



Clinical paper

A survey of key opinion leaders on ethical resuscitation practices in 31 European Countries[☆]



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ABSTRACT

Background: Europe is a patchwork of 47 countries with legal, cultural, religious, and economic differences. A prior study suggested variation in ethical resuscitation/end-of-life practices across Europe. This study aimed to determine whether this variation has evolved, and whether the application of ethical practices is associated with emergency care organisation.

Methods: A questionnaire covering four domains of resuscitation ethics was developed based on consensus: (A) Approaches to end-of-life care and family presence during cardiopulmonary resuscitation; (B) Determinants of access to best resuscitation and post-resuscitation care; (C) Diagnosis of death and organ donation (D) Emergency care organisation. The questionnaire was sent to representatives of 32 countries. Responses to 4-choice or 2-choice questions pertained to local legislation and common practice. Positive responses were graded by 1 and negative responses by 0; grades were reconfirmed/corrected by respondents from 31/32 countries (97%). For each resuscitation/end-of-life practice a subcomponent score was calculated by grades' summation. Subcomponent scores' summation resulted in domain total scores.

Results: Data from 31 countries were analysed. Domains A, B, and D total scores exhibited substantial variation (respective total score ranges, 1–41, 0–19 and 9–32), suggesting variable interpretation and application of bioethical principles, and particularly of autonomy. Linear regression revealed a significant association between domain A and D total scores (adjusted $r^2 = 0.42$, $P < 0.001$).

Conclusions: According to key experts, ethical practices and emergency care still vary across Europe. There is need for harmonised legislation, and improved, education-based interpretation/application of bioethical principles. Better application of ethical practices may be associated with improved emergency care organisation.

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Introduction

Cardiac arrest is an unexpected but potentially reversible event and should be distinguished from the expected cessation of cardiorespiratory function as part of natural dying. Survival to hospital discharge following emergency medical service-treated out-of-hospital cardiac arrest is 8–10%.¹ This very low survival rate raises ethical considerations. Equally, significant ethical dilemmas have arisen from the rapid evolution of resuscitation science.² Indeed, as advanced and/or potentially beneficial interventions become widely available and applicable and patient outcomes are improving,¹ defining which patients might benefit from new treatments becomes increasingly important.

Healthcare bio-ethics has evolved as bioethicists endeavoured to accommodate dominant cultural and societal trends.³ However, Europe is a patchwork of 47 countries with legal, cultural, religious, and economic differences. These factors affect how European societies interpret and apply ethical principles in resuscitation and end-of-life care. A previous European survey revealed variation in withholding or withdrawing cardiopulmonary resuscitation (CPR), euthanasia, family presence during resuscitation, death diagnosis by non-physicians, teaching on the recently dead, and communicating a failed resuscitation attempt.²

We sought to determine whether the variation in the practice of resuscitation ethics across Europe has evolved. Furthermore, as emergency care design and organisation also probably varies across Europe, we hypothesised that the level of organisation of emergency care might be associated with the level of application of ethical practices.

Methods

Between February and March 2015 an on-line questionnaire was sent to 40 National Resuscitation Council (NRC) Representatives and/or acknowledged opinion leaders in emergency care from all 32 European countries, where the European Resuscitation Council (ERC) has organised activity [see electronic supplementary material (ESM)]. Questionnaire development was based on co-author consensus, and the principles of autonomy, beneficence, non-maleficence, justice, dignity and honesty.⁴ Co-authors contributed to questionnaire synthesis, revision, and testing prior to dissemination.

Survey items were organised in an analytical framework comprising 4 domains:⁵

- (A) Ethical practices including approaches to end-of-life (i.e. end-of-life practices and decisions), and family presence during CPR,
- (B) Determinants of access to best resuscitation and post-resuscitation care,
- (C) Diagnosis of death and organ donation, and
- (D) Emergency care organisation.

