



Ethico-legal regional differences in European neurosurgical practice: Part 1-pre-COVID-19 era

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ABSTRACT

Introduction: Professionalism entails expert knowledge, self-regulation, accountability, and professional ethics. These factors are influenced by culture, political observance, professional maturity, education, and occupation; ethical practices may thus vary between countries and affect how neurosurgery is practiced.

Research question: This paper aims to conduct a survey that addresses whether ethico-legal practices differ in European countries and whether existing ethical guidelines have been implemented.

Material and methods: A questionnaire survey was used to examine the ethico-legal situation in 29 European countries or regions. The reports were validated by representatives of each nation.

Results: Existing guidelines had been implemented to a minimal extent. Major regional and national differences were found in attitudes toward life and death, prioritization, and issues related to professional conduct.

Discussion and conclusion: The results of this survey reveal inadequacies and weaknesses of policies and resources, which should spark national discussions to improve the conditions that influence professional ethics. Unfortunately, only a minority of neurosurgeons know the neurosurgical ethics guidelines and apply them in their decision making. Our findings highlight the importance of values and professional ethics in decision making.

1. Introduction

Neurosurgery is a field that is regulated by professionalism. Professionalism can be conceptualized as a social contract between society and professionals that regulates how society confers power, resources, and rewards to professionals in return for their expert knowledge, accountability, and self-regulation (Cruess and Cruess, 2008). Neurosurgery services are largely provided through the lens of professional ethics. The body of neurosurgical knowledge is subject to international harmonization, and clinical science is globally unified. However, culture differs, and thus ethical values and practices may differ between countries (Values Survey, 2022). Harmonization of ethical practices may occur as a result of globalized professional interactions and professional organizations

that publish international guidelines for professional conduct, such as the International Code of Medical Ethics (The World Medical Association Inc, 2022a) and the Helsinki Declaration (The World Medical Association Inc, 2022b). The European Association of Neurosurgical Societies (EANS) and the World Federation of Neurosurgical Societies (WFNS) produced a set of ethical guidelines (World Federation of Neurosurgical Societies, 1999) to support an internationally unified approach to ethics in neurosurgery. However, it is unclear how these were implemented, and the World Federation provided a new and different set 13 years later (Umansky et al., 2011).

The recent outbreak of the COVID-19 pandemic has led to exhaustive medical triage and prioritization as a result of limited resources, especially in intensive care units (ICUs) (Hulsbergen et al., 2020; Mathiesen et al., 2020; Eijkholt et al., 2021). This situation, in turn, has augmented

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Abbreviations

CPR	cardiopulmonary resuscitation
ICU	intensive care unit
EANS	European Association of Neurosurgical Societies
UN	United Nations
WFNS	World Federation of Neurosurgical Societies

concerns about patients' inability to reach equal and adequate treatment. In addition, it has clearly demonstrated the difficulty physicians face in making the right medical decisions. All medical decisions involve applying medical evidence to individual characteristics and values. Hence, in spite of agreement regarding medical facts and evidence, neurosurgical practices may differ based on ethical conduct and values. The World Value Survey ([Values Survey, 2022](#)) identifies major differences related to religious beliefs, socio-economy, self-expression, and survival orientation. It is likely that such differences affect values and moral attitudes. An understanding of the moral landscape in which it will be applied is essential for any implementation of a code of ethics and for any international comparison of medical practice.

The Ethico-Legal Committee of the EANS undertook an evaluation of the use of ethical guidelines and a survey of the neurosurgical landscape of ethics in Europe, in 2006–2007. Previously, the results of these efforts were only disseminated in oral presentations. This paper makes them available for reference and comparison to present attitudes, which will be examined in a follow-up study. The primary aims were to determine whether the ethical guidelines had been implemented and to explore whether ethico-legal differences may exist between European countries and regions.

2. Methods

This work is a project consisting of two parts. Although the first part was originally conducted in 2006–2007 and presented verbally in congresses, the results have never been published until today. We have recently decided to follow up with a second part, which covers the present post-COVID-19 period. This article describes the first part from 2006 to 2007, as the follow-up is currently being carried out by members of the ethico-legal committee of EANS. The first part of the study thereby becomes an obligatory benchmark against which to compare possible changes in ethical values in neurosurgery practice across Europe after the COVID-19 pandemic.

