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REVIEW

Ethical aspects of waiting lists in neurosurgery

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Abstract

Purpose Long waiting times for elective surgery have been a persistent problem in many countries since well before the COVID-19 pandemic. This study aims to describe the extent of waiting lists&times for elective neurosurgery and discuss the potential ethical dilemmas they pose.

Methods A narrative review was conducted on waiting lists & times in neurosurgery using PubMed and the Web of Science Core Collection.

Results The majority of the available data on elective surgery waiting times and lists are based on analyses of non-neurosurgical interventions. These are generally high-volume surgical procedures, such as cataract surgery, hip replacement, and knee replacement. Elective surgery waiting times challenge the clinical application of the bioethical principles of beneficence, nonmaleficence, autonomy, and justice. Extensive waiting may prolong time to benefit or even lead to harm. Moreover, failure to receive timely care runs counter to patients' autonomous wishes to be treated without delay. Finally, different principles of distributive justice are likely to contradict each other under the conditions of restrained access to care that exist when patients must wait for care. It is essential to ensure that patients on waiting lists receive fair access to health care services.

Conclusion This analysis indicates that long waiting lists potentially violate three of the four basic biomedical principles proposed by Beauchamp and Childress. The fourth principle, justice, is also challenged and remains to be analyzed in reference to underlying ethical principles. From an ethical perspective, waiting lists create accountability at the governmental, institutional, and physician levels, although not to an equal degree.

Keywords Elective surgery · Ethics · Neurosurgery · Waiting list · Waiting time

Introduction

Unnecessarily delayed neurosurgical care has high individual and societal costs, both financial and nonfinancial [13, 45, 58, 64, 66, 77, 89]. Delays in performing clinically indicated neurosurgical interventions can be associated with increased uncertainty, dissatisfaction, pain, and anxiety among patients [33, 73]. Neurosurgical patients on waiting lists are among those most likely to report significant and severe depression [89]. As a result, long waiting times may worsen clinical outcomes, increase costs, generate inequalities, decrease quality of life, and adversely impact patient trust in health care and health care staff [7, 13, 47, 58, 61, 66, 86].

Long waiting times for neurosurgery are noteworthy in almost all parts of the world [17, 36, 66, 73, 89] and are frequently criticized in the media, accompanied by demands for political action [40, 62, 64, 66, 77, 95]. When waiting times for outpatient appointments and diagnostic procedures are considered alongside waiting times for surgery, it becomes evident that the delay in patients' access to treatment is a critical issue globally. For example, as of 2022, there were six million people on NHS waiting lists in the United Kingdom (UK) alone, encompassing all medical specialties [40]. Moreover, in many low- and middle-income countries in Africa, which account for approximately 15% of the global neurosurgical disease burden, access to neurosurgical services is far more difficult, and surgical procedures are frequently delayed due to staff shortages and geographical, social, or financial barriers [51]. For example, a study conducted at a tertiary referral hospital in Ethiopia, a low income country, found that the median time from symptom onset to neurosurgery consultation was 185 days and that the median time from neurosurgical decision-making to surgery was 44 days [17]. As an example of a lower-middle-income country, in Nigeria, the waiting time for a non-neurosurgical procedure (urological)

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has been reported to range from 0.5 to 36 months [67]. A study covering mostly upper-middle-income Latin American countries (Colombia, Mexico, Uruguay, Dominican Republic, Brazil, and Argentina) found that the vast majority of patients with adolescent idiopathic scoliosis (66.8%) waited approximately 6 months for surgery, and 33.9% waited a year [39]. In Türkiye, another upper-middle-income country, the waiting time for non-neurosurgical procedures (orthopedic surgery and general surgery) ranges from 1.5 to 3 months, while for cardiovascular surgery it can be 6 months or longer [48]. As an example from high-income countries, according to the OECD's Health at a Glance 2025 report, in OECD countries (based on the average of 10–11 countries), 43% of patients wait more than 3 months for an ophthalmological surgery and 58% wait more than 3 months for an orthopedic surgery [65]. In Australia, another high-income country, it was reported that in 2024–2025, 50% of patients waited up to 37 days for neurosurgical procedures, while 3.8% waited 12 months or longer [4]. Since waiting times in these examples have been measured and reported using different methods and within various surgical specialties, direct comparisons are inherently limited; however, they still help illustrate the magnitude of surgical waiting times in diverse health care settings.

Some argue that waiting times are unavoidable in health care systems and are primarily caused by the interaction of numerous complex factors, including supply and demand balance, patient characteristics, physician workload, appointment scheduling, and patient preferences [32]. However, medicine is not only a practical or technical field, but inevitably a moral one as well [49]. Thus, long waiting times for elective surgery could raise many ethical concerns related to patient care [31]. The medical literature on ethics and waiting lists comprises an almost exclusive focus on organ transplantation while a limited body describes patient experience or socio-economic factors. Ethics of organ allocation reflect underlying shortages of available organs, which concerns a minority of all medical waiting lists. Most waiting lists handle regular medical and surgical practices, where an unsolvable equation of demand for scarce organs cannot justify a need to wait for treatment. Yet, applied ethics in the medical field have not addressed how waiting lists agree with or violate ethical principles. Normative ethics discusses the use of different systems of ethics, but Beauchamp and Childress's (B&C's) [12] four principles of bioethics perspective have reached wide acceptance in applied medical ethics as the commonest framework to structure ethical thinking in clinical practice. To address this gap in the medical literature, this study aims to analyze the phenomenon of waiting lists from an applied bioethics and to identify potential ethical challenges and administrative shortcomings in addressing waiting times for elective neurosurgical procedures.

Methods

A narrative review was conducted on November 23, 2024, and regularly updated until December 31, 2025. Searches were conducted on PubMed and the Web of Science (WOS) Core Collection using the following key terms: "world or global or Europe or Asia or Middle East or Africa or Australia or America" and "waiting list or waiting time" and "neurosurgery or neurosurgical or neurological surgery". No filters such as publication date, publication type, or language were applied in the searches. Furthermore, without applying any "neurosurgery" term restrictions, articles related to waiting lists/waiting times in general elective surgery were found in PubMed and the WOS Core Collection and later read. In addition, related books, publications of national or international health institutions, and the references of obtained articles were examined and discussed. Next, we contextualized findings in the applied framework of four principles of bioethics as proposed by B&C [12] and further discussed ethical dilemmas in the Discussion. The analysis of the findings was presented in a narrative synthesis because of the inherent heterogeneity of publications related to ethical aspects of waiting lists and times.

