy (beyond the traditional
507 beneficence-nonmaleficence framework), several countries have moved to permit donation after

circulatory determination of death. After a specific period of circulatory arrest (which varies by country), death is considered permanent and thereby meets the medical, ethical, and legal criteria for declaring death. If no further resuscitative measures are undertaken – aligned with the known values and preferences of the patient and their family - 'permanent' is ethically equivalent with 'irreversible.' Once death is declared, resuscitation may be restarted to preserve organ viability, a practice that remains ethically debated.

Restarting resuscitation after death can raise additional concerns, including physical trauma to the body (which may distress the family), theoretical risk of regained consciousness due to resumed brain perfusion, or confusion and renewed grief when observable signs such as a heartbeat return. These issues are further complicated by the increasing use of extracorporeal CPR and post-mortem organ perfusion.

Importantly, if it is clear that the deceased would have wished to donate their organs, and this is supported by their family, then Kantian objections – such as the claim that individuals should not be used merely as a means to an end—are not applicable. In that context, the donation also serves the interest if the deceased and their family.[136] At this stage, the clinical team should make every reasonable effort to facilitate the donation. Families should be informed in advance that organ procurement may not succeed, and the entire process should be explained transparently, including any steps of the process that may improve the likelihood of a successful uncontrolled organ donation after circulatory death outcome.

[h2] Ethics of education and systems

Ethical preparedness in resuscitation is essential to ensure that healthcare professionals can navigate complex decisions related to advance care planning, DNACPR, TOR, and shared decision-making with clarity and consistency. However, current evidence reveals significant gaps in ethical education and institutional policies, resulting in variability in decision-making and increased moral distress among professionals.[159-161]

The 2021 ERC Guidelines highlight the importance of embedding structured ethical reasoning within resuscitation education to equip providers to apply ethical principles in high-pressure scenarios.[2] Institutional structures and legal frameworks exert a strong influence on ethical decision-making in resuscitation. However, the absence of standardised policies contributes to uncertainty, reinforcing the need for ethical reasoning to be systematically integrated into resuscitation curricula.[118] Systematic reviews and observational studies indicate that structured ethical training enhances ethical decision-making and reduces variability in practices.[104,161,162] RCTs showed that healthcare professionals who received formal ethical education report greater confidence in decision-making, better alignment with patient values, and reduced moral distress in ethically challenging situations.[104]

Ethical reasoning is not an inherent skill, it requires structured learning and experiential practice to ensure consistent application in resuscitation settings. [104,161,162] Simulation-based training has proven effective in providing controlled exposure to ethical dilemmas, enabling providers to refine their approach before facing real-world encounters.[161] Evidence suggests that simulation improves the ability to handle DNACPR discussions and TOR decisions, decreasing hesitancy and promoting ethically sound interventions.[162] Additionally, embedding standardised frameworks into resuscitation curricula enhances clarity during advance care planning conversations and ensure greater consistency in end-of-life decision-making.[159]

Ethical challenges extend beyond individual education into broader institutional policy domains. Variability in advance care planning, DNACPR, and TOR policies contributes to ethical ambiguity and inconsistencies in resuscitation practices.[159,160,163] In the absence of clear, enforceable ethical guidelines, resuscitation decision-making is often influenced by subjective judgment rather than established ethical principles. [159,160,163] Observational studies highlight that institutional inconsistencies in advance care planning and DNACPR protocols generate uncertainty and leave providers without a standardised framework for addressing ethically complex cases.[160] This inconsistency increases moral distress and undermines patient-centred care.[163]

System-wide ethical oversight and standardised policies are essential to ensure ethical consistent DNACPR and TOR decision-making.[159-161] Moreover, disparities in access to structured ethics training further affect ethical preparedness. Evidence indicates substantial variation in the availability of training across healthcare settings.[104,161,164] Universal access to ethics education and harmonising institutional policies is critical to ensure fairness and transparency in resuscitation care.[159,161,164]

Training in the ethics of resuscitation must be both standardised and adaptable to diverse healthcare contexts, enabling all providers to make ethically sound decisions regardless of institutional or systemic constraints.[161] These recommendations support the 2021 ERC Guidelines, which advocate for the integration of ethical decision-making as core component of resuscitation education and system policies, rather than treating it as an optional or secondary consideration.[2] Ethical preparedness training, institutional standardisation, and equitable access to ethical education are fundamental to reducing uncertainty, enhancing provider confidence, and aligning resuscitation practices with patient rights and ethical best practices.

Table 5. Structured approach to ethical training in resuscitation: key components and methods.