A questionnaire ([Appendix A1](#)) was constructed to investigate the use of the ethical guidelines ([World Federation of Neurosurgical Societies, 1999](#); [Umansky et al., 2011](#)) and to elucidate the implemented ethical practices. We used a two-stage approach with an initial questionnaire response and a validation step. The first reply was created by a senior neurosurgeon from each country. The second step involved validation by the national neurosurgical societies. The informant was asked to record numerous types of factual data and to complete an objective assessment encompassing various ethico-legal issues. The responses were then submitted to the secretary and president of each national neurosurgical society for validation. The officers were asked to comment on the replies that they, as societal representatives, regarded as not representative of their country. One independent “validator” was invited from three national societies and two independent validators from 26 national societies in the second step.

The questionnaire was divided into five sections. The first section contained questions concerning use of the EANS/WFNS good practice guidelines. The second section contained questions regarding decision making in the ICU, discontinuation of care, and the procedures involved. The third section concerned prioritization of neurosurgical care, the quantity of beds, and potential resource shortages. The fourth part

concerned access to equal and adequate care. The fifth part dealt with legal questions.

3. Results

Between 1 September 2006 and 1 May 2007, the questionnaire was completed by senior neurosurgeons with vast national experience and an interest in ethical issues. The completed questionnaires were recorded by one informant, the intended senior surgeons, from each of 29 different European countries (Armenia, Belgium, England, Scotland, Denmark, Estonia, Finland, the Netherlands, Portugal, Lithuania, Turkey, Austria, Greece, Germany, Poland, Slovakia, Iceland, Serbia, Sweden, Romania, France, Ukraine, Norway, Switzerland, Hungary, the Czech Republic, Italy, Spain, and Israel). Minor changes were requested by seven of the 29 participating national neurosurgical societies. Four validators replied that they were satisfied. The chairmen and secretaries of the remaining 18 national societies did not comment or request changes.

3.1. Use of guidelines

Only a minority of all respondents reported that the guidelines were known (34%) or used for decision making (27%) ([Fig. 1](#)). The guidelines were not reported to have any legal impact (100%) and were believed to have affected medical practice in only five countries (17%).

3.2. Discontinuing care and withholding cardiopulmonary resuscitation (CPR)

Fifteen countries (52%) reported discontinuing ventilation in case of a “bad prognosis.” Eighteen countries (62%) reported that they may sometimes continue ventilation while withholding other life support. Seven countries (24%) reported continued ventilation and discontinuation of other support as a common practice.

[Table 1](#) lists numerous conditions that were considered examples of a “bad prognosis,” that would lead to discontinued care. All countries reported discontinuation of care for brain-dead patients. In 16 countries, this was the only condition that constituted a “bad prognosis” to allow for discontinuation of care. Expected vegetative state or manifest vegetative states were considered sufficient reasons in a large minority of European countries. Typically, these countries were situated in north-western Europe and had lower numbers of neurosurgical beds.

The respondents were asked whether “no CPR” would be practiced under different conditions ([Table 2](#)). Brain death was the only indication in eight countries (Italy, Lithuania, Portugal, Serbia, Slovenia, Spain, and Ukraine). Fourteen countries would not provide CPR for a patient who was expected to become vegetative, and 18 countries would not provide CPR for a patient who already had been vegetative for one year, while eight would (Italy, Slovenia, Serbia, Belgium, Spain, Greece, Lithuania, Ukraine and Portugal). A low number of countries in north-western Europe would not use CPR with a patient who was vegetative after two weeks (Norway, Czech Republic, Finland, France, and Holland) or prognosticated to have a “<5% chance of recovery” (United Kingdom, Norway, Hungary, Holland, and Sweden).

The factors that affected decision making were typically neurological condition (86%), prognosis (83%), concomitant disease (70%), and age (65%). Relatives' own wishes were considered in 40% of countries, while patients' wishes as perceived by relatives were considered in 52%. Approximately half (55%) of the European countries reported that decisions were influenced by a pre-written statement.

