

Ethics in medicine: Challenges in the 21st century



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The article provides an overview of important topics in contemporary medical ethics. Methodologically, it is a literature review. The article addresses only a limited selection of the problematic areas, which are, however, related to each other: digitisation of medicine, genome editing, personalised medicine as well as ethical problems and dilemmas of allocation in healthcare. The global COVID-19 pandemic has emerged as a focus and trigger. Reflections on human rights and justice in medicine are fundamental not only on the individual and social level but also on a global scale. The fundamental question is how society as a whole can be involved in the complex biopolitical and bioethical debate. The social and cultural consequences of life increasingly being understood as a technical product rather than a gift are serious.

Contribution: The article also reflects on the specific contribution that Christian theology, and in particular the reformed heritage, can make to bioethical debates in modern society. The distinction between instrumental knowledge [*Verfügungswissen*] and orientational knowledge [*Orientierungswissen*] is helpful for its better understanding. A crucial result of this article is that medical treatment is repeatedly faced with ethical dilemmas. Moreover, medical progress not only creates new and better solutions to medical problems, it also raises new ethical questions that did not exist before. The purpose of medical ethics lies in identifying such dilemmas and developing ethical decision-making processes that help us to deal with such dilemmas to some extent.

Keywords: ethics in medicine; digitisation of medicine; genome editing; life sciences; reformed theology and heritage; personalised medicine; allocation; dilemmas in medicine and healthcare.

Introduction

Medicine and medical ethics are facing new challenges at the beginning of the 21st century. To cover all of them exceeds the possibilities of a short article. One can focus on the scientific breakthroughs, which include genome editing using the so-called genetic scissors or the digitisation of medicine, artificial intelligence (AI) and big data. On a global scale, however, the challenges also include the demographic development of the genus *Homo sapiens* on our planet and the regional differences that exist in this context, the consequences of the worldwide increase in life expectancy, questions of global justice in access to medical resources as well as the fair distribution of the benefits and risks of medical research.

The aforementioned challenges were also clearly evident in the COVID-19 pandemic. The pandemic is a burning glass and at the same time not only a catalyst and trigger for global but also regional social and political developments. One need only think of the unequal access to vaccines. The Covax initiative of the 20 leading economic powers wanted to provide the World Health Organization with 2 billion vaccine doses by the end of 2021. Non-governmental organisations (NGOs) have joined together in the People's Vaccine Alliance initiative. Churches have also spoken out that the principle of solidarity should also apply to vaccination policies, both national and global (cf. CPCE 2021:18–20). However, there are still shortcomings in the practical implementation of these programmes. This is partly because of practical problems, such as when vaccines are delivered to poorer countries but there is a lack of logistics for distribution and vaccination. Also, rich countries have not fully delivered on their promises.

It is possible that the COVID-19 pandemic is 'not a pandemic of the kind that humanity has experienced from time to time, but the beginning of a pandemic period the likes of which humanity has never known before' (Ulrich 2021:2). The US American historian Frank Martin

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Snowden invokes the judgement of experts who agree that since the emergence of avian flu in 1997 'a dangerous period for human health has begun' (Snowden 2021). Snowden quotes medical experts Anthony Fauci and Julie Gerberding, who made the following comparison at a hearing before the U.S. Senate back in 2005:

If you live in the Caribbean, you can expect to experience a hurricane. You don't know when or in what strength, but you know it will come. It's the same with pandemics. (p. 3)

That makes it all the more important for the global community to better prepare for future pandemics.

Last but not least, the consequences of climