Table 1. Common, Major Ethical Challenges in Resuscitation and associated Principles of Bioethics.

Ethical Dilemma / Practice Issue *	**Associated Principle(s)**
During Cardiac Arrest	
Should the patient receive CPR? †	Balance of Beneficence/Nonmaleficence vs. Autonomy, Dignity;
When should I stop CPR?	Nonmaleficence; Dignity
Is there legal support for AD/ACP?	Country-specific interpretation of Autonomy
After ROSC	
Does patient clinical status / comorbidities justify LST?	Beneficence/Nonmaleficence
How should I inform the family and involve them in decision-making? ‡	Honesty; Autonomy; Beneficence/Nonmaleficence; Dignity; Justice
Is there legal and/or healthcare systemic support for AD/ACP?	Honesty; Autonomy; Beneficence/Nonmaleficence; Dignity; Justice
ICU care:	
When should I withdraw or withhold LST?	Nonmaleficence; Autonomy, Dignity
How should I involve the family and/or the patient in decision-making? ‡	Honesty; Autonomy; Beneficence/Nonmaleficence; Dignity; Justice
Is there legal and/or healthcare systemic support for AD/ACP?	Honesty; Autonomy; Beneficence/Nonmaleficence; Dignity; Justice
Healthcare system	
Do patients have equal access to the best quality of care?	Justice
Research	
Is autonomy of research participants respected?	Balance of Autonomy vs. Beneficence/Nonmaleficence §
Is participants' risk exposure minimized?	Nonmaleficence
Is there a prospect of individual benefit for each participant?	Beneficence; Justice
Is the burden of risk equally distributed among societal groups?	Justice
Are research subjects treated with the appropriate respect?	Dignity
Is the research conducted in a transparent manner?	Honesty; Beneficence/Nonmaleficence

CPR, cardiopulmonary resuscitation; DNACPR, Do not attempt CPR; AD, Advance Directive; ACP, advance care planning; LST, life-sustaining treatment; QoL, Quality of Life.

Definitions for Ethical Principles are provided at the end of the Introduction.

The Associations between Clinical Dilemmas / Practice Issues and Ethical Principles are analyzed throughout the text.

*, Challenges associated with other, specific, clinical practices/circumstances are presented in Table 4.

†, Patient consent for CPR is presumed, unless there is immediate access to or prior knowledge of recorded patient wishes against CPR (see also text and Table 2); as further analyzed in the corresponding article subsections, recorded patient preferences are normally associated with an AD or ACP.

‡, This should include a shared decision-making process as further analyzed in the text.

§, Clinical research may evaluate new and potentially beneficial interventions, or even routine practices (eg, epinephrine use during CPR) with a still unclear risk-to-benefit relationship.

Table 2. Characteristics of OHCA and IHCA potentially influencing Autonomy and Beneficence/Nonmaleficence.

	OHCA	**IHCA**
Onset and Etiology	Sudden and most often of presumed cardiac etiology [E56 and E57 of ESM]; victims often not likely to have considered drafting advance directives and/or advance care planning	Often preceded by initiation of invasive monitoring and LSTs (eg, vasopressor support or mechanical ventilation), aimed at managing life-threatening, conditions, such as respiratory or circulatory failure of frequently noncardiac etiology [E58 and E59 of ESM]; victims may be more likely to have considered drafting advance directives and/or advance care planning, especially in the presence of multiple comorbid conditions potentially aggravating prognosis [8; E47 and E48 of ESM]
Clinical status and comorbidities	Often unknown when CPR is started	Generally known and reported in the clinical chart
Advance Directives	Most often unknown to rescuers; Resuscitation normally proceeds under presumed, patient consent	LST Directives normally known to attending physician, and accessible by the hospital's resuscitation team
ACP	Most often unknown to rescuers; Resuscitation normally proceeds under presumed, patient consent; in certain healthcare systems, forms containing patient preferences may be accessible by the EMS rescuers [9, 26; E33 of ESM]	Patient preferences regarding LST normally known to attending physician, and accessible by the hospital's resuscitation team
DNACPR orders	Most often unknown whether there would be a DNACPR order in place if the patient had experienced an IHCA; Patient comorbidities and general health status /QoL are also unknown, unless a pertinently informed person such as a family member is present on the scene; Resuscitation normally proceeds under presumed, patient consent	Normally recorded and accessible by the hospital's resuscitation team
CPR providers	Doctors and nurses but also paramedics or firemen, according to the EMS organisation	Doctors and nurses
Prediction tools potentially useful for decision making	Termination of resuscitation rules before transport to hospital	Clinical scores to predict the chances of neurologically intact survival before CPR or after ROSC

IHCA, in-hospital cardiac arrest; OHCA, out-of-hospital cardiac arrest; CPR, cardiopulmonary resuscitation; ACP, advance care planning; ESM, electronic supplementary material (with additional references); LST, life-sustaining treatments; EMS, emergency medical services; DNACPR, do not attempt cardiopulmonary resuscitation; QoL, quality of life; ROSC, return of spontaneous circulation.

Table 3. Issues of justice related to cardiac arrest, separated by OHCA versus IHCA.