3.3. Decision to discontinue care

The decision to discontinue care was reported as purely medical in 17 countries ([Table 3](#)). This decision is made by only one physician (attending physician, department head, or ICU physician) in eight countries, while nine countries have a system in which two or more

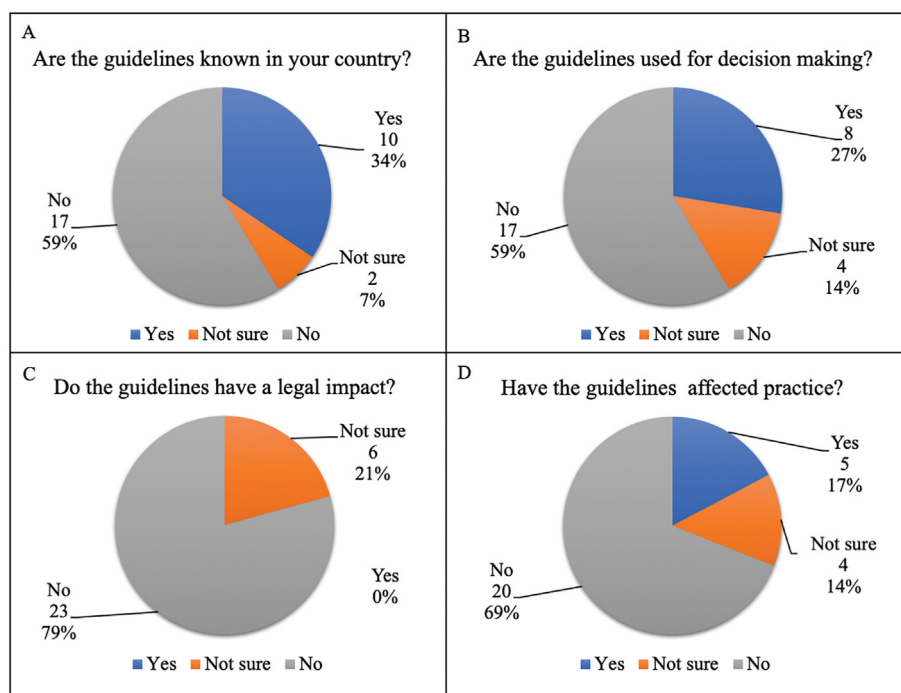


Fig. 1. The four survey questions to determine whether the EANS-WFNS ethical guidelines (World Federation of Neurosurgical Societies, 1999; Umansky et al., 2011) had been implemented. A: Awareness rate of the ethical guidelines; B: rate of use of guidelines in decision making; C: legal impact rate of the guidelines; D: the rate at which guidelines influence medical practice.

Table 1

Reasons to discontinue care.

The conditions which would lead to discontinued care	Number of Countries	Number of Neurosurgical beds/ population (million)
Brain death	29 (100.0%)	65
<i>Brain death only</i>	16 (55.1%)	75
<i>Brain death + other indications</i>	13 (44.8%)	43
Vegetative state	22 (75.8%)	36
<i>Vegetative state at 2 weeks</i>	1 (3.4.8%)	30
<i>Expected vegetative state with optimum therapy</i>	9 (31.0%)	34
<i>Vegetative state at 1 year</i>	12 (41.3%)	44

Table 2

Reasons to withhold CPR.

The conditions which would lead to discontinued care	Number of Countries
Brain death	29 (100%)
<i>Brain death only</i>	8 (28%)
<i>Vegetative state at 1 year</i>	18 (62%)
<i>Expected vegetative state with optimum therapy</i>	14 (48%)
<i>Chance of recovery <5%</i>	5 (17%)
<i>Vegetative state after 2 weeks</i>	5 (17%)
<i>Expected inability to care for oneself</i>	4 (14%)
<i>Hemiparesis and aphasia</i>	1 (3%)

physicians must agree on discontinuation of care. Eleven countries have a more complex system that requires a conference and the agreement of several physicians, relatives, a court of law, and/or an ethics committee.

Procedures are correlated with the number of neurosurgical beds. Countries that require only one doctor to decide on discontinuation of care had a mean of 30 beds per million people. Nine countries with more than one doctor making this decision had a mean of 60 beds per million people. Countries with complex systems of decision-making had a mean of 80 beds per million people.

Table 3

Who decides on discontinuation of care? Legal and procedural requirements.

Parties involved to decide to discontinue care	Number of Countries
Physician(s) only	17 (58.6%)
<i>One attending neurosurgeon only</i>	5 (17.2%)
<i>Attending neurosurgeon + ICU physicians</i>	4 (13.7%)
<i>Attending neurosurgeon + Head of department</i>	1 (3.4%)
<i>Attending neurosurgeon + ICU physicians + Head of department</i>	2 (6.8%)
<i>ICU physician only</i>	1 (3.4%)
<i>ICU physicians + Head of department</i>	2 (6.8%)
<i>Head of department only</i>	2 (6.8%)
Physician(s) + Other parties	11 (37.9%)
<i>Physicians + Ethics committee</i>	2 (6.8%)
<i>Physicians + Court of law or judge</i>	4 (13.7%)
<i>Physicians + Relatives</i>	4 (13.7%)
<i>Physicians + Relatives + Court of law + Ethics committee</i>	1 (3.4%)
Decisions not made	1 (3.4%)

ICU: Intensive care unit.

3.4. Medical priorities and shortages of resources

Only ten countries (34%), with a mean number of 40 beds per million people, reported a shortage of neurosurgical beds. Specifically, five out of six countries (83%) with fewer than 30 beds per million people reported a "shortage." Nineteen countries (66%), with a mean of 79 beds per million people did not report a shortage of neurosurgical beds. Twelve countries (Italy, Scotland, Israel, Turkey, Slovenia, Serbia, England, Norway, Denmark, Greece, and Lithuania) reported insufficient ICU beds.

Of these 17 countries, a shortage of beds was reported by 6 (with an average of 40 beds per million people), and no shortage was reported by 11 (with an average of 80 beds per million people). Twelve countries did not report a national debate regarding resource allocation and priorities. Four of these countries reported a shortage of beds (an average of 42 beds per million people), while eight did not (an average of 79 beds per

million people). Twelve countries (Italy, Scotland, the Netherlands, Israel, Germany, Sweden, Norway, Spain, Estonia, Lithuania, Ukraine, and Portugal; 12/29, 41%) reported a system of priorities. Table 4 shows the diversity of high and low priorities perceived in different countries.

3.5. Access to equal and adequate care

Twenty-four countries reported that all patients had access to equal treatment, while five (Armenia, Greece, Turkey, Italy, and Hungary) did not. A difference in quality between public and private care was reported in 14 countries (48%), and a difference in quality between different centres was reported in 19 (66%) countries.

Numerous questionnaires reported the perceived occurrence of inadequate care for different reasons. Physicians' lack of knowledge was frequently cited as a reason in 13 countries, sometimes cited as a reason in nine, and never cited as a reason in seven. Physicians' greed was frequently reported as a relevant cause in nine, sometimes in six, and never in 14. Unwillingness to refer was frequently reported in 11 countries, sometimes in nine, and never in nine.

3.6. Malpractice and insurance

Most (72%) respondents expressed that there were adequate methods to handle malpractice. However, respondents from eight countries disagreed (Italy, Serbia, England, Denmark, Hungary, Greece, Lithuania, and Armenia). They reported that patients were adequately protected in case of malpractice in 22 countries, but not in Turkey, Austria, Serbia, Greece, Ukraine, Armenia, and Iceland. It was necessary to sue the surgeon to receive compensation in case of untoward outcomes in 14 of 29 countries. Lawsuits were reported to be common in six countries (Italy, France, Israel, Scotland, Spain, and Lithuania). The following 12 countries reported a "feeling of an inappropriate use of malpractice suits": Italy, France, Scotland, Israel, Serbia, England, Romania, Switzerland, Lithuania, Ukraine, Spain, and Hungary. Seven respondents believed that patients take advantage of the legal system, while six reported that the legal system takes advantage via the malpractice suits and benefits financially from lawsuits.

Malpractice issues were reported to be handled by a court of law in 22 countries, by government offices in 19 countries, and by professional societies in 18 countries. Different forms of fines, liabilities, loss of license, and exclusion from professional societies were reported as possible forms of punishment in 14 countries.