Each domain consisted of subcomponents that could be grouped under its descriptive title as they exhibited conceptual/organisational relations or tight organisational/temporal interdependence. For example, regarding domain C, brain death diagnosis is an essential prerequisite for organ donation before circulatory death. Questions and response options are listed in Table 1; questions were based on the Basic Principles of Bioethics.³

Respondents had to choose either among 4 options, i.e. *never*, *sometimes*, *usually* and *always* or between *no* and *yes*. Respondents were also asked to comment on domain subsections. Subsequently, responses of *never/sometimes* and *usually/always* were respectively grouped as *no* and *yes*, because *never/sometimes* does not and *usually/always* does reflect common/everyday practice. For data

analysis, we used a dichotomous quantizing approach⁶ by grading a positive response with 1 and a negative response with 0.

Discrepancies between respondents from the same country were resolved through consensus. Clarification was also requested from single respondents in case of initially absent, and/or contradictory responses (e.g. concurrent positive response(s) regarding advance directives and negative response regarding withholding of CPR). Respondents' comments were also taken into account. Single respondents were encouraged to consult with colleagues. Furthermore, following data review, we provided respondents with country-specific Microsoft Excel datafiles containing quantified responses and through a standardised e-mail message we asked them to (a) either confirm or correct the gradings of their original responses, (b) provide any still missing responses, and (c) correct any remaining inconsistencies in responses to domain subcomponents (e.g. reporting that citizens are allowed to defibrillate but nurses or police are not). In this message, we further clarified questions pertaining to death diagnosis and defibrillation (Table 1, ESM). Presented survey data reflect individual perceptions of respondents.

Data analysis

For each group of questions of each domain subsection, we calculated a grading score by summing up the positive responses; the maximum possible score reflects the actual number of questions (Table 1). Subsequently, we calculated grading scores for domain subsections A1–A3, B1–B3, C1 and C2, and D1–D5 by adding the respective, subcomponent (group) scores. Lastly, again by subcomponent score summation, we calculated a total score for each domain. The normalities of the distributions of domain and subcomponent scores were determined by Kolmogorov-Smirnov test. Data are reported as number, number (percentage), and mean \pm SD or median (interquartile range) as appropriate.

Bivariate linear regression (see ESM for details) was performed to explore a possible association between domain A and domain D total scores. The dependent variable was domain D score. Statistical significance was accepted at $P < 0.05$. Analyses were performed with SPSS version 22.0 (IBM, Armonk, New York, USA).

Results

Responses were originally received from 32/32 countries (100%) and revised Excel datafiles were returned by respondents from 31/32 countries (97%). Only revised data from these 31 countries were included in the final analysis. Respondents provided 73 (99%) of the 74 originally missing data-points. One respondent concluded that he could not answer 6 Domain C questions secondary to regional/local variation in clinical guidelines of healthcare services and/or absence of a specific legal framework. Consequently, 7 (0.16%) out of a possible total of 4402 data-points were ultimately missing (see also ESM, footnotes of Tables E1 and E3). Respondents corrected 199 (4.6%) and confirmed 4129 (95.4%) of the 4328 original response grades. Domains A, B, C, and D total score data exhibited normal distributions. Domains A, B, and D total scores exhibited greater variation compared to domain C total score (Table 2; variation coefficients' decreasing order: $A > D > B > C$). Results on subcomponent scores are presented along with additional details in the ESM. Analysed survey data are provided in a supplemental, pdf-converted Excel file.

Domain A (Table 3)

Euthanasia and/or assisted suicide in adults and euthanasia in children is allowed and commonly practiced in 4/31 (13%)

Table 1
The administered questionnaire.