Results

Of the sources we found, 128 were deemed suitable for full-text review on the topic. Some studies addressed multiple themes and therefore overlapped conceptually. However, to ensure clarity in the presentation of the results and avoid duplication, each article was categorized according to its principal focus. The studies were subsequently grouped into six main thematic categories: Normative ethics, justice theory, and ethics studies in health care (18 sources), human rights, global health policy reports, and institutional documents (22 sources), waiting time/studies on inequality in access to health care (23 sources), clinical outcomes and the effects of waiting time (40 sources), health systems and management models in health care (11 sources), and the impact of COVID-19 and crisis management (14 sources).

Ethical analysis of waiting lists and times

The waiting list or waitlist for elective surgery is a measure of the number of patients waiting for treatment and a measure of their expected time to wait. Typically, they can be affected by long waiting times or by an inability to undergo surgery at their preferred time, which forces them to wait until others with similar conditions are operated on [58, 93]. The terms "waiting list" and "waiting time" are often used interchangeably since they describe interconnected aspects of patient access to care. The waiting time typically can be

calculated from the referral, first specialist visit, or placement on the waiting list and ends on the day of surgery or hospitalization [54, 55, 58, 66, 72, 86, 93]. Elective surgery waiting times can be subjected to ethical analyses from perspectives of applied ethics. We have chosen to primarily analyze how waiting lists challenge the clinical application of the four main bioethical principles: beneficence, nonmaleficence, autonomy, and justice [12].

Beneficence

At first glance, delaying the procedures required for the patient's treatment appears to be incompatible with the principle of beneficence, which entails doing what is considered good for a sick person. Nevertheless, there may be exceptions. For example, in a case involving an acute intervertebral disc herniation, delaying surgery can be conducive to the patient's well-being and the promotion of health care if an initial conservative approach can allow for spontaneous recovery [70]. A truly beneficent approach would spare the patient an unnecessary operation by initially relying on less invasive management while avoiding needless surgical booking. It is postulated that the patient would benefit "at the end of the day" from avoiding unnecessary surgery even though surgery could have shortened the duration of the patient's suffering. This is particularly crucial in neurosurgical procedures, in which balancing the possible benefits and risks of a procedure is delicate [1]. The prima facie idea to reduce waiting time for the principle of "beneficence" must thus be qualified with the presence of an unequivocal medical indication to have a short waiting time. A short waiting time minimizes possible suffering while awaiting cure and it prevents possible worsening of the underlying disease. The principle of "beneficence" thus reflects the principle of "nonmaleficence". Worsening can comprise progression of a malignant disease, or in cases of delayed treatment, an increased risk of patients developing disabling chronic pain, such as neuropathic pain in compressive radiculopathies [84]. In addition, waiting times for elective surgery are a source of psychosocial distress for the caregivers of pediatric patients [33]. From the physician perspective, waiting times undermine physicians' professional duty and autonomy in treating their patients [86].

Nonmaleficence

" Nonmaleficence" is to a large extent similar to "beneficence" in the context of waiting lists; patients may suffer while waiting for surgery and their underlying disease may progress. The need to avoid a particular procedure to prevent harm to the patient is particularly important in neurosurgery [1]. In typical cases, delayed surgical treatment may lead to harm—namely, a failure to benefit, with potential irreversible consequences. However, at times, delaying surgery may paradoxically align with the principle of "do no harm." For instance, long waiting times negatively impact patients' physical and psychological health. Braybrooke et al. [15], found that a longer waiting time adversely affected pain severity and physical function after lumbar spine surgery for degenerative disorders. Furthermore, a Canadian study showed that waiting for more than 12 weeks for an elective lumbar discectomy was associated with worsened pain six months after surgery [73]. As another example, in a patient with internal carotid artery (ICA) stenosis who presents with symptoms of intermittent cerebrovascular insufficiency, ICA stenosis should be treated urgently, if indicated, as this is necessary to shorten the period the patient is at risk of a stroke from cerebrovascular insufficiency [16, 68]. Similarly, glioblastomas should be treated rapidly since the posttreatment Karnofsky performance status decreases as the time to glioblastoma resection increases [26].

Three representative anonymized radiological images from routine clinical practice at the participating institutions represented by the author affiliations were included as examples of the principles of beneficence and nonmaleficence, with written informed consent for publication obtained from all patients. Figure 1 shows a patient whose arteriovenous malformation bled during the surgical waiting period, and Fig. 2 shows a meningioma that enlarged while the patient was waiting for surgery, with an associated increase in the risk of postoperative deficits. As mentioned above, postponing discectomy surgery for a few months to allow for the possibility of spontaneous recovery from radiculopathy caused by a herniated lumbar disc may result in a favorable outcome while sparing the patient unnecessary surgical risks. One such patient, whose clinical and radiological findings improved while on the surgical waiting list, is presented in Fig. 3. In this particular case, avoidance of surgery is aligned with the principle of nonmaleficence. In contrast, in some cases, early surgery may be appropriate to alleviate severe pain, allow patients to return to work, or avoid psychological distress while awaiting spontaneous recovery. Thus, the subjective evaluation of harm may differ between patients and those responsible for delivering care, especially if resources are limited. Overall, empirical evidence shows that long waiting lists not only increase costs while delaying surgical treatment but also jeopardize final outcomes [15, 19, 43, 79, 80]. We cannot identify ethical reasons in terms of benefit or avoidance of harm to justify delaying surgery. When "all other things are equal" and the surgical indication is balanced, extended waiting conflicts with both the principles of beneficence and nonmaleficence.

Autonomy

In medical ethics, autonomy can be defined as patients' right to make their own decisions [1]. This may mean that patient

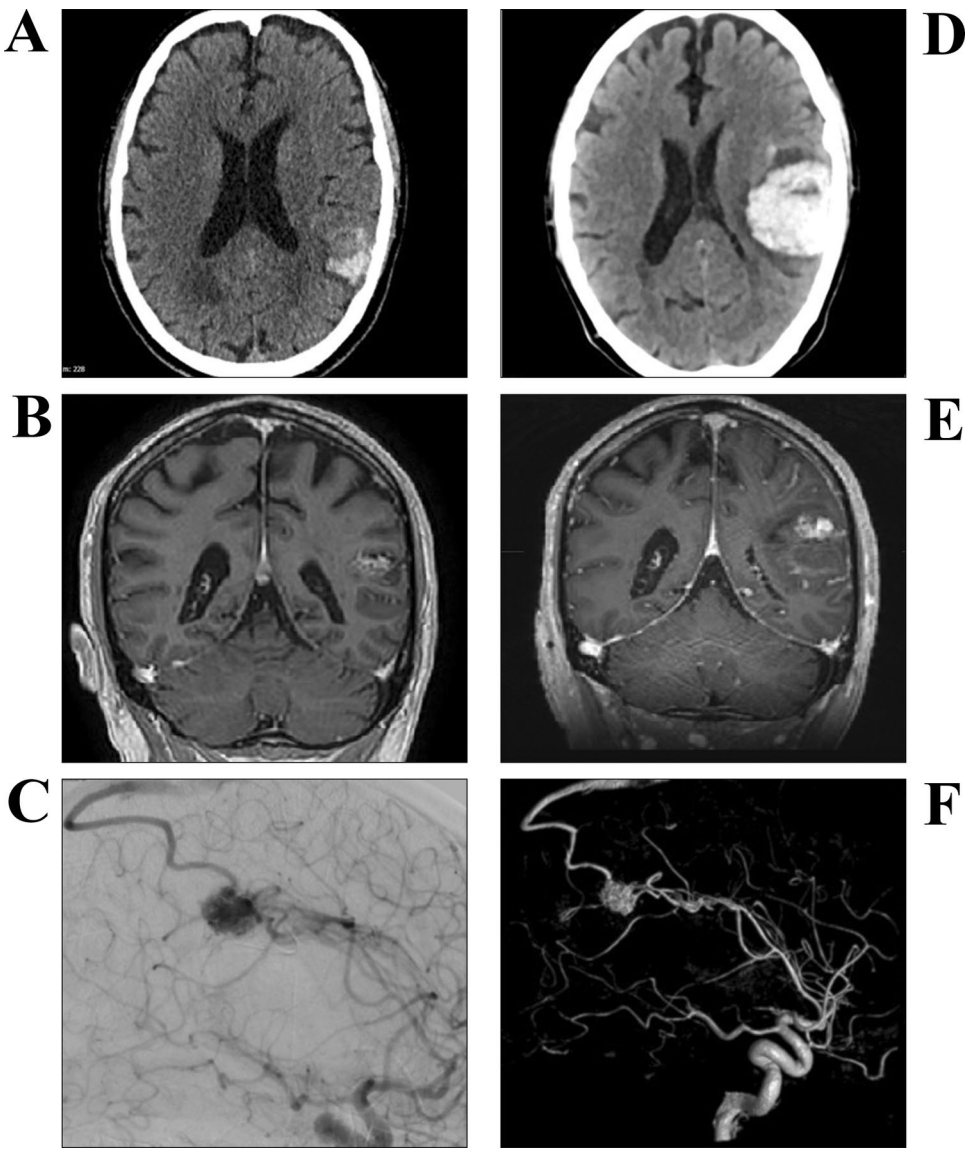

Fig. 1 The patient's arteriovenous malformation bled, and the patient worsened during the surgical waiting period. Initial radiological scans (**A–C**) and follow-up scans (**D–F**) are shown. This illustrative case indicates how extended waiting times may expose patients to risks of deterioration and is therefore related to the medical ethics pillar of nonmaleficence because the natural history of vascular malformations meant, in this case, exposure to harm

autonomy has been at least partially violated if patients cannot receive treatment at the desired time. For example, the patient with a meningioma whose scans are shown in Fig. 2 could have opted for stereotactic radiosurgery when the tumor was diagnosed, but this option was no longer available due to tumor growth while waiting for neurosurgical consultation. Another concern regarding autonomy relates to informed consent. Every patient has the right to make informed decisions about their care and receive treatment at the appropriate time. However, there is often a lack of accurate and transparent information available to patients on waiting lists regarding their positions in the queue, expected waiting times, and alternative treatment options. The most concerning point is whether the situation has changed between the moment consent was given and the time of surgery. An initially informed, autonomous treatment decision can become irrelevant while waiting, as seen in the examples of the meningioma and disc cases.

Autonomy can still be improved when external factors make a desired choice impossible. Patients sometimes acknowledge that resources are limited, but they do not understand why they have not been provided with a definite waiting time. Consequently, they may feel like they are facing a kind of lottery, with an uncertain chance of winning or losing [83]. Uncertainty is a source of concern for patients, and adequate communication and informed consent are crucial to respecting patient autonomy and empowering them in decision-making. A simple phone call to inform patients of their waiting list status can reduce uncertainty and improve the sustainable planning of elective surgery [63]. Transparent criteria for prioritizing patients on waiting lists are essential to ensure that resources are allocated fairly and equitably. Respecting patient autonomy means allowing patients to choose their care as they wish. However, autonomy does not grant patients the right to use or allocate