Twenty countries reported a system of insurances to protect patients in case of complications, but only 15 countries were believed to provide adequate coverage. In the 20 countries with insurance to compensate patients, inappropriate use of litigation was reported in 30%, and it was necessary to sue doctors for compensation in 30%. In contrast, inappropriate use of litigation was reported in 6 out of the 9 countries (67%) without insurance to protect patients. It was necessary to sue for compensation in 89% of these countries.

Table 4
Highest and lowest priorities.

Disease condition	Number of countries scoring		
	Total No: 29		
	High priority	Intermediate priority	Low priority
Acute, potentially curable	16 (55.1%)	13 (44.8%)	0 (0%)
Acute, questionable prognosis	2 (6.8%)	19 (65.5%)	8 (27.5%)
Cancer screening	15 (51.7%)	10 (34.4%)	4 (13.7%)
Elective curative surgery	12 (41.3%)	14 (48.2%)	3 (10.3%)
Malignant glioma	5 (17.2%)	22 (75.5%)	2 (6.8%)
Recurrent malignant glioma	1 (3.4%)	21 (72.4%)	7 (24.1%)
Terminal care	3 (10.3%)	18 (62.0%)	8 (27.5%)

4. Discussion

Our 2006–2007 survey provided a primary, wide, and general benchmark for European ethico-legal issues in neurosurgery. The questionnaire revealed extensive differences within Europe. The questionnaire also highlighted that the EANS/WFNS ethics code and the good practice guidelines (World Federation of Neurosurgical Societies, 1999; Umansky et al., 2011) were largely unknown. Furthermore, views concerning life and death issues, the need to establish priorities, and the use of litigation differed extensively. Such differences may depend on political contexts and national legislation, but they also correlate with different values and different views regarding what is ethically right or wrong. Although it is already historical, it provides a reference for our ongoing inquiry of the present post-COVID-19 situation.

The EANS and WFNS ethics committees constructed a series of guidelines for ethical behaviour. However, these guidelines have only had only a marginal impact on practices since their publication. Many countries were oblivious to the guidelines, and most commonly, they were reported to not be used. They have not been extensively cited in the literature, and the WFNS ethics committee even published a new set of guidelines without a clear reference to the previous ones. The original guidelines (1998) (World Federation of Neurosurgical Societies, 1999) were published as an editorial and commented upon journals, but examples of implementation or citations are not available. The WFNS guidelines (2011) (Umansky et al., 2011) have only 7 Clarivate citations (Clarivate™ Analytics, Philadelphia, United States) as of April 2022. These findings, including their questionable dissemination, raise questions concerning the value of guidelines. Guidelines can define areas of possible conflict between values and offer support for reasoning. It is clear that guidelines must be implemented if they are to have a positive effect on professional decision-making. They can then provide a framework for analysis of individual cases and problems. However, ethical reasoning is a practical activity that requires training and knowledge (Borhani et al., 2010; Helft et al., 2009; Moon et al., 2014). The main value of ethical guidelines lies in the process of implementation and in actual analysis of individual problems and how they reflect on the guidelines. Guidelines can serve as a formalization of professional ethics, but they also must be implemented and used as a tool to maintain or develop professionalism. As such, we do not think that detailed guidelines can serve to regulate ethical behaviour. A general codex that identifies individual moral agency and professional duties as a foundation of professionalism is probably more useful, since moral agency and judgement must be exercised all the time, and not only as a practice of applying detailed guidelines. Although they are available, ethics guidelines do not appear to attract readers and citations. Hence, they must be disseminated via other means, including workshops and electronic media.

4.1. Discontinuation of treatment, life, and death

Reasons to discontinue treatment, practices to discontinue, and attitudes toward not performing CPR reflect exceptionally different approaches and values. Interestingly, the countries that reported the lowest numbers of neurosurgical beds and problems with resource shortages also had the most frequent indications to withhold or discontinue treatment as well as the least complicated procedures to discontinue treatment. Typically, one physician could make the relevant decision, while countries with higher numbers of beds and stricter requirements had more complex modes of decision making. The countries with strict criteria, complex practices, and large numbers of beds could be described as adhering to a "sanctity-of-life" view. In contrast, other countries regarded the value of life as instrumental to achieving other values, but not as a value in itself. For the latter group, the physician must sometimes prioritize and decide which life to save: the one with the poor prognosis in the intensive care bed or the next new arrival with a better prognosis. Those with many beds—and therefore more empty beds—generally have

more time for decision making.