A. Ethical practices[*]
A1. End-of-life practices
1. Euthanasia/assisted suicide in adults (legally supported? actually applied?); Euthanasia in children (legally supported? actually applied?). No. of discrete questions (N) = 5; Maximum attainable score if all responses positive (Max. Score) = 5
2. Written living will (advance directives) (legally recognised/supported? actually applied in the out-of-hospital and/or in-hospital setting?). N = 8, 4-choice; Max. Score = 8
3. Do-not-attempt resuscitation (DNAR) orders (legally recognised/supported? actually applied in the out- of-hospital and/or in-hospital setting? written in medical record? Reviewed?) N = 9; Max. Score = 9
4. Terminal analgesia/sedation (legally supported? actually applied?). N = 2; Max. Score = 2
5. Termination of Resuscitation (TOR) protocols (legally supported? actually applied in the out- of-hospital and/or in-hospital setting?). N = 5, 4-choice; Max. Score = 5
6. Limitation of in-hospital treatment level (If applied, does it pertain to withholding or withdrawing cardiopulmonary resuscitation (CPR), TOR, withholding of invasive treatments, and withholding of feeding/hydration?). N = 5; Max. Score = 5
7. During patient transportation: is CPR continued in the prospect of organ donation? Is CPR continued in the prospect of access to higher-level treatment (e.g. extracorporeal CPR)? N = 2; Max. Score = 2
A2. End-of-life Decisions
1. Adults/children: Family participating in Decisions? N = 2; Max. Score = 2.
A3. Family presence during CPR
1. Adults: Family present during CPR?; Children: Parents present during CPR? Children: Other family members present during CPR? N = 3; Max. Score = 3
Max. Score for Domain A: 41
Questions pertaining to law and those included in A1. 6 and A1. 7 had 2-choice responses (i.e. yes or no); Questions pertaining to what is actually applied had 4-choice responses (i.e. <i>never, sometimes, usually, and always</i>)
B. Access to best resuscitation and postresuscitation care[†]
B1–B3. Out-of-hospital (B1) and in-hospital (B2) resuscitation care, and postresuscitation care (B3)
1. Is access to best available care affected by age? race? religion? comorbidity? socioeconomic status? urban-rural (area of occurrence)? type of admitting and/or treating hospital? minority? language? high-risk presentation? suicide attempt? knowledge of patient's wish against undergoing CPR? other? The same group of questions was asked about B1, B2, and B3. For each of B1, B2, and B3: N = 13; Max. Score = 13
Max. Score for Domain B: 39. All questions had 2-choice responses (i.e. yes or no)
C. Diagnosis of death and organ donation
C1. Diagnosis of death
1. Who is legally allowed to diagnose death? physician? nurse? ambulance person [advanced life support (ALS) provider], ambulance person [basic life support (BLS) provider]? N = 6; Max. Score = 6
2. Who is legally allowed to diagnose death in the absence of obvious signs of death such as rigor mortis or decapitation, and after 20 minutes of asystole without reversible cause? physician? nurse? ambulance person (ALS provider), ambulance person (BLS provider)? N = 6; Max. Score = 6
3. Diagnostic criteria for death: Brain death criteria or Cardiorespiratory death criteria used in the out-of-hospital or in-hospital setting and written on death certificate? N = 6; Max. Score = 6
C2. Organ donation
1. What is allowed/applied? Heart beating organ donation? Non-heart beating organ donation? N = 4; Max. Score = 4
Max. Score for Domain C = 22. All questions had 2-choice responses (i.e. yes or no)
D. Emergency care organization[†]
D1. Access to resuscitation care in case of cardiac arrest in different areas/settings
1. Out-of-hospital: rural areas [emergency number (112 or another?–2 questions); ambulance arrival within 10 min? telephone CPR?] N = 4; Max. Score = 4
2. Out-of-hospital: urban areas [emergency number (112 or another?–2 questions); ambulance arrival within 10 min? telephone CPR?] N = 4; Max. Score = 4
3. In-hospital: emergency number? cardiac arrest team arrival within 10 min? N = 2; Max. Score = 2
D2. Defibrillation
1. Who is legally allowed to defibrillate using an automated external defibrillator (AED)? physician? nurse? ambulance personnel? police? On-site responder? Citizen? Other (specify)? N = 7; Max. Score = 7
2. About AEDs: Are they available in single tier ambulance? first tier ambulance? fire cars? police cars? public places? mass gatherings? first responder dispatch projects? other? N = 8; Max. Score = 8
3. Are ongoing public access defibrillation programs in place? home AED? school AED? in-hospital AED? - Is there a registry of all AEDs? N = 5; Max. Score = 5
D3. Level of care provided by out-of-hospital emergency services
1. First responding ambulance: ALS? BLS plus defibrillation? Second responding ambulance: ALS? N = 3; Max. Score = 3
D4. Organization of in-hospital resuscitation services
1. Is CPR feedback, debriefing, and audit applied? N = 3; Max. Score = 3.
2. Is CPR training on the recently dead legally allowed? - is CPR training practiced? N = 2; Max. Score = 2
D5. Registry reporting of cardiac arrest
1. Out-of-hospital and/or in-hospital cardiac arrest data reported to a Registry? N = 2; Max. Score = 2
Max. Score for Domain D = 40. Questions D1. 1-3. D4. 1-2., and D5 1. had 4-choice responses (i.e. <i>never, sometimes, usually, and always</i>); all other questions had 2-choice responses (i.e. yes or no)