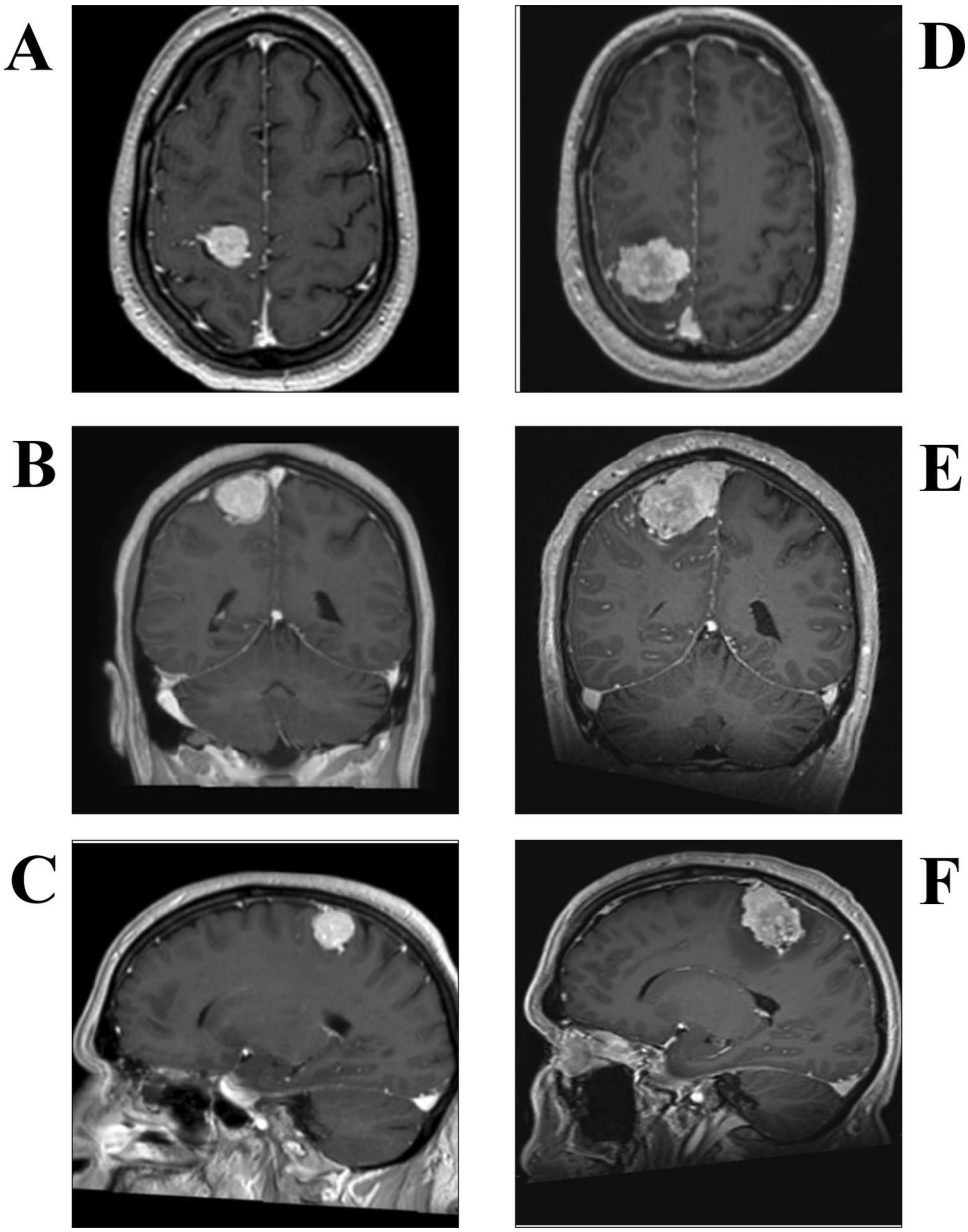

Fig. 2 The patient's meningioma enlarged while on the surgical waiting list. Initial radiological scans (**A–C**) and follow-up scans (**D–F**) are shown. This illustrative case indicates how extended waiting times may erode patients' ability to choose among a wide range of treatment options (such as radiosurgical management of the meningioma when its size still allowed for it) and is therefore related to the medical ethics pillar of autonomy

resources that belong to others, such as public or societal resources, without limits.

Although the literature on waiting times has largely focused on patients undergoing surgery, "cancellations" have been neglected. Cancellations constitute a key feature of waiting lists, as they indicate patients dropping off the list prior to surgery [20]. Some patients leave the waiting list without undergoing elective surgery to apply for alternative treatments or seek treatment at another health institution; alternatively, they may have moved away from their homes or died. Such patients are not included in the measurements of waiting times and lists [86]. Patients from disadvantaged socioeconomic groups, men, and older adults are more likely to cancel elective surgery [20]. Thus, the inability to provide timely access to treatment conflicts with the principle of applying clinically effective practices to benefit and not harm the patient. However, since the demand for health care services is high and supply is limited, waiting times for elective surgery can be long. In such cases, it is necessary to ensure that patients can exercise autonomy maximally with effective communication and updates on the patient's situation. Taken together, a long-waiting list is not compatible with the principle of autonomy.

Justice

The moral principle of justice implies the optimization of a fair and equitable distribution of health care resources in a