Views regarding the value of life differ between cultures. A world value survey (WVS) produced the Inglehart-Welzel cultural map (Inglehart and Welzel, 2011), which differentiates between rational/secular and traditional cultures and between cultures that value survival as opposed to self-expression (Values Survey, 2022). The countries with the most pronounced rational/secular and self-expression values had the lowest numbers of beds, the broadest indications to withhold or halt treatment, and the simplest procedures to discontinue. The “post-communist” countries with high rational/secular ratings, but lower self-expression values also ranked near the northern-western European countries. The countries that regarded life as an intrinsic value were less extreme on the Inglehart-Welzel map (Inglehart and Welzel, 2011). They were centrally located in the map and had higher “traditional” and “survival” scores. European Catholic countries, Turkey and Israel were in this group. Interestingly, Germany had a comparatively high rational/secular rating, but not a correspondingly high self-expression rating, and it differed immensely from Norway, Sweden, England, and Holland. Germany and Belgium reported high numbers of beds and extensive procedures to discontinue care when considered adequate. Perhaps German culture was influenced by an awareness of how fragile medical ethics could be, while affluent countries in the north-western part of Europe considered these issues rationally and disregarded more religious attitudes toward the value of life as superstitious and outdated. Regardless, it appears that there are strong correlations between culture and how care is provided in existentially extreme conditions, with variations across Europe.

We detected an inverse relationship between resources and attitudes toward treating patients in severe conditions. This relationship could either reflect either economical pressure affected end-of-life decisions or that cultural differences allowed for legally visible ways to withhold or discontinue care with subsequent limited need for ICU resources. It is possible that both mechanisms are relevant, disturbingly, though, economic pressure seems to play a large role since the respondents with more limited resources and more restricted care also described a feeling of “lacking sufficient resources”. It appears that medical practices and professional values were, to some extent, an adaptation to limited resources, suggesting that this is an area where slippery slope arguments are relevant (Volokh, 2003). This mechanism is psychologically understandable, as ethical agents must adapt to their clinical realities, but it is unclear whether this is an actual mechanism that may subject neurosurgical patients to inadequate care. At present, such a finding requires additional corroboration because of the extensive existential consequences. We need prospective trials to validate patient management and more extensive epidemiological analyses. At this point, however, the awareness of this possible bias in decision making will diminish the future risk of poor decisions.

4.2. Priorities

Only 41% of the participating countries reported that medical priorities were not an issue, implying that medical care was available as needed and requested for all patients. In contrast, there appeared to be a discrepancy between supply and demand for care in the remaining 59% of countries. Priorities were considered integral to healthcare politics in these countries. The common belief was that demand for healthcare is unlimited (Scott et al., 2001) and that vertical prioritization is necessary to keep healthcare spending at a realistic level (Cromwell et al., 2015). Vertical prioritization is a practice in which the responsible healthcare professionals are expected to establish priorities within a budget allocated by politicians or administrators. In contrast, horizontal prioritization compares different fields to each other and could weigh the need for intensive care beds against government support for political parties. Usually, prioritization is perceived as a medical professional's task; consequently, medical professionals are expected to choose which healthcare needs should be covered and which patients should be treated

(Hulsbergen et al., 2020; Mathiesen et al., 2020; Eijkholt et al., 2021).

The discrepancy is intriguing, especially since affluent northern-European countries perceived a shortage of available care and a need to restrict access, while economically poorer countries did not. The reasons for this discrepancy are unclear and were not addressed by the questionnaire. One reason could be that healthcare is labour-intensive and that the cost of labour is relatively higher in the richest countries. Another reason could be that demand for expensive care is higher. However, it is also possible that healthcare is directed differently in different countries (Castlen et al., 2017).

4.3. Access to care

Most countries reported that all patients had access to equal and adequate neurosurgical care for all patients, but many aspects of ethical delivery differed. In contrast, respondents in many countries expressed that patients could be deprived of adequate care for several reasons. At first sight, general access to equal care is not consistent with reports that patients may have been deprived of it. It is possible that access to care is equal in the sense that anybody with appropriate economic resources, insurance coverage, individual contacts, or knowledge to request the desired quality can obtain the same quality of care, but that individuals are required to carry responsibility for acquiring the desired care. The questionnaire did not address different interpretations of “access.” Possible differences in “access” and how these differences may affect ethical issues must be studied in depth with a different and appropriately formulated inquiry.