^{*} Related to the application of the following Ethical Principles: Autonomy, Beneficence, Non-maleficence, Dignity, and Honesty.

[†] Related to the application of the Principles of Justice and Beneficence.

countries. In contrast, advance directives are legally recognised and/or supported in 20/31 (65%) and commonly or variably practiced in 20/31 (65%) countries, do-not-attempt resuscitation (DNAR) orders in 22/31 (71%) and 24/31 (77%) countries, terminal analgesia/sedation in 21/31 (68%) and 20/31 (65%) countries, and termination of resuscitation (TOR) protocols in 20/31 (65%) and 24/31 (77%) countries. At least one form of treatment limitation is commonly practiced in 26/31 (84%) countries. Ongoing CPR for organ donation is practiced in 20/31 (65%), and ongoing CPR to enable transportation to higher-level treatment facility in 28/31 (90%) countries. Family participates in end-of-life decisions on adults in 21/31 (68%) and on children in 25/31 (81%) countries.

In contrast, family presence during CPR is not usually permitted either for adults or for children in 16/31 (52%) countries (see ESM).

Domain B (ESM)

Frequently reported [i.e. for at least 8/31 (26%) countries] factors influencing access to the best available resuscitation and postresuscitation care included patient comorbidity, age, location/type of admitting/treating hospital, and knowledge of expressed patient wish against receiving CPR.

Table 2
Domain A, B, C, and D total scores and coefficients of variation.

	A: ethical practices (max. score = 41)	B: access to best available care (max. score = 39)	C: death diagnosis & organ donation (max. score = 22)	D: emergency care organisation (max. score = 40)
Austria	22	9	13	29
Belgium	28	16	12	27
Bosnia & Herzegovina	6	8	11	9
Croatia	4	6	13	20
Cyprus	11	5	16	26
Czech Republic	23	7	14	23
Denmark	26	3	13	28
Finland	21	10	13	25
France	18	6	11	30
FYROM	2	6	9	16
Germany	16	4	8	22
Greece	11	15	11	15
Hungary	16	19	19	26
Iceland	17	8	11	21
Italy	8	6	10	24
Luxembourg	26	12	12	24
Malta	33	6	14	25
Norway	12	2	19	31
Poland	20	4	13	24
Portugal	18	1	10	22
Romania	10	0	14	23
Russian Federation	14	18	13	27
Serbia	1	2	11	16
Slovakia	19	13	14	23
Slovenia	26	4	11	24
Spain	30	3	12	22
Sweden	31	4	13	29
Switzerland	32	10	12	26
The Netherlands	41	3	12	32
Turkey	7	7	12	16
United Kingdom	31	8	14	31
Mean ± SD	18.7 ± 10.2	7.3 ± 4.9	12.6 ± 2.4	23.7 ± 5.3
CV (SD/√n)	1.82	0.88	0.43	0.95

FYROM, Former Yugoslav Republic of Macedonia; CV, Coefficient of variation; n, number of observations (=31).