What to train	Definition	Distinctive focus or contribution	Examples for how to train

Ethics training (foundational knowledge & application)[165]	Provides baseline knowledge of ethical principles in resuscitation, including advance care planning, shared decision-making, do-not-attempt cardiopulmonary resuscitation, and termination of resuscitation	Focuses on teaching core ethical concepts and frameworks so providers understand ethical principles before applying them in clinical settings	Lectures & online modules covering ethical frameworks in resuscitation, case-based discussions exploring advance care planning, shared decision-making, do-not-attempt cardiopulmonary resuscitation, and termination of resuscitation scenarios
Ethical reasoning (critical thinking & judgment in ethical dilemmas)[166]	Strengthens decision-making skills by helping providers analyse ethically complex resuscitation cases and apply ethical reasoning to align with patient values, medical best practices, and societal considerations while professionals can reflect on their own values and motives.	Goes beyond ethical training by focusing on critical thinking and problem-solving when making ethical resuscitation decisions and focuses on healthcare professionals' own values and motives that may affect decision-making.	Ethical dilemma discussions (e.g., weighing patient autonomy vs. medical futility in termination of resuscitation cases) Role-play scenarios on leading shared decision-making conversations with families in emergency settings
Ethical preparedness (resilience, coping with moral distress & systemic challenges)[167]	Develops strategies to manage moral distress, ethical dilemmas, and institutional constraints that affect	Unlike ethics training and reasoning, this focuses on managing ethical stress and systemic barriers that impact decision-	Simulation-based training: high-pressure resuscitation scenarios where providers must make real-time ethical decisions under

	ethically sound resuscitation decision-making in high-pressure situations	making (e.g., legal uncertainties, policy constraints)	institutional constraints Workshops on managing moral distress and ethical conflicts in termination of resuscitation cases Ethical rounds
Institutional & policy training (standardising ethical decision-making across healthcare settings)[168]	Ensures healthcare professionals understand and navigate institutional policies, legal constraints, and ethical frameworks related to advance care planning, do-not-attempt cardiopulmonary resuscitation, termination of resuscitation, and shared decision-making	Focuses on system-level understanding of ethical policies, ensuring consistency in how ethics is applied across different healthcare settings	Policy training workshops on institutional do-not-attempt cardiopulmonary resuscitation and termination of resuscitation policies Case reviews of real-world resuscitation policies in emergency medical services, intensive care units, and emergency departments

[h2] Cardiac arrest as a result of a suicide attempt

Cardiac arrest resulting from a suicide attempt present an ethical conundrum, challenging the boundaries of autonomy and the concept of having mental capacity. The duties and principles that typically guide clinicians in their role as caregivers may become more complex in cases of attempted suicide, where the patient autonomy may conflict with the principle of beneficence. Perspectives among healthcare professionals and society vary widely and are often influenced by the legal, religious and sociocultural context in which care is provided.

Only two recent observational studies have added to the evidence base summarised in the 2021 ERC Guidelines.[2,169,170] Another six publications were reviewed that discuss ethical reflections and philosophical issues in suicide.[171-178] We strictly focused on the withholding or withdrawal of life-sustaining treatment in the context of sudden cardiac arrest due to suicide, explicitly excluding physician-assisted suicide and euthanasia.

In cardiac arrest after attempted suicide, healthcare professionals' beliefs about the moral permissibility of honouring refusals of life-sustaining treatment are central.[169,172] These beliefs are shaped by their assessment of the patient's decision-making capacity - regardless of motive – but are not neutral; they are influenced by personal values, preferences, and perceptions of the treatment's worth.

The ERC recommends that advance directives should be honoured, those made in the context of suicide require additional scrutiny. If a suicide attempt is understood as a clear expression of the patient's wish not to receive resuscitation—and if the patient possesses medical decision-making capacity and autonomy at the time—then, from a patient-centred perspective, such a wish should be respected. However, many argue that suicidal ideation is often transient and closely associated with mental disorders that may impair decision-making capacity. In these circumstances, the principle of beneficence—protecting individuals suffering from potentially treatable conditions—may take precedence over autonomy to prevent harm from impulsive actions. This may apply even if the suicide attempt is supported by an advance directive, which may or may not have been created when the patient was fully mentally capable. Until the context and background of any possible advance directive is known, it is therefore advisable to start or continue resuscitation in this situation.

A further ethical dilemma arises when we consider that withdrawal of life-sustaining therapy is often viewed as acceptable—or even advisable—in cases of severe physical suffering or poor quality of life, where the burden of treatment clearly outweighs its potential benefit. It is then questionable what the position should be when the source of suffering is mental illness. Some authors argue that most psychiatric illnesses can be managed and quality of life improved, why it is very difficult to predict terminal outcomes and justify withdrawal of life-sustaining therapy.[171,172] However, expert opinion remains divided. For some individuals, existing treatments may be ineffective, leading to a persistently unacceptable quality of life.[172]

Decisions about withholding or withdrawing life-sustaining treatment are typically made by the treating team in collaboration with surrogate decision-makers. Yet, in the context of attempted suicide, surrogates may be particularly influenced by their own experiences and values.[172] They might have suffered significant emotional distress from previous suicide attempts, substance use, or prolonged mental or physical illness of their relative. As a result, they may feel resentment or a pessimistic view of the patient's potential for

recovery. Conversely, others may respond to stigma surrounding suicide by insisting on prolonged life-support, even when this may conflict with patient's known or presumed wishes.

[h2] Ethical considerations in low resource settings

Ethical decision-making in resuscitation within low-resource settings may differ from that in high-resource settings due to scarce resources, different health care priorities, and different psychological, sociocultural, and religious considerations on resuscitation and end-of-life care.[179] Limited resources in any context should be allocation should be non-discriminatory, ethical, considering equity and with maximal efficiency.