The reasons why adequate care was denied were, however, described as causes that are central to the quality of professional conduct and performance. Inadequate knowledge, unwillingness to refer, and even physicians' greed were cited as causes of inadequate care in one-third of countries. Post-graduate training related to medical issues and ethical reasoning can most likely mitigate such problems. Professional societies could play a role in counteracting such threats to patient care. There is evidence that moral reasoning and behaviour improves with increased awareness and training (Borhani et al., 2010; Helft et al., 2009; Moon et al., 2014). It could thus be an ethical duty to improve ethical behaviour and professional knowledge. It is, however, also possible that the responses reflect a schism between university employees and private practitioners. Hence, there might be a risk of bias. The respondents were professional leaders from university hospitals who may have felt that more patients should be referred to their academic settings for adequate care.

4.4. Malpractice and patient protection

A large majority of respondents reported that patients were protected in cases of malpractice and that malpractice issues were adequately handled. Twenty-two countries reported that court procedures were necessary for patients to receive compensation. The system for litigation as opposed to insurance to cover and protect patients in cases of malpractice and unexpected complications may be a better solution. According to the questionnaire, a larger proportion of countries reported inappropriate litigation in the countries that lacked specialized insurance for patients. Professional malpractice was either handled by professional societies (18 countries), courts of law (22 countries), or governmental offices (19 countries). The bodies thus reflect political power and policy making, legal power, or professional self-regulation. The impact of different regulatory bodies warrants in-depth studies. The questionnaires could not discern the overlaps and pros and cons of bodies' different systems and responsibilities. It would be interesting to evaluate what society gains from either system to preserve the superior systems. Only seven countries reported that malpractice issues were inadequately handled. We feel that the realization that most European countries address this acceptably may set an example and empower professional bodies to use good examples to improve the national situations in the

seven underperforming nations. Adequate malpractice systems are important for patients and doctors alike.

4.5. Weaknesses

This study is a preliminary, qualitative, and general character. It was designed to provide a cross-sectional examination of relevant ethico-legal issues in European countries to identify areas for detailed analysis. The study could not provide a detailed sociological data with statistical evaluation of population responses; such a study would have been out of the scope of a scientific article, and it would have required unattainable resources. The questionnaire sampled simple facts and general evaluations of ethical issues relevant to neurosurgical practice in order to identify areas that warrant quantitative data. While a single person's reply is subject to individual differences in evaluation, we regarded the assessment by nationally elected officials as a legitimate means of validation. The validation process never led to requests from the national bodies for significant changes to the primary replies. We can never exclude the possibility that other informants or other national society representatives would have responded differently. However, given the results' their general character and the agreement between first and validated results, we have reason to believe that the results were representative.

The aim to compare ethico-legal views and practices in neurosurgery was limited by the preliminary fact-finding character of the study. Nevertheless, the study provides a novel approach and new information to understand and influence professionalism and to understand how professional ethics influence decision-making. The identification of national differences provides examples that can serve as models for weaker countries, and it identifies weaknesses that must be improved. Our data broadens national perspectives and can empower international neurosurgical professionalism as a counterbalance to national political goals, which may have beneficiaries other than neurosurgical patients. However, it is worth noting that the questionnaires were distributed in 2007; consequently, new surveys may indicate changes made in recent years.

4.6. Professionalism and ethico-legal issues

"Professionalism" can be viewed as the behaviour of professionals in a social contract with society (Cruess and Cruess, 2008). In the context of neurosurgery, society grants exceptional power to neurosurgeons, including the power to handle extreme existential challenges and to perform invasive surgery on sensitive structures. In return, "professionals" have a high degree of accountability and are responsible for managing the power granted for the benefit of society in the form of individual patients. Professionals are further characterized by their possession of professional knowledge and skills that are esoteric to non-professionals, their code of professional ethics, and their self-regulation (Balak et al., 2020). The latter conditions are necessary because professional skill confers a monopoly on knowledge that is fully accessible only within the profession, and regulation is a necessary aspect of accountability. In this context, professional ethics is a pivotal component of professionalism.