Domain C (ESM)

In 24/31 (77%) countries, death can be diagnosed solely by physicians. In 7/31 (23%) countries, death can also be diagnosed by ambulance personnel and/or nurses. Heart-beating organ donation is allowed and/or applied in 28/31 (90%) countries.

Table 3
Main results on domain A (Ethical Practices).

ETHICAL PRACTICE	Legally recognised/ supported (allowed)* (No. of countries)	Commonly practiced† (No. of countries)	Variably practiced (No. of countries)	Not allowed (no. of countries)	Not commonly practiced (No. of countries)
Euthanasia (adults & children)/assisted suicide (adults)	3/3	3/3		28/28	28/28
Advance directives	20	6	14‡	11	9
Do-not-attempt resuscitation orders	22	3	21‡	9	7
Terminal analgesia & sedation	21	20		10	11
Termination of resuscitation protocols	20	7	17‡	11	8
Treatment limitation		8**	18**		5
CPR in prospect of organ donation/access to higher-level treatment		20/28			11/3
Family participation in end-of-life decisions on adults/children		21/25			10/6
Family presence during CPR adults/children [parents/other family members]]		10/[15/9]††			21/[16/22]††,‡‡

CPR, Cardiopulmonary Resuscitation.

* Legally recognised: mentioned in a non-binding section of national law, such as a recital; Legally Supported (Allowed): specifically mentioned in (and allowed through) a law article.

† Commonly practiced: constitutes part of common practice (see also the Methods section).

‡ Frequency of practice differs according to circumstances, such as the out-of-hospital or the in-hospital setting.

** Certain forms and/or combinations of treatment limitation such as withholding of CPR and invasive treatments are commonly practiced and may thus be presumed as having gained legal acceptance corresponding to a non-forbidden status in 21 countries; in contrast, another form of treatment limitation, i.e. withholding of feeding/hydration may not be presumed as having gained legal acceptance in 11 of the aforementioned 21 countries, because it is not commonly practiced.

†† In a total of 15 countries, family presence during CPR is commonly practiced either for adults, or for children, or for both adults and children; in a total of 16 countries, family presence during CPR is not commonly practiced either for adults or for children.

‡‡ In the Results section, this is referred to as not usually permitted which is considered as synonymous to not commonly practiced.

Domain D (Table 4)

Out-of-hospital emergency numbers are available in rural areas in 31/31 (100%) and in urban areas in 30/31 (97%) countries. In-hospital emergency numbers are available in 26/31 (84%) countries. Telephone CPR is available in rural areas in 15/31 (48%) and in urban

Table 4
Main results on domain D (Emergency care organisation).

Emergency care subcomponent	Positive response (No. of countries)
Access to emergency care	
Rural areas: emergency number/T-CPR/Ambulance arrives in ≤10 min	31/15/16
Urban areas: emergency number/T-CPR/ambulance arrives in ≤10 min	30/18/25
In-hospital: emergency number/cardiac arrest team arrives in ≤10 min	26/29
Defibrillation	
Legally allowed for physicians/other healthcare providers	31/29
AED availability:	
Public places/mass gatherings	28/24
Single/first tier ambulance	20/22
Fire cars	17
First responder dispatch projects	17
Police cars	11
Ongoing PAD programs in-place	26
AED registry	9
First responding ambulance provides:	
Basic Life Support + Defibrillation	29
Advanced life support	25
Second responding ambulance provides:	
Advanced life support	30
In-hospital resuscitation service practices:	
CPR debriefing	11
CPR feedback	7
CPR audit	5
Registry reporting of	
Out-of-hospital cardiac arrest	10
In-hospital cardiac arrest	10

CPR, cardiopulmonary resuscitation. T-CPR, telephone CPR; AED, automated external defibrillator; PAD, public access defibrillation; BLS, basic life support; ALS, advanced life support.