Ethical considerations for resuscitation in low-resource settings have been addressed in ILCOR statements and consensus-based reviews, which highlight challenges related to inconsistent policies, limited resources, and the absence of structured frameworks for advance care planning , shared decision-making, DNACPR orders, and TOR criteria.[38,118,179,180] The 2021 ERC Guidelines highlight variability in legal frameworks, ethical complexities, and disparities in the application of DNACPR and TOR across different healthcare settings.[2]

Use of advance care planning and DNACPR may be considered of particular importance in low resource settings to enable fair allocation of resources.[181] However, there are multiple barriers and facilitators to proper implementation of DNACPR discussions. Barriers may include sociocultural norms, lack of legal clarity, organisational policies, societal and family views, religious and ethical beliefs, and diverging views among healthcare professionals.[181] Moreover, patient preferences are often undocumented, unacknowledged, or overridden in DNACPR discussions, resulting in clinician-driven DNACPR decisions made without formal input from patients or their families. [8,12,180,182,183] In contrast, education in DNACPR and clear legislation including local protocols may be important facilitators for efficient implementation.[181]

In some countries, a very large proportion of patients with OHCA may be transported to hospitals in spite of many cases being considered futile, potentially leading to large healthcare expenditures.[121,184] In such cases, TOR rules may be a cost-effective solution to reduce the number of transports to hospitals with ongoing resuscitation where the chance of survival is extremely low.[121,185,186] This may be an important consideration for low-resource settings as ethical challenges may arise during prolonged resuscitation attempts when survival is unlikely but resuscitative efforts persist due to systemic pressures or societal expectations.[187,188] Evidence from prehospital emergency medical services (EMS) systems in low-resource settings indicates that workforce shortages, limited equipment and medications, and a lack of consistent ethical guidance contribute to significant variability in how resuscitation decisions are made.[121,184]. [183,189,190]

When considering patient prognosis during resuscitation as part of the TOR decision, the options for treating the reversible causes are important. Limitations to e.g. medication or access to cardiac laboratory or extracorporeal life support may change what is perceived reversible causes in the situation. Thus, the situation (incl. location), the available resources, and the safety of the providers should always be considered as part of the holistic, team-based process of TOR.

[h2] Resuscitation research ethics

The current guidelines are supported by evidence from five systematic reviews, five scoping reviews, 23 narrative reviews, one randomised controlled trial and 33 observational, descriptive or survey studies. These were identified through systematic searches corresponding to eight population-concept-context frameworks. The recommendations are further supported by a 2018 ILCOR advisory statement on core cardiac arrest outcome,[191] as well as additional published evidence sourced from the reference lists of the 2021 ERC Guidelines.[2]

In addition to this main text, a more detailed and structured presentation of the evidence underpinning the research ethics guidelines is provided in the accompanying Supplement A.

[h3] The critical balance between patient/family autonomy and emergency research

In cardiac arrest research, immediate treatment is essential, leaving no opportunity to obtain valid informed consent at the time of enrolment.[192,193] According to the Helsinki Declaration, low-risk RCTs or studies evaluating resuscitation interventions may proceed without prior informed consent, provided that consent is sought afterwards from the patient or their legally representative or decision-maker.[2,192,194] This approach is consistent with the deferred consent model.[192,195,196] Deferred consent is widely regarded as an acceptable safeguard of patient and family autonomy until the emergency research participant regains decisional capacity.[192] This consent model is endorsed by international ethics guidelines and reflected in Article 35 of the currently EU Clinical Trials Regulation No. 536/2014.[194,197,198] This regulation supports and harmonises low-risk, multicentre and multinational emergency research that has the potential to provide clinical benefit.[2,192]

Patient and public involvement in research is increasingly used and can be considered in all phases, including the design, delivery, and dissemination[199,200] while variations remain in its implementation across countries and medical fields.[201] Researchers should define clear and collaborative roles for patient and public advisors and provide adequate support. Patient and public involvement in research is considered important as it can enhance the focus on patient-relevant outcomes and the acceptability of research for all.[202] Additionally, including patients and the public fosters equality between researchers and patients,

allowing them to engage in research that is meaningful to them.[202] Moreover, patient and public involvement may improve the quality of other research aspects, including enrolment, funding acquisition, study design, implementation, and dissemination. [203]

Methodologically robust development of core outcome sets may enhance the clinical and societal value of future RCTs by enabling harmonised and consistent reporting of patient outcomes.[191,204] Core outcome sets may include in-hospital survival, functional outcome at 30 days or discharge and health-related quality of life at 90 days or at intervals up to 1 year.[191]