The survey provided a benchmark of ethical issues relevant to professionalism. The results can serve to identify individual and national weaknesses and strengths, both of which can be used to improve professional behaviour. Naturally, society can demand a high degree of accountability and perfect professional performance in return for the power granted to professionals. Reciprocally, perfect performance is likely the most important means to retain the power needed to practice. Hence, the survey data can mobilize political action to benefit neurosurgical patients.

An interesting question to consider is why a decision is difficult. A decision is individual and targets only a unique case. Decision making involves knowledge of the relevant external data, such as science and law etc, and shared decisions with the knowledge of internal data, bias,

personal considerations such as religious beliefs. One important perspective is lacking: one should consider "shared decision-making" and how to involve the patient. Evidence, legal regulations and ethics provide a framework while the knowledge and skill of the responsible professional caregiver is to adapt this framework to the individual. In other words, the professional decides which medical, legal, and ethical data apply and adapts them to the patient's subjective values and goals. This means that patient and professional should agree on goals and risks when decision making. Either all alternatives are equal in risk/benefit and one cannot easily select "the best" alternative, or one must make a choice where values are conflicting; finally it could be difficult because a reasonable decision may carry emotionally difficult consequences – such as switching from curative to palliative care or refusing to operate on a hopeless case.

4.7. Use and further directions

Codes of professional ethics are intended to universalize professional ethics and to enable accountable medical decision making. Every decision requires professional knowledge and defines the role of individual neurosurgeons as moral agents with ultimate responsibility for their individual patients. Whether values exist and whether they are universal are controversial topics addressed by a major field of research in philosophy; however, the United Nations has declared that certain rights are universal (Universal Declaration of Human Rights (UDHR), 2015). It is possible that certain abstract values, such as a *prima facie* respect for life, are universal, while detailed understandings of values and applications of personal ethics may differ. Karl Popper noted that the study of human behaviour is particularly prone to scientific difficulties because research and scientific results affect behaviour (Jarvie and Miller, 2006). For this reason, a study of ethics and regional differences can be expected to affect practice, and an awareness of good or bad examples may change individual decisions. Psychological research suggests that people tend to be altruistic and support "good" values (Andreoni et al., 2008); philosophically, this can be viewed as a contribution to the common good (Brink, 2003). Aristotle noted in *Nicomachean Ethics* that whenever we act, we aim toward virtue (Reeve, 2014). In line with this reasoning, it was reported that the questionnaire itself led to the implementation of ethical guidelines in Estonia (Toomas Asser, personal communication). Our general impression is that formalized training in ethics and ethical analysis has not been sufficiently covered in post-graduate training nor exercised in clinical neurosurgery. Thus, there is probably an unmet need for better training. In a rigid hierarchical system, if residents do not receive formal ethics training, they risk failure to grasp ethical issues because they do only what they are told. The need for a formal ethics curriculum has been recognized by various surgical societies in Canada, the United States, and the United Kingdom (Tisell et al., 2020). In neurosurgery, ethical discussion groups are formed in all parts of the four-year cycle in EANS training courses. In Sweden, it was decided that the oral neurosurgery board exam should include ethical discussions (Tisell et al., 2020).

5. Conclusion

We have presented data from a 2006–2007 European questionnaire concerning ethico-legal issues; these data form a preliminary benchmark for future inquiries. Numerous wealthy northern European countries reported a lack of beds, which appeared to affect practice in life-threatening situations. Many countries reported that sufficient numbers of beds were available for the treatment of all neurosurgical patients, while others described a reality in which not all patients received medically motivated care; instead, there were political discussions regarding "necessary prioritization." Numerous countries reported inadequate care that appeared to correlate with non-professional behaviour and legal systems that needed improvement to protect patients and doctors in some countries. Our findings identified many areas

of improvement to ensure better professional quality and conduct at the individual and national levels. The findings also revealed inadequacies and weaknesses of policies and resources that should fuel national discussions to improve the conditions for the practice of professional ethics. Finally, our findings highlight the importance of values and professional ethics in decision making. Unfortunately, only a minority of neurosurgeons know the neurosurgical ethical guidelines and apply them in their decision making.

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Author statement

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Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

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Appendix A1. Supplementary data

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