	OHCA	IHCA
Location:	Public versus private location	In-hospital location at time of cardiac arrest (eg, emergency department, ICU, ward, clinic)
	Rural versus urban; Type of admitting/treating hospital (academic/university, private/community, public)	Type of treating hospital (academic/university, private/community, public)
	Country, city, and county	
System:	Organization, physician oversight, efficiency, staffing models, paid versus volunteer providers, quality assurance programs.	Organized response (eg, rapid response teams) versus haphazard hospital coverage (single physician covering entire hospital for arrests), staffing, continuous quality improvement efforts
	Different staffing models at night and on weekends	
	Tracking of outcomes with timely feedback providers	
	Community focus on bystander CPR, availability and use of AEDs	Hospital focus on early provider recognition of pre-arrest state and standardized activation plan
	Availability and use of standardized forms for patient end-of-life wishes (eg, POLST form) to guide resuscitation and interventions	
Provider:	EMS provider level of training and education	Presence of standardized provider resuscitation training
	Paid versus volunteer	Financial incentive/stipend for covering hospital arrests
	Provider bias (eg, age, race, religion, ethnicity, citizenship status); provider judgment based on patient factors (eg, age, comorbidity burden) regarding likelihood of success with resuscitation influencing quality of resuscitation	

IHCA, in-hospital cardiac arrest; OHCA, out-of-hospital cardiac arrest; ICU, intensive care unit; CPR, cardiopulmonary resuscitation; AED, automated external defibrillator; POLST, physicians orders for life-sustaining treatments; EMS, emergency medical services.

Table 4. Ethical Challenges pertaining to Specific Clinical Practices or Circumstances.[ΣM1]

Specific Practice or Condition *	Ethical Dilemma / Practice Issue *	Applicable Principles	Relevant ESM References
FPDR †	Psychological trauma to family members;† Distraction/performance anxiety of resuscitation team;† Physical/psychological or medicolegal consequences for emergency caregivers; †	Family Autonomy	E77-E90
Pediatric/neonatal resuscitation	Child's/neonate's best interest might conflict with parent's /guardian's rights; Autonomy by proxy may result in futile CPR prolonging the patient's suffering; Prognostication may be difficult in preterm neonates	Beneficence vs. Nonmaleficence; Autonomy	E90-E95
Slow code	"Symbolic" resuscitation is unethical, despite arguments that it helps families to deal with the loss of their loved one	Nonmaleficence; Honesty	E96, E97
Ensuring provider safety	Should take priority over any resuscitative procedure	Justice	E90, E98
Organ donation	This practice can result in aggressive resuscitation for the survival of the donor's organs	Nonmaleficence	E99
"Very recent" (ie, ≤2 years) immigrants/refugees	Such patients may be more likely to receive end-of-life aggressive care compared to long-standing residents	Nonmaleficence; Justice; Dignity; Autonomy	E100

ESM, electronic supplementary material, FPDR, family presence during resuscitation; CPR, cardiopulmonary resuscitation.
*, A more detailed presentation is provided in the ESM.
†, Recent evidence [ESM's references E83-E85] supports FPDR in the presence of caregivers skilled in providing family support; FPDR policies could be developed within the broader context of family-centered care [ESM's reference E87]. [ΣM2]

Table 5. Characteristics of Consent Models used as alternatives to Pre-enrollment Informed Consent (IC).

IC Model	Prerequisites	Advantages	Associated Challenges
Deferred IC [E08 of ESM]	Life-threatening condition – inability to obtain patient IC Potential for direct, research-related benefit to the patient or alleviation of suffering, or improvement in the diagnosis of his / her condition Inability to obtain a valid, pre-enrollment IC from the patient's LR Investigator not aware of any previously expressed patient objections with respect to clinical trial participation The LR must be informed about the study as soon as possible [a] The clinical trial relates directly to the patient's medical condition The clinical trial may be conducted exclusively in emergency situations The clinical trial poses a minimal risk to, and imposes a minimal burden on, the subject in comparison with the standard treatment of the subject's condition	It respects the patients' autonomy, and enables the conduct of much needed emergency research [13] Not excessively resource demanding It ensures "balanced" application of the principles of bioethics [13]	Absence of legal definition of consent for procedures that have occurred previously [13,14] Potential discrepancies between patients and their surrogates regarding willingness to grant IC [E8 of ESM] Surrogate IC validity may be affected by their ability to comprehend the study protocol under conditions of psychological stress, and uncertainty about the patient's outcome [10,15]; previously recommended time frames for the surrogates' IC decision were within 4-24 h [14]
EFIC with Community Consultation [E109 of ESM]	Life-threatening condition Current treatments are unsatisfactory or unproven Need for new and valid evidence for treatments Inability to obtain pre-enrollment IC The patient's LR must be informed about the study as soon as possible Possibility of direct subject benefit from research participation Inability to conduct the research without the waiver Definition of therapeutic window for contacting an LR Research Ethics Committee approval of IC procedures Public disclosure and community consultation	Fast recruitment of a great number of patients.[E5 of ESM] Opt-out options may be feasible [69]	Respect for autonomy applied at community-level but not at patient-level Public disclosure and community consultation has been associated with very low (i.e. 5%) levels of trial awareness among actual participants [E111 of ESM]

Adapted with permission from reference 1. ESM, electronic supplementary material (with additional references); EFIC, exception to informed consent; LR, legal representative.

[a], Practices may vary in cases of patient's death occurring before the LR can be reached (see also text).

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