The inclusion of core patient-centred outcome sets in large registries - such as the European Registry of Cardiac Arrest,[205,206] the Cardiac Arrest Registry to Enhance Survival,[207,208] and Get With The Guidelines®[206,209] may (1) facilitate identification of relevant predictor variables and assess the relative effectiveness of different treatments used in clinical practice; and (2) provide insights into the impact of evidence-based guideline implementation on key outcomes.[2]
In the context of big data observational research,[2,210,211] a panel of 29 European experts in cardiac arrest research, medical ethics, and health law recently recommended that deferred consent should be the preferred model, with data placed on hold until the patient regains decisional capacity.[212] A broad consent model was also considered ethically acceptable,[213 213] though requiring specific consent for each study was seen as potentially burdensome.[212] Ethical oversight of data, harmonisation of governance requirements across Europe, and the development of a code of conduct created by interdisciplinary experts in collaboration with patient representatives were also recommended.[212]

[h3] Artificial intelligence and emergency research

Current and emerging applications of artificial intelligence (AI) in emergency and resuscitation care are summarised in Supplement A. With AI performance expected to continue improving and its integration into resuscitation practice expanding,[214] several important ethical concerns arise. These include:

(1) Beneficence vs privacy and autonomy – while AI-driven pre-emptive advice, warnings, or interventions may offer life-saving potential, they must be balanced against possible infringements on patients' personal or mental privacy and their right to self-determination. Such interventions could become paternalistic, potentially compromising the integrity of an individual's personal life;[214]

(2) Justice – disparities in access to advanced healthcare technologies may widen based on socioeconomic status, particularly in resource-limited settings. Moreover, AI algorithms trained on population- or group-specific datasets may be ineffective—or even harmful—when applied to populations with different characteristics, especially if those groups lack the capacity to generate representative datasets.[215]

To address these concerns, EU Regulation 2024/168921 has been introduced with the following aims:

(1) to classify and manage AI risk and impact levels;[214]

(2) to prohibit misuse of AI, such as unauthorised use of facial images or exploitation of individual vulnerabilities; [214]

(3) to promote responsible AI use by requiring scientific safeguards, transparency, and ethical precautions;[214]

(4) to support innovation and ensure the free movement of AI-based goods and services across EU member states.[216]

Despite these regulatory efforts, there remains a need for a comprehensive ethical and scientific framework, concurrently addressing ethical concerns and ensuring the rigorous evaluation of technological advancements.[214] Achieving this requires ongoing cooperation among technology experts, healthcare professionals, researchers, ethicists, and legal authorities to prevent potential harm to patient autonomy, privacy, or safety.[214]

[h1] Collaborators

The following individuals contributed as collaborators to the 2025 version of this guideline: Professor Ulrik Kihlbom, an academic ethicist, Karolinska Institutet, Stockholm, Sweden and Paul Swindell, Essex, United Kingdom, cardiac arrest survivor and founder of Sudden Cardiac Arrest UK.

[h1] Conflict of interest

Patrick Van De Voorde, Ileana Lulic, Ángel Estella, Spyros D. Mentzelopoulos, and Leo Bossaert declare no conflict of interest. Violetta Raffay serves as a Basic Life Support Task Force member of ILCOR, Jana Djakow serves as the Chair or Czech Resuscitation Council, and Co-Chair Paediatric Life Support Science and Education Committee of the European Resuscitation Council. Koenraad G. Monsieurs declares research grants from the Laerdal Foundation, ZOLL Foundation and CSL Behring. Therese Djarv declares a research grant from the Laerdal Foundation and is an Editor for Resuscitation Plus. Johannes Wittig serves as the Chair of the Young ERC and declares research grant support from the Laerdal Foundation. Kasper G. Lauridsen declares research grants from Aarhus University Research Foundation and Riisfort Fonden and serves as an Education, Implementation and Teams Task Force member of ILCOR and as an associate editor for Resuscitation Plus.

[h1] Figure legends

Figure 1. Top 5 messages relating to the ethics of resuscitation

Legend: To be added along with reference in main text.

Figure 2. Key ethics considerations for resuscitation

Legend: To be added along with reference in main text.

Figure 3. Step-by-step advance care planning for the patient

Legend: To be added along with reference in main text.

[h1] Table legends

Table 1. The major changes in the ERC Guidelines 2025 for Ethics in Resuscitation

Legend: Abbreviations: Do-not-attempt-cardiopulmonary-resuscitation (DNACPR); cardiopulmonary resuscitation (CPR); return of spontaneous circulation (ROSC); termination of resuscitation (TOR)

Table 2. ERC Guidelines 2021 consensus definitions and statements.[2] Adopted and modified by the Writing Group ERC Guidelines 2025 Ethics for Resuscitation

Legend: None.

Table 3. Structured approach to ethical training in resuscitation: key components and methods.

Legend: None.

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[h2] Appendix

[h3] Appendix A.

Resuscitation research ethics

Ethical standards for research have been established by the World Medical Association, the World Health Organization, and the International Committee of Medical Journal Editors. The current section of evidence supporting the guidelines focuses primarily on ethical challenges associated with emergency research. This topic has not been previously addressed by a review of the International Liaison Committee on Resuscitation.