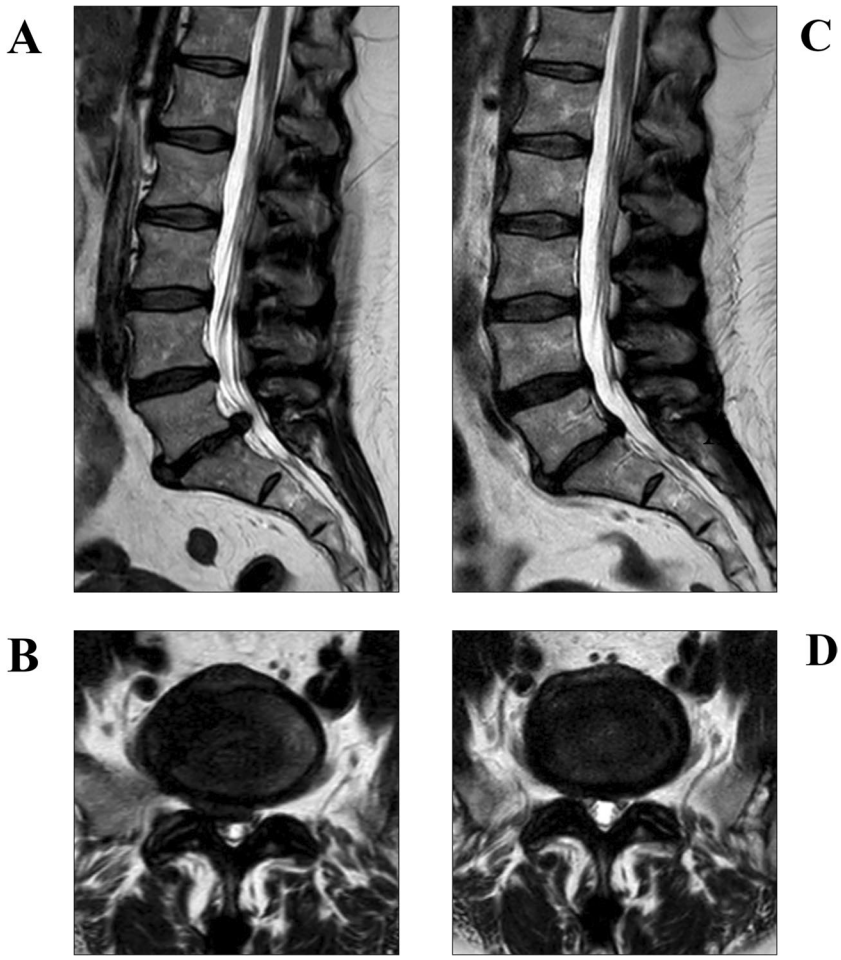

Fig. 3 Radiological scans of a patient with an intervertebral disc herniation whose symptoms improved while on the surgical waiting list. Initial radiological scans (**A–B**) and follow-up scans (**C–D**) are shown. This illustrative case is related to the medical ethics pillar of beneficence and indicates how extended waiting times have highlighted problems with the way surgical indications are made in contemporary neurosurgery. Given long waiting times, many surgeons add patients to their waiting list earlier rather than later; however, adherence to guidelines on degenerative disc disease, which recommend managing patients conservatively for 3–6 months before considering discectomy, would have prevented an unnecessary admission [60]

given society, including the distribution of the doctor's time and attention [1]. In contrast to the principles of beneficence, nonmaleficence and autonomy, justice includes not only the individual patient, but also society as a whole. Globally, health care systems and resource allocation vary extensively; waiting lists are multidimensional and time to wait as well as availability of care differs. Global inequality remains obvious, but principles of global justice are abstract: it is problematic to claim a right for global justice in the absence of a body with a duty to guarantee such global justice. In contrast, states that have signed the UN charter of human rights [92] have assumed a duty to provide equal rights including a right to medical care (Articles 1 and 25) to their citizens. Subsequently, upholding a principle of justice has become a national commitment. Paradoxically, the principle of justice is not violated by a very long waiting list provided that everyone suffers *equally* from the delay. Moreover, principles of justice may be fully observed under seemingly unfair conditions if everyone gets care based on equal principles. One example would be if the same principle of "excellent care at a high cost" applies to the wealthy and the poor, although only the former can afford treatment. However, in practice, long waiting lists are inherently associated with variation in time to treatment, with subsequent issues of fair distribution.

A long stable waiting list is essentially an indicator of poor-quality health management [69, 93], whereas a growing list in which more patients are added than treated suggests a relative lack of resources. It can be argued that it is ethically wrong to manage health care badly, but more challenging ethical issues arise if waiting lists signal a lack of resources, as this would lead to patients being deprived of the health care they are entitled to. Principles of fair resource allocation include distribution according to need, waiting times, economic capacity, and access to care. Such principles have been discussed extensively in prior research [29, 44, 56, 57]. Waiting lists can serve in handling an explicit or a hidden shortage of resources.

In this vein, a potential solution for health managers is priority rationing [8, 29, 75, 76]. Waiting lists can sometimes be viewed as a form of hidden rationing, with patients even dying while waiting—an outcome often observed in transplant cases [94]. A similar scenario arises when lengthy waiting lists are created for patients with glioblastoma. It has been reported that waiting more than 21 days before

resection in patients with glioblastoma is associated with worse clinical outcomes and that longer waiting periods may therefore be inappropriate [26]. Moreover, if rapidly progressing abscesses, which can be effectively treated with surgery, are mistaken for gliomas, the patient may die while awaiting surgery. In addition, socioeconomic status, age, ethnicity, communication skills, gender, or geographic location may result in unequal access to neurosurgical procedures during priority rationing [10, 29, 58, 69, 87]. Those who are better educated and wealthier are likely to face shorter waiting times for treatment [87]. Furthermore, there are potential barriers to older adults' access to health services, and their waiting times may therefore be longer [28]. Waiting times have been found to be the shortest for patients aged 30–45 years [20].

Priority guidelines for surgery may categorize patients according to more or less transparent criteria and use surgeons' own scoring or even artificial intelligence [82, 87]. They typically contain not only objective but also subjective criteria. Factors such as disease severity, suffering, and quality of life are subjective. In contrast, objective parameters such as disease progression speed, prognosis, and duration of exposure to disease are impossible to evaluate at an individual level. Importantly, priority and triage guidelines are usually a hidden method of rationing rather than a just allocation of health care [87]. Thus, good prioritization does not reduce the waiting time but may mitigate its harmful effects at the population level. Furthermore, priority guidelines may differ depending on whether health systems operate under routine, contingent, or crisis standards of care. While prioritization may appear to manage planned surgical capacity in the short term, it can lead to increased emergency department visits as many patients' clinical conditions progress and become more severe. Ultimately, this can result in higher costs for the health care system, overloading of emergency departments, long-term disabilities, loss of labor capacity in society, and deterioration of public health.

Some policies, such as "cost containment" and "choosing wisely," have been designed with an overt or covert aim of decreasing health care spending. Typically, policies allow treatments depending on the formal quality of supporting "evidence" for efficacy. Any policy designed to reduce the demand for treatment involves ethical conflicts. These policies could include forcing surgeons to raise clinical thresholds for patients on waiting lists, thereby redefining and adapting "proper medical practice" based on allocated resources. The promotion of private health insurance coverage can reduce public demand and reduce waiting times for many; however, financially struggling patients are disadvantaged and treated unfairly as a result. In another example, cuts in publicly funded care for procedures that are arbitrarily, rather than medically, classified as low value (e.g., injection for nonspecific lower back pain without sciatica and carpal tunnel syndrome release) have resulted in increases in privately funded care for this type of elective surgery in private hospitals, suggesting a shift toward patients who can afford the costs of private hospitals. [2] Finally, policies that decrease demand by limiting supply include the use of prioritization guidelines, which can be unfair, ethically controversial, and even abused by hospital administrators and clinicians or by patients trying to gain higher priority [86]. Directives to restrict surgical indications due to the waiting list—often involving managerial coercion of the surgeon—constitute a flagrant violation of ethical principles, especially those of "beneficence," "nonmaleficence," and "autonomy," while justice is violated only when restrictions are applied unequally.