areas in 18/31 (58%) countries. In rural areas, ambulances arrive within 10 min in 16/31 (52%), and in urban areas in 25/31 (81%) countries. In-hospital cardiac arrest teams arrive within 10 min in 29/31 (94%) countries. Defibrillation is legally limited to physicians in only 2/31 (7%) countries. Automated external defibrillators (AEDs) are available in public places and/or during mass gatherings in 28/31 (90%) countries. AEDs are available in ambulances and/or fire cars and/or police cars in 26/31 (84%) countries. Ongoing public access defibrillation programs are in place in 26/31 (84%), and an AED registry is present in 9/31 (29%) countries. Basic life support plus defibrillation is provided by first responding ambulances in 29/31 (94%), and advanced life support in 25/31 (81%) countries. In-hospital, post-CPR debriefing is commonly practiced in 11/31 (36%), feedback in 7/31 (23%), and audit in 5/31 (16%) countries. CPR training on recently dead is not commonly practiced in any country. Registry reporting of out-of-hospital cardiac arrest is commonly practiced in 10/31 (32%), and of in-hospital cardiac arrest in 10/31 (32%) countries.

Linear regression

There was a significant association between the total scores of ethical practices and emergency care organisation (adjusted $r^2 = 0.42$, $P < 0.001$, Fig. 1), indicating that domain A score explained 42% of the variance of domain D score (see ESM for details).

Discussion

According to national key experts, there is still significant variation in the interpretation of ethical principles across Europe. This is consistent with a previous survey in 2004.² In the 2004 survey,

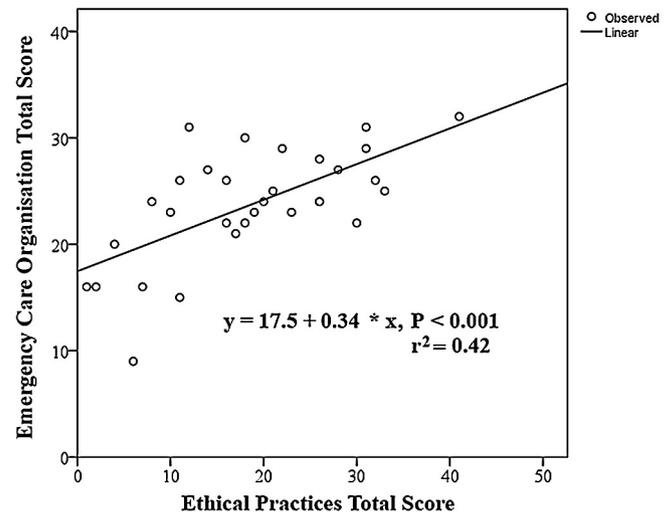


Fig. 1. Scatterplot of emergency care organization total score against ethical practices total score.

ethical issues referring to euthanasia, withholding/withdrawing of CPR, family presence during CPR, death diagnosis, CPR training on the recently dead, and breaking bad news in 20 European countries were explored.² In the current survey, we highlighted differences in a more organised fashion by separating variables for 31 countries into 4 domains. Domain A pertained to autonomy, beneficence, non-maleficence, dignity and honesty. The principles of justice and equal access to care are addressed in domains B and D (Table 1, footnote). We also sought to determine a possible association between ethical practices and emergency care organisation. To our knowledge, this has not been addressed to-date.