The critical balance between patient/family autonomy and emergency research

High-quality research, including randomized controlled trials (RCTs), is needed to establish causality between emergency resuscitation interventions and critical/patient-centred outcomes.[1,2] Interventions of uncertain efficacy as regards neurological outcome (e.g. adrenaline[3]) are still recommended,[4] whereas previously/recently proposed drug regimens[5,6,7] require urgent further evaluation to address knowledge gaps. [8,9,10]

In cardiac arrest research, immediate treatment is necessary, leaving no time for a valid informed consent.[11,12] According to ethical standards set forth in the Helsinki Declaration, low-risk RCTs/research assessing resuscitation interventions may proceed without pre-enrolment, informed consent, provided it is subsequently sought as soon as possible from the patient or their substitute/surrogate decisionmaker.[11,13,14] This aligns with the deferred consent model, which, however, lacks a legal definition of consent for prior procedures.[11,15,16]

The first successful American-European RCT-level implementation of deferred consent occurred during the Brain Resuscitation Trial II (1984-1989), with a refusal rate of 2.3% (12/531) and a negative reaction rate of 1.1% (6/531).[17] Since then, several large European cardiac arrest RCTs evaluating new drug interventions employed deferred consent with refusal rates of <0.1%.[18,19,20,21] Notably, this occurred despite the concurrent ambiguity regarding the legitimacy of emergency research created by Article 5 of European Union (EU) Clinical Trials Directive 2001/20/EC.[11,22,23,24]

Deferred consent is widely regarded as a sufficient safeguard of family autonomy until the emergency research participant regains decisional capacity.[11] This consent model is endorsed by international ethical guidelines[13,25,26] and has been incorporated into Article 35 of the currently applicable EU Clinical Trials Regulation No. 536/2014.[27] This Regulation harmonizes and fosters potentially beneficial, low-risk,

multicentre and multinational emergency research.[11,14,28] Still-unresolved issues include 1) possible patient exclusion secondary to patient/proxy objection to the use of already collected data,[11,27] though such objections are rare; [5,6,18,19,20,21,29] and 2) regulatory improvements are still needed for emergency surgical research, because of its higher-risk nature;[11,30] generally, the higher the research-related risk, the lower the willingness of patients to participate;[31] and 3) regulatory improvements are still required for non-medicinal interventions, such as device-related research.[11,14]

The alternative, United States exception-to-informed consent (EFIC) model is based on Food and Drug Administration regulation 21 CFR (Code of Federal Regulations) 50.24.[14,32,33,34,35] EFIC application criteria[32] include 1) participants in acute, life-threatening situation with unproven/unsatisfactory treatment; 2) inability to obtain a valid patient/next-of-kin consent;[14] 3) potential of direct research-associated benefit with reasonable related risk; 4) need for scientific testing of the intervention; 5) EFIC criteria deemed fulfilled by an institutional review board (IRB); 6) mandatory, pre-study community consultation an public disclosure; and 7) study oversight by an independent monitoring committee, ensuring participant safety. Systematic review-identified regulatory issues/impediments across 28 published studies using EFIC or waiver-of-consent (for head-to-head RCT comparisons of standards of care[36]) include rigorous pre-study requirements, inconsistent reporting of applicable EFIC criteria, ethical concerns for EFIC justification adequacy, absence of standardized guidelines for describing the EFIC process, and post-enrolment requirements for disclosure of study participation and "no objection" or consent to continued participation.[33,34,37,38,39] Regulatory impediments have significantly reduced the United States emergency research output between 1993 and 2003.[40,41,42] Notably, in a prior major out-of-hospital RCT,[43] consent for continued participation following hospital admission was 3.15 and 7.64 times more likely in patients with shockable rhythms and survivors with good functional outcome, respectively.[39] In-hospital consent decline rates amounted to 10%, but subsequent medical record review for the primary outcome was allowed by 45/46 IRBs (98%).[35,39]

Community-level EFIC concerns may include inability to refuse participation, ambiguity in using community input in study decisions, inadequate disclosure and consultation, racial bias with disproportionate impact on ethnic minorities, and suspicions that hospital and sponsor profits might outweigh patient interests.[44, 45] In preceding/recent survey/observational studies (n=43-1583)[31,46,47,48,49,50] and a recent systematic review of community consultation surveys from 27 EFIC RCTs (n=44248),[51] a variable majority of key stakeholders [i.e. patients, surrogate decisionmakers (including parents), and attending physicians] considered low-risk RCT research without pre-enrolment consent to be acceptable (rate=63-96%), [31,46,47,48,49,50] or approved EFIC in principle (rate=58%);[51] in a focus groups study (n=42), "most" participants also supported low-risk EFIC research.[52] A four-centre RCT (n=473) reported that an

emergency department educational intervention increased patients' willingness to participate in EFIC research by 30%.[53]

Perceived barriers related to pre-study community consultation may include lack of standardized methods/guidelines for conduct and evaluation and researcher familiarity with regulations, concerns about public misconception and possible legal implications of EFIC, variable IRB requirements and logistical/implementation issues (e.g. need for concurrent public disclosure and interactive consultation, difficult budget planning), possible impact of cultural and demographic differences among participating communities, survey sample size and representativeness, and low cost-effectiveness of geographically focused efforts.[54,55,56] Recent studies support using remote consultation and/or integration of social media with targeted emails.[49,57]