A notable example of a political response was the introduction of waiting time guarantees that were never met, possibly because they were unrealistic and lacked effective regulation, monitoring, and transparent accountability procedures [83]. In Sweden, for example, patients have very limited power or support to ensure that they are treated according to such guarantees when the intended national provider fails to fulfill the legal guarantee [18]. Furthermore, unrealistic goals can encourage stakeholders to engage in opportunistic behavior to achieve these goals, and governments may even tolerate misreporting and dishonest manipulation on the part of hospitals to cover up the reality of waiting times [83]. From the perspective of four principles, "justice" is unique in the aspect that it does not necessarily disagree with the creation of waiting lists and that it pinpoints a need to discuss societal resource allocation, choice of cost-effective health care systems and selection of principles of distributive justice. Physicians, while acting as advocates for their patients, may circumvent rules of resource allocation through deception. This friction between the traditional ethics of patient advocacy and the methods to get approval for care from third-party payers has been identified in various clinical contexts and even referred to in the media as "the strategic lies of oncologists." [34, 38] Deception may secure fair care for patients in a system of implicit checks and balances. Yet, honesty is an important virtue regardless of adherence to normative duty-based or utilitarian ethics. Deception may be temporarily successful, but erodes fundamental societal trust as securing just care becomes a game where physicians sacrifice honesty for "a greater good."

Discussion

Our narrative review identified limited literature on waiting lists in neurosurgery; there are descriptive studies but importantly no analyses centered on ethical aspects. The analysis indicated that long waiting lists potentially violate three of

the four basic biomedical principles proposed by B&C [12]. The fourth principle, "justice" is challenged, and remains to be analyzed in reference to underlying ethical principles. Waiting list issues must be identified as a problem before solutions can be sought. First, elective neurosurgery waiting times are not well researched. Delayed elective neurosurgery, as seen in all surgical specialties, was widely reported during the COVID-19 pandemic [11, 27, 30, 35, 37, 44, 56, 57, 99]. Apart from the pandemic period, very few clinical studies have been published on this topic, and the existing ones are mainly retrospective [3, 30, 54, 68]. Furthermore, these studies addressed waiting times only in certain conditions, such as spinal degenerative disease, idiopathic normal pressure hydrocephalus, and symptomatic ICA stenosis. Therefore, there is a need for comprehensive multicenter and multinational surveys of waiting lists and times that provide an up-to-date global overview across neurosurgical diseases with comparable parameters.

A glimpse at global data on surgical waiting lists

The waiting time burden varies considerably by country and specialty as well as between children and adults and can even show substantial regional differences within the same country [14, 64, 66, 86]. The majority of the available data on elective surgery waiting times and lists are based on analyses of non-neurosurgical interventions [33, 58, 66, 86]. These are generally high-volume surgical procedures, such as cataract surgery, hip replacement, and knee replacement [66, 86]. For example, regarding the pre-pandemic situation in European countries, the average waiting time in 2019 ranged from around 40 to 250 days for cataract surgery and from around 45 to 400 days for hip and knee replacements. A study based in Pakistan found that the longest waiting times were observed in patients diagnosed with meningioma, pineal tumor, and craniopharyngioma, while the shortest waiting times were seen in patients with hemangioblastoma, metastatic lesions, and brainstem glioma [5]. It has been reported that, in Somaliland, up to 90% of children diagnosed with spina bifida or hydrocephalus experience delays of up to 60 months, primarily due to rural living conditions and diagnostic difficulties [23]. This is reportedly because families in rural Somaliland are either unaware that children with congenital hydrocephalus and spina bifida can be successfully treated free of charge, or believe these conditions are fatal. A multicenter study conducted in the Netherlands revealed delays in performing carotid endarterectomy surgery in patients within the recommended initial 14-day symptomatic period, and that this problem was related not to the number of surgeons or the volume of surgeries, but to inefficient patient referral flow and internal hospital organization [53].

The World Health Organization recognizes the right to health as a fundamental human right; however, this right is not considered absolute but is dependent on available resources and national capacities [12, 97]. This approach could ethically defensible to some extent, as the right reflects a duty of states, however, ethics and human rights are not identical [49, 92]. Although it largely aligns with the principles of distributive justice, individual beneficence and patient rights may still be challenged, particularly when prolonged waiting times result in clinical deterioration or irreversible harm. Public health systems could be seen as ethically grounded in fairness and equity, but they may operate more slowly; private systems, in contrast, could offer faster access but at the possible expense of justice and equal opportunity.

For health care policymakers, long waiting times constitute a major public health concern that requires intervention; however, such measures, if implemented carelessly, may also raise ethical challenges. For instance, financial concerns may drive hospital administrators to prioritize specialties that generate higher revenue, carry lower risk, and ensure greater operating room efficiency, as opposed to prioritizing patient care. In neurosurgery, optimal timing is particularly critical compared to most other surgical fields. In other words, neurosurgery—in which patients usually require intensive care bed reservations, long operation durations, and extended hospital stays—is at a disadvantage in terms of efforts to reduce waiting times compared to other surgical specialties [6, 9, 10, 50, 79, 91, 96].

The impact of the Covid-19 pandemic on waiting times and lists

Although long waiting times for elective surgeries have long been a known problem, this issue attracted greater public attention during the pandemic. After 2020, both waiting times and the proportion of patients on a waiting list for more than three months increased in nearly all European countries and in many other regions of the world [66]. Waiting lists has been exacerbated by the backlog of patients on waiting lists due to pandemic-related interruptions in elective care services [35, 44, 56, 66, 86]. Although the degree of disruption in health services due to the effects of COVID-19 decreased toward the end of 2021, this decrease was not uniform across all services; patients with neurological diseases, infectious diseases, and mental disorders continue to struggle due to the persistent backlog and waiting lists [93]. Furthermore, while the future effects of the pandemic on health care demand remain uncertain, life expectancy has already declined in the post-pandemic era in many countries [93].