Despite expert perception diversity,² certain practices seem to be gaining ground. Advance directives and DNAR orders are used in nearly two thirds or more of the 31 included countries (the Results section and Table 3), compared with just 6 (30%) and 11 (55%) of the 20 countries surveyed in 2004.²

Euthanasia/assisted suicide remains controversial and its practice reflects an aggressive interpretation of autonomy. The number of European countries applying such interpretation is still limited to 4 (ESM), despite a recent extension of euthanasia to children.⁷ Nevertheless, euthanasia/assisted suicide and terminal analgesia/sedation are currently subjects of intense debate in Europe and North America and pertinent legislative developments are expected.⁷ Autonomy means “capability of self-determination”. However, the interpretation of patient/individual autonomy may vary according to religious affiliation and culture.^{8,9}

Written living wills, DNAR orders, TOR protocols, treatment limitation, and patient transportation with the prospect of organ donation seem to be more widely accepted than euthanasia/assisted suicide, despite significant variation. Within the concept of autonomy, family participation in end-of-life decisions is not common practice in adults in almost a third of the countries (ESM). This again highlights the variable interpretation of individual autonomy. For example, and in contrast to other countries, in Germany the law sets out specific criteria for who should be involved in decisions on resuscitation. The German law states that patients under custody or even minors (>14 years old) may be capable of understanding and should therefore consent to end-of-life decisions.¹⁰ A legal case raised in the United Kingdom demonstrated that paternalistic approaches in reaching DNAR decisions are no longer acceptable. A DNAR decision was made without patient/family consent, for a patient severe comorbidities, and the court decided that patient autonomy was compromised.

This resolution is in line with the recently increasing focus on patient centricity.¹¹ Both legal examples indicate that healthcare professionals should discuss DNAR decisions with their patients.

The Council of Europe has recently issued a guide on the decision-making process in end-of-life situations.¹² The guide specifies the ethical and legal frames for the decision-making process, the involved parties and the distinct phases of the decision process. The guide also specifies disputed issues such as limitation of artificial nutrition/hydration, limits, contents, and legal status of advance directives, and appropriate use of terminal analgesia/sedation. The guide aims to ensure respect for autonomy (also by recommending a structured evaluation of the patient's ability to decide), and application of beneficence and non-maleficence (by specifying the obligation to deliver only appropriate treatment), and justice (also by supporting broadened access to palliative care). A similar target of balanced and concurrent application of the fundamental principles of bioethics is sought for emergency research involving incapacitated patients through Article 35 of European Union Regulation No. 536/2014.^{13,14}

Family presence during resuscitation is still controversial across Europe. In 16/31 countries (52%), family presence is not routinely allowed; in the 2004 survey, family presence was not usually permitted in 12/20 countries (60%).² Family presence may oppose patient autonomy or even patient dignity. However, in several countries, family presence is permitted to help the family come to terms with the dying patient and the healthcare personnel efforts to restore life. Family presence is supported by several international organisations, including the European Resuscitation Council and the American College of Emergency Physicians.¹⁵ Family presence may occasionally not be permitted because of healthcare professionals' fear of litigation, or because the resuscitation attempt is considered as too traumatic for the family.¹⁶ Written policies on family presence during resuscitation have been adopted by 5% of hospitals in North America¹⁷ and 12% of hospitals in Europe.¹⁸

The questions of domain B are associated with justice and beneficence. Justice relates to the equality of rights to health and healthcare and beneficence to maximizing the patient's welfare.^{4,14} For the out-of-hospital setting, only two and for the in-hospital setting only three countries did not report any determinant of limiting access to best resuscitation care, while the remaining countries reported factors such as comorbidity, age, and location/type of admitting/treating hospitals (ESM). The same applies for post-resuscitation care, with only five countries indicating that it is not affected by such factors (ESM). In the 2004 study, medical history was a major determinant for deciding on the level of CPR in 19/20 countries (95%); notably, age per se was not considered as a determinant for stopping CPR by any respondent.² Although taking severe comorbidity into account is consistent with ethical guidelines,¹⁹ any decision based only on age is not supported by the current literature,²⁰ and may represent ageism, i.e. age-dependent discrimination for treatment provision. However, a well-organised, in-hospital resuscitation service providing systematic and high-quality training and clear protocols for withdrawing, withholding or intensifying CPR²¹ may be associated with better patient outcomes.²² Domain C pertained to the diagnosis of death and the occasionally subsequently occurring organ donation. In-line with prior findings,² responses on death diagnosis revealed that in >75% of the included countries, death may be diagnosed solely by a physician. In a few countries, death may also be diagnosed by nurses ($n=4$) or ambulance personnel ($n=5$). In >70% of the countries, brain death criteria can be used for death diagnosis, and organ donation is applied. This may reflect community-level beneficence and justice not conflicting with individual (dying patient) non-maleficence (i.e. physician abstention from harm^{4,14,23}).