Depending on applicable legislation, IRB requirements, public advice, personal experience, societal norms, or even local community culture, researchers may have to inform families of deceased participants about their RCT enrollment.[58] In a recent systematic review of 64 RCTs,[58] active notification of families of deceased study participants (n=28/64, 44%) was associated with concerns about emotional burden and relevant logistical challenges; passive and still resource-intensive notification (n=11/64, 17%) posed risks of relatives' being left uninformed and of uncontrolled disclosure[21] leading to possible inaccuracies/misunderstandings; in 25/64 RCTs (39%), performed mainly in Australasia, no information was provided. As in pre-review period emergency RCTs,[5,6,59,60] active notification was associated with negligible withdrawal rates of participant data (0.0-0.9%).[58]

Methodologically robust derivation of critical outcome sets may improve the clinical and societal benefit of future RCTs with harmonized/homogenous reporting of patient outcomes.[2,61] This derivation may include systematic review of RCT outcome reporting, qualitative research involving cardiac arrest survivors and their family, Delphi study with multiple key stakeholders, professionals and researchers, consensus meeting and anonymous voting, specification of core measurement set informed by appraisal of measurement quality, relevance and feasibility, and identification of core outcome domains such as survival, neurological function, and health-related quality of life, with specific methods and time frames for assessment.[2,14,61] Diverse views of stakeholders can improve planning in research of complex interventions like prehospital critical care for out-of-hospital cardiac arrest (OHCA).[62] In general, mixed methods stakeholder studies can identify key emergency research priorities such as lay responder CPR rates and response time, responder interventions, CPR impact on lay rescuers, determination of key features of high OHCA performing systems, knowledge level of resuscitation in the elderly/frail population, and level of CPR training volunteer rescuers. [63,64,65,66,67]

Incorporation of key/core patient-centred outcome sets[2,61] in large registries such as EuReCa,[68,69] CARES[70,71] and Get With The Guidelines®[69,72] would likely enable the determination of 1) relevant, recorded predictor variables (e.g. comorbidities, bystander CPR and downtimes to defibrillation and drugs);[14] 2) comparison of the effectiveness of different treatments between propensity score matched patient subgroups;[14] and 3) provide insights into the effect of implementation of evidence-based guidelines on these critical outcomes. In addition, established DNA biobanks for genomic cardiac arrest research may contribute to genetic risk factor determination and population/individual risk stratification, prevention strategies and treatment plans tailored to an individual's genetic profile (e.g. pre-symptomatic lifestyle modification, medical treatment, and/or defibrillator implantation), and development of new therapeutic targets and treatments.[73]

Donating health-related and/or genetic data for research raises ethical and legal issues, including potentially non-existent patient awareness/decision-making capacity, relative appropriateness of consent models in balancing autonomy with high-quality research, personal data protection, risk of genetic discrimination, and the moral obligation to disclose high-risk genetic findings to individuals who might not want to know their results.[14,73,74]

Scientific processing of personal data is regulated by safeguards (i.e. safe data storage and encryption, access logging, maintenance of processing activity records by data controllers, requirement for prompt data breach notification etc.) mandated by the EU General Data Protection Regulation (GDPR) 2016/679.[14,73,75] GDPR compliance of research institutions is monitored by designated data protection officers.[14,73,75] GDPR does not apply to anonymous data or data from deceased individuals.[14,75] However, as previously documented,[11] a strict requirement for prospective (or precollection) informed consent would still exclude most of the successfully resuscitated cardiac arrest patients, thereby effectively blocking unbiased observational research.[14,75] Therefore, GDPR 2016/679 consent requirements should be interpreted within the context of Article 35 of EU Regulation No. 536/2014.[14,75] Accordingly, a recently convened panel of 29 European experts in cardiac arrest research, medical ethics, and health law suggested that deferred consent is preferred, with data placed on hold until the patient regains decisional capacity.[76] An alternative broad consent model was deemed acceptable, but specific consent for each sub study might prove unreasonably burdensome.[76] Ethical oversight of data, harmonization of governance requirements across Europe, and development of a code of conduct by interdisciplinary groups and patient representatives were also recommended.[76]

Justice and respect for dignity in emergency research

Justice and human dignity are central to European medical ethics, ensuring fair treatment and respect for individuals in medical practices.[77]

Justice involves fair allocation, rationing, and setting of priorities in healthcare. After emergency research is completed, systems should ensure that all patients, including those who bore research burden and risks, have equal access to subsequently validated and potentially beneficial treatments.[11,14,78] For example, the survival benefit of bystander CPR in OHCA is well established by preceding research.[79,80] However, a recent systematic review of 19 studies performed in high-income countries (i.e. United States, Australia, Japan, South Korea and 7 EU countries) reported that socioeconomically deprived subpopulations (e.g. African American in Miami, Florida and Latino in Denver, Colorado), perceived financial cost barriers to CPR training, leading to lower confidence and likelihood to perform bystander CPR.[79] Other barriers included safety risks, fear of legal consequences, lack of community cohesion, and cultural issues.[79]

Inclusion in versus exclusion from emergency research (e.g. due to consent decline) should not result in preferentially increased intensity of care for research participants.[14,78] Regarding patients with poor prognosis, decisions for time-limited trials of life-sustaining treatments[81] should not be associated with any concurrent requirement for data collection in the context of research.[14,78]