Normative ethical arguments concerning waiting times

The four principles represent a system of applied ethics which has been used successfully in biomedicine. Usually, its application appeared unproblematic. The system is, at first sight, compatible with most normative systems, regardless of whether they represent consequentialist ethics such as utilitarianism, duty-based ethics, or virtue ethics. In a utilitarian system, the four principles could be interpreted to provide a framework to maximize utility, regardless of the definition of utility, while acknowledging that any ultimate utilitarian calculus is a utopian goal. The four principles already represent a system of duty ethics; yet any Kantian scholar may agree that they are probably consistent with the moral law; the fundamental requirement of an ethically correct action in the system. Virtue ethics defines the morality of an action by the virtue of the agent.

According to the utilitarian view, it is morally preferable for one patient to suffer harm while awaiting elective surgery if it increases the total utility, typically by greater benefit of other patients. Priority may then be given to patients who are expected to achieve a higher quality of life from surgery, have a lower risk of surgical complications, have a shorter recovery time, and can return to work quickly. Utilitarianism holds that achieving the goal of creating maximum utility may require acceptance of harm to some individuals [59]. From this perspective, the rightness of an action is judged by the total sum of consequences; it is irrelevant whether the reason for acting in this way is duty, hope of reward, or greed. At first sight, distributions where many are harmed to benefit others are incompatible with the moral law.

John Rawls [74] handled distributive justice from a contractual view, arguing that parties in a hypothetical contract "under the veil of ignorance" would not accept that the benefit of one person could justify harming another. Rawls derived two principles of justice: (1) everyone has an equal right to the broadest set of fundamental freedoms compatible with the same freedoms of others and (2) individuals with the same ability and effort should have access to the same positions regardless of their socioeconomic class, and that inequalities are only legitimate if they improve the condition of the most disadvantaged group. Rawlsian views accept unequal distributions if the person who is worst off is in a better situation than in any other condition. Subsequently, attention should primarily be given to those who are most disadvantaged or fragile in terms of health.

Accountability for long waiting times

A waiting list is a societal phenomenon. Prioritization and waiting lists comprise a complex system where stakeholders have different roles. At the macro level, the state or its extended institutions are responsible [71]. An overwhelming majority of nations have signed the Universal Declaration of Human Rights [92] which stipulates that states have an obligation to optimize health and ensure just allocation of health care resources for their populations. Hospital management may be responsible at the meso level for organizing things like the number of surgery days, operating theater allocation, and the balance between outpatients and surgeries. Neurosurgeons share responsibility at the micro level. They cannot primarily create surgical capacity; they must be responsible for professionalism in indications, prioritization of patients within the existing capacity and providing information to patients. Recently, the doctors' roles have come under debate. Sometimes patients may attribute delays to the doctors' excessive workload or indifference and may not be aware of the systemic constraints that could be called implicit rationing. While the Hippocratic tradition states that a physician should do everything solely for the patient before them, physicians may also need to consider the totality of patients. The Canadian Medical Association Code of Ethics was revised in 1996, with the addition of a statement that physicians are also responsible for the equitable allocation of resources beyond their individual patients [71]. The involvement of physicians in prioritization is necessary, as prioritization is impossible without the medical expertise required to understand prognoses and treatment alternatives. Yet, depriving the most disadvantaged of a physician who can act as the patient's advocate is risky. We have recently discussed how "prioritization" is used to disguise rationing and that physicians can risk justifying a "welfare" system where legitimate medical needs are not met [29]. The dichotomy places extensive individual responsibility on physicians to realize their moral agency and to maintain primary responsibilities to their patients. In this context, the state should take responsibility for a social contract between patients and physicians by providing necessary resources but also demanding self-regulated professional services. Denmark, with its largely socialized medical system, has very few problems with waiting times and access to surgery [41]. In Denmark, physicians' professional role appears to be respected by lawmakers, with functioning professional self-regulation and low subsequent burnout [46].

In Europe, the demand for health services is relatively inflexible due to the structure of the health care system, which is primarily centered on public health. Countries such as the UK and Norway spend well above the Organisation for Economic Co-operation and Development (OECD) average on public health, but waiting times continue to be a major health policy issue [85]. One may assume that waiting lists are shorter in systems where health care provision is not solely the responsibility of the state; however, this is not entirely accurate. In South Korea, where the health care system is dominated by private providers and over 90% of hospitals are privately owned, the initial adoption of private

health insurance led to reduced waiting times [42]. However, outpatient visits increased over time, leading once again to longer waiting times [52, 90]. As seen in the example of South Korea, the issue of "delayed treatment" also exists in private systems; however, in such cases, the responsibility may be placed on the patient. In other words, if the patient cannot afford to pay or fails to decide, the delay is blamed on them.

Incentivization

Incentive-based inequalities emerge as a potential problem in health care delivery. Economic incentives to increase productivity can be effective, primarily on a short-term basis, but they can challenge the ethical principles of justice. Market values must not be prioritized over moral and civic values and the Rawlsian focus on the most disadvantaged must be maintained when accepting unequal distributions [21, 81]. Concerns include private care or concierge medicine, a health care model where patients pay a membership fee to receive faster, more personalized medical care [24, 78]. Such systems allow wealthier patients to receive faster health care and may relieve a generalized system of pressure; they are, however, unacceptable if others face longer waits and reduced access. In addition, medical tourism could lead globalized inequality in access to health care [78]. Another problematic trend in health care run by business logic is scalpers in health care systems [78, 98]. Appointment scalping—in which individuals or bots book scarce medical appointments and then resell or transfer them for a fee—illegal brokerage in organ transplants, and other resale practices are becoming more common [78, 98]. Scalping exploits the scarcity of medical appointments and services, leading to unethical and illegal results. Incentivization may have a role, and we work in a system where business models are necessary tools. Importantly, market values must not be prioritized over moral and civic values. Plural values characterize humans and human societies, and a simple belief that all can be reduced to monetary value is highly misleading. The justice theorist Gerald Allan Cohen [21] criticized the idea that professional services would be primarily incentivized by monetary reward; professionals should probably be rewarded for their services, but monetary reward is not their primary driver. He argued that a perfectly just society would not have incentive-based inequality barriers.