Domain D, i.e. emergency care organisation, pertained to access to resuscitation care, defibrillation, level of care provided by out-of-hospital emergency services, organisation of in-hospital emergency services, and registry reporting. Linear regression between domain D and A total scores suggests that organisational level is associated with the extent of ethical practices application. These two domains may influence each other as ethical practices are being re-defined, in the presence of new technologies and achievements in resuscitation. Rubin and Zoloth argued that ethics evolve and are responsive to healthcare practices.²⁴ However, organisational issues can also affect ethics in healthcare environments.²⁵ Our results support the statistical association between domains A and D but do not definitively clarify whether ethics influence organisation or organisation influences ethics.

Limitations

The assumption that one or two persons can be experts through all fields covered by the current survey may be regarded as "overoptimistic."^{26,27} However, these NRC representatives/opinion leaders have already been acknowledged/appointed as experts in resuscitation by the ERC and/or NRCs according to their clinical expertise and scientific achievements in resuscitation. The survey covered ethical issues that are consistently addressed by the Ethical Guidelines.¹⁹ Consequently, we actually assumed that respondents had (1) thorough knowledge of the current Ethical Guidelines and extent of their application as part of common clinical practice in their countries; and (2) the capability to access information pertinent to the survey items. The high confirmation rate of original response grades implies a high level of expert certainty about the aforementioned knowledge, as one would normally expect from persons who actually have it. Furthermore, we repeatedly sought to minimise possible bias due to missing responses and to eliminate inconsistencies in groups of responses corresponding to domain subcomponents (see the Methods section).

Our dichotomous grading approach might have resulted in loss of critical information and analytic power. Indeed, converting qualitative data into dichotomous variables may respectively result in overestimation or underestimation due to identical grading of responses like "usually" and "always" or "sometimes" and "never".⁶ However, the majority of published examples of quantizing use dichotomous variables for simplicity.⁶ Furthermore, this simple grading system enabled us to assess respondents' perceptions about whether a certain practice or emergency service standard does or does not reflect what actually happens in the majority (i.e. >50%) of the cases. In this "crude" context, we showed a substantial variability of respondents' perceptions about ethical practices' application and emergency care organisation across Europe. The use of ordinal variables⁶ would have probably enabled detection of more subtle differences, but might have also magnified the potential effect of respondent subjectivity. As an example, if family presence during CPR is never practiced but the respondent believes that this occurs sometimes, our dichotomous approach results in a grade of 0 but the ordinal approach (i.e. never = 0, sometimes = 1, frequently = 2, and always = 3) results in a grade of 1, which is biased.

Conclusions

Despite progress in the practices of advance directives and DNAR, our key expert perception-based results are suggestive of persisting substantial variation, primarily in ethical practices and emergency care organisation/access across Europe. This implies a need for harmonisation of national legislations and education-based interpretation and overall improved application of the

principles of bioethics, in the presence of a rapidly evolving resuscitation science and technology. Our results also imply that better application of ethical practices may be associated with improved emergency care organisation; this warrants validation through further research.

Contributors

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Author contributions

Study conception and design, critical revision of the manuscript for important intellectual content, and final text approval and assumption of responsibility for the integrity and accuracy of the presented work: All Authors. Data collection: LB and VR. Data analysis: SDM and LB. Data interpretation: SDM, TX, and LB. Drafting of the manuscript: SDM, TX, and LB.

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Conflict of interest statement

The authors have no conflict of interest to declare.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.resuscitation.2015.12.010>.

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