Both intrinsic dignity (self-esteem, autonomy, hope)[82] and extrinsic dignity (respect, meeting needs, privacy)[82] of research participants should be upheld.[14,78] Research conduct should not hinder dignity-centred care in the context of a holistic approach to post-cardiac arrest care.[14,78,82]

Scientific and ethical integrity of research conduct and reporting of results

As previously detailed,[14,78] measures aimed at addressing major issues like flawed study design, selective reporting, and scientific misconduct[83] include pre-enrolment registration of RCT protocols,[84] reporting any changes during the trial, and posting main results within 12 months of study completion.[85] Failure to report RCT results risks dissemination bias.[13,85,86,87] This may distort the understanding of scientific achievements, disrupt resource allocation for research and health interventions, create indirect costs due to payment for suboptimal or harmful treatments, and distort regulatory and public health decision-making.[85,86,87]

On manuscript submission, authors must disclose the sponsor's role and their contributions.[14,85] This promotes transparency regarding sponsor's role and may mitigate issues such as "ghost writing", and "guest" or "gift" authorship.[14,78,85] In addition, nonauthor contributors or collaborators not fulfilling authorship criteria should be listed in an appendix, with their role clearly stated.[88,89]

Research transparency and addressing of knowledge gaps through individual patient data meta-analyses[10,90] are major benefits of RCT data sharing.[14,91,92] Detailed data sharing plans are required for RCTs

with enrolment initiation after January 1, 2019. A pertinent systematic review of 65 studies referred to multiple benefits including assessment reproducibility of results, cost-efficiency and acceleration of discovery, but also identified multiple barriers classified as technical, motivational, economic, political, legal and ethical.[93] The United States Office for Human Research Protections supports data sharing without separate consent from RCT participants.[92] In the EU, significant barriers still exist secondary to variation in national legislation and GDPR, lack of incentives for researchers, concerns about commercial use/commodification, and trust issues.[73] The recently launched "Towards the European Health Data Space (EHDS) 2" program aims to produce guidelines and technical specifications for a harmonized implementation of the EHDS regulation.[94] This project may also facilitate registry and DNA biobank data sharing.[73,74]

As previously detailed,[14,78] there is substantial need for increase in the funding of non-commercial academic resuscitation research aimed at addressing major knowledge gaps concerning the patient-centred efficacy of standard[3] or potentially beneficial interventions.[5,6,7, 8,9,10]

Funding of non-commercial RCTs is associated with numerous barriers, including intense competition,[95] complex funding arrangements (e.g. grant agreements and contracts) and requirements for legal, administrative and management skills.[96]

Emergency research - lessons from the coronavirus disease (COVID)-19 pandemic

As previously foreseen,[14] the COVID-19 pandemic caused widespread clinical research disruption, with delays and/or deferral of non-COVID RCTs,[97,98] especially during periods of acute case surges and healthcare system/intensive care unit (ICU) capacity strain.[99] Barriers to interventional cardiac arrest research included 1) deficient/scarce resources (i.e. personnel, equipment and funding) due to diversion to the prioritized pandemic research and response;[98] 2) regulatory challenges as IRBs prioritized consideration of COVID-19 studies;[98] 3) risks of disease transmission during CPR/life-sustaining interventions and patient follow-up visits, with consequent protocol deviations and potentially compromised data quality and reliability;[98,100] 4) restricted visitation policies,[101,102] likely hindering effective researcher-family communication and obtainment of post-enrolment consent for continued study participation; and 5) pandemic-induced changes in resuscitation strategies,[103] end-of-life decision-making[14,104,105] and ICU outcomes,[106,107] potentially modifying the effect of tested interventions and complicating the interpretation of emergency RCT results on patient outcomes.[108]

Despite the seemingly unsurmountable pandemic barriers, there are examples of RCTs with pre-pandemic start and uneventful continuation and completion within 14 months after pandemic's onset.[109] This might reflect healthcare system resilience based upon prompt achievement of 75% vaccination rate, shift to

telecommunication,[14] virtual care and enhanced response capacity through real-time adverse event tracking, accurate forecasting of healthcare demands by using predictive models, and monitoring public behaviour and trust to authorities.[110]

Regarding cardiac disease registry-based research, a recent scoping review of 52 studies (n=18-12226) reported effective and rapid dissemination (mean time from end of data collection to publication: 2.8-13.6 months) of epidemiological, clinical course and outcome data of patients with COVID-19 and cardiovascular complications, including cardiac arrest.[111] Pertinent filling of knowledge gaps was deemed as cost-effective and non-disruptive to health services. Furthermore, the review highlighted the need for flexible, modifiable research platforms, enabling international collaboration and rapid dissemination during pandemics.[111]

The overwhelming demand for prompt dissemination of "promising" results on COVID-19 treatment, especially at the beginning of the pandemic, led to initial publication and later-on retraction of articles of highly questionable quality and reliability.[112,113,114] From January 1, 2020 to December 31, 2022, 223480 articles (RCTs, n=3727) concerning COVID-19 were published in scientific journals indexed in SCOPUS.[115] Currently, there are 507 retractions of COVID-19 papers listed in the "retraction watch database" (https://retractionwatch.com/retracted-coronavirus-covid-19-papers/), implying a retraction rate of < 0.3%.