Potentially actionable recommendations

Some factors appear to be associated with long waiting times, such as public health systems without private insurance, disadvantaged patients who cannot exercise their rights, physicians who do not advocate for patients, excessive bureaucracy, cost limits, high demand, and poor management. In contrast, other factors can make care faster, such as strong patient groups, low bureaucracy, a large private sector, a sufficient number of hospitals and doctors, good management, staff retention and continuous training, and a general belief that fast treatment is important. A good system should maintain a balance between these factors to avoid long waiting times while ensuring that surgery does not become a business, such as offering surgery to patients with limited surgical indications.

Efforts to address waiting lists include decreasing demand or increasing supply [2, 96]. However, a simple supply–demand model cannot automatically balance needs with access to care, as three different parties demand, produce, and pay for care. Spending more money or allocating more funds to the health care sector does not guarantee an increase in health care performance. The Commonwealth Fund's international performance report, "Mirror, Mirror 2024: A Portrait of the Failing U.S. Health System," [22] compared the health care system performance of 10 countries, including the US, by measuring timely access to health care. According to the report, while overall performance differences between most countries were relatively small, Australia, the Netherlands, and the United Kingdom ranked in the top three; however, the US health care system performance was found to be significantly lower than the other countries examined.

In theory, balancing the institutional goals of the state with the individual autonomy of patients and physicians could be a solution, but it is also necessary to define the mechanism for its implementation. Health care management systems worldwide have recognized that increasing staff numbers is the most important factor in overcoming workload backlogs and ensuring sustainability in health care. However, reducing waiting times should not be equated with increasing the workforce. Waiting lists may become bloated due to the inclusion of patients who have not been adequately evaluated and examined before referral, negatively impacting accurate and effective prioritization. For example, a public hospital in Australia observed a significant reduction in waiting times after implementing a general practitioner referral system aimed at improving the quality of referrals for non-urgent specialist appointments [88]. Similarly, another Australian study suggests that the most important factor in reducing waiting times is not increasing staff numbers or performance, but redesigning patient flow, appointment management, and internal organizational structure [25]. A Canada-based study highlighted the need for non-surgical interventions to alleviate pain and depression in patients awaiting scheduled surgery [89].

From this perspective, leaving the waiting period as merely passive waiting may be ethically problematic. From the narrative, physicians need to consider their patients' needs and access to health care as a professional duty and assume ethical agency for individual patients as well as the needs of the

collective; access to treatment for all legitimate medical needs should be a transparent goal in all welfare states. Next, the bureaucracy and management structures that allow or necessitate physicians to forego their professional duties must be eradicated. Finally, the state must assume its umbrella role in securing health care. The realization that a practice of creating waitlists can disguise health care rationing and is probably unethical, as argued in this article, provides an actionable foundation. Moreover, we argue that ethical values have superiority over business values regardless of whether they are employed by a socialized or free-market system.

Strengths and limitations

Due to the inherent limitations of all review studies, this study may not include the entire relevant literature, and therefore the findings should be interpreted with caution. The literature on waiting times for elective neurosurgical procedures is limited and varies between different countries and public and private health systems; therefore, it is important to realize that an in-depth description which could be generalizable for the entire neurosurgical community is beyond the scope of this study. Given the heterogeneity of "elective" neurosurgery in terms of urgency, risk, and patient preference, some normative statements should be approached with caution, as they may be overly absolute.

Nevertheless, although our inventory of waiting times and lists suffered from a lack of available information, it is clear that long waiting times for elective surgery are a major problem globally. Moreover, we have concluded that long waiting lists violate the basic bioethical principles of providing benefit, avoiding harm, and ensuring autonomy. In addition, the existence of waiting lists is associated with potential challenges in distributive justice.

If national or, even better, multicenter international studies are conducted and prospective data on various key indicators (e.g., diagnosis, admission and waiting times, waiting lists for scheduled surgeries) are collected and analyzed, then ways to overcome these problems could be discussed in more detail. Hence, factors that prolong waiting lists could first be identified at the hospital level (reasons why patients are not admitted to departments on time), then at the "provincial" level (problems related to transportation), and finally, whether this could help improve the delivery of medical care from a neurosurgical perspective could be examined in more detail.

Conclusion

This analysis indicates that long waiting lists potentially violate three of the four basic biomedical principles proposed by B&C. The fourth principle, justice, is also challenged and remains to be analyzed in reference to underlying ethical principles. Although some patients may benefit from waiting for a certain amount of time to allow for spontaneous recovery, long waiting times generally represent mechanisms of hidden rationing and, possibly, dysfunctional health care systems where resources are wasted on managing waiting lists, covering extended infirmity while waiting for potential recovery after treatment, or funding the costs of permanent health deterioration during waiting. In a well-functioning system, waiting for surgery should not be an accepted norm but a preventable inefficiency. There is a global need to better document waiting times for elective surgery and thus facilitate an understanding of the scope and determinants of the problem. Simple business models would suggest financial rewards to boost productivity. Earning a living is not unethical, but financial rewards risk transforming a vocation regulated by professional ethics into a market transaction.

Tackling waiting lists in neurosurgery requires a multifaceted approach beyond simply increasing resources. Policymakers and health care administrators must aim to provide fair, equitable, and high-quality care when allocating resources. Professional organizations and patient advocacy mechanisms must strongly voice patients' legitimate health care needs. Physicians, even while operating within bureaucratic constraints, must advocate for their patients within an ethical framework to contribute to fair and transparent prioritization. By providing necessary professional and ethical training, establishing hospital management systems that adhere to institutional ethical codes, and ensuring physicians provide services in accordance with professional and personal ethical standards, waiting lists would likely decrease, if not disappear entirely. Overall, from an ethical perspective, waiting lists create accountability at the governmental, institutional, and physician levels, although not to an equal degree. Ethical health care governance requires transparent prioritization without hidden rationing, indications that are in agreement with professional knowledge and ethics, and continuous monitoring of waiting list equity.

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Data availability No datasets were generated or analyzed during the current study. All data supporting the findings of this study are included in the manuscript.

Declarations

Ethics approval and consent to participate The study was conducted according to the General Data Protection Regulation (2016/679) of the European Parliament and of the Council. All procedures performed comply with the 1964 Declaration of Helsinki and its subsequent amendments. All radiological images were anonymized to protect patient identity, and written informed consent was obtained from all patients for the use and publication of clinical imaging materials in accordance with institutional ethics requirements.

Consent for publication Not applicable.

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