Artificial intelligence and emergency research

A systematic review of 39 medical-context and 36 technical-context studies reported good machine learning performances in predicting cardiac arrest, including mean areas under the receiver operating characteristic curve (AUROC) of 75.44-88.25, sensitivity of 73.41-85.02%, specificity of 65.10-88.93 % and accuracy of 84.00-94.00%.[116] Forty eight % of studies predicted cardiac arrest within a specific time interval prior to its occurrence.[116] In a scoping review of 47 studies, 81% used machine learning models to predict cardiac arrest, with neural networks being the most commonly employed algorithm (48%). K-fold cross-validation was the most common validation method (51%), whereas 49% of studies used data sets with less than 1000 samples.[117]

Three narrative reviews[118,119,120] report integration of artificial intelligence (AI) in several new technologies aimed at prompt recognition of and response to OHCA. Examples include 1] real-time support to Emergency Medical Service (EMS) dispatchers by estimating OHCA probability from patterns of words spoken during emergency calls;[121,122] 2) real-time video analysis from surveillance cameras can trigger alerts for rapid EMS activation;[123] 3) smartphones and smart speakers detecting pre-arrest agonal breathing;[124] 4) development of condition-specific AI models (e.g. coronary artery disease,

cardiomyopathies, long QT and Brugada syndrome) for prediction of ventricular arrhythmias and cardiac arrest;[125,126,127] and 5) automated classification of electrocardiographic rhythms during resuscitation and determination of timepoint of return of spontaneous circulation (ROSC).[128,129,130] Furthermore, a recent review focused on future AI-related advancements described upcoming technologies such as 1) ambient vital signs monitoring using radio waves, wearable devices, and smart speakers within the next 2-5 years (early recognition/EMS activation); 2) robotic CPR and wearable AEDs within the next 2-10 years (Early CPR and defibrillation); and 3) brain-computer interfaces within the next 2-10 years (post-resuscitation care).[131]

Key messages from 2 scoping reviews of 54 and 59 studies[132,133] (with data from > 1.8 million patients) include that AI can 1) predict both OHCA and in-hospital cardiac arrest, life-threatening arrhythmias, and post-cardiac arrest outcomes; 2) enhance decision-making for EMS personnel by prompt/real-time data analysis and prediction of CPR and long-term outcomes; and 3) enhance the dispatch of drone-delivered defibrillators,[118] potentially reducing response times. An observational study of 302799 patients with presumed cardiac OHCA reported AI development and validation of a termination of resuscitation (TOR) rule aimed at predicting favourable neurological outcome.[134] Top 4 (out of 11) influencing variables were prehospital ROSC, witnessed by EMS, age ≤ 68 years, and non-asystole. AI-based TOR had an AUROC of 0.953 and a specificity of 0.990 compared to Universal TOR rule's[135] specificity of 0.959. AI-based TOR missed 58 survivors (0.07%) with favourable outcomes, compared to 234 (0.2%) missed by the Universal TOR rule.[134]

In contrast to the overall positive AI results, a recent observational study reported poor performance of 2 large language model-powered chatbots in providing resuscitation guideline-consistent instructions for helping a non-breathing victim.[136] Just 9.5-11.5% of the AI responses were deemed as satisfactory, with essential bystander elements such as early CPR start and uninterrupted chest compressions frequently missing. Responses also included inappropriate instructions for untrained rescuers (e.g. advice for rescue breaths) and incorrect/potentially harmful guidance (e.g. using the heel of a hand in infant CPR). Finally, 55% of one chatbot's responses included artificial hallucinations, i.e. plausible but incorrect advice (e.g. not performing chest compressions in case of spinal cord injury).[136]

Assuming a continuously improving AI performance and integration in resuscitation practice,[131] associated ethical issues may include 1) beneficence vs privacy and autonomy: the potentially life-saving effect of preemptive advice, warnings or interventions should be balanced against the associated, potentially paternalistic breaches in the patient's personal and/or mental privacy and right to determination of their personal life's integrity[131] and 2) justice: socioeconomic status-dependent disparities in the access to best

available healthcare technology could substantially increase, especially in limited or deficient resource settings; furthermore, AI algorithms based on population-specific or group-specific datasets may prove ineffective or harmful in populations/groups with different key characteristics and inability to provide their own datasets. EU Regulation 2024/1689[137] is aimed at 1) addressing AI risk and impact levels;[131] 2) prohibiting AI misuse of facial images and manipulation of vulnerabilities;[131] 3) encouraging responsible AI use through precautions, scientific safeguards and transparency;[131] and 4) supporting innovation and free movement of AI-based goods and services across Member States.[137] However, there is still need for a comprehensive ethical and scientific framework, concurrently addressing ethical issues and rigorous evaluation of technological progress.[131] This requires cooperation among technology experts, healthcare providers, researchers, ethicists, and legal authorities to prevent harmful effects on patient's autonomy and privacy, or any compromise of their safety.[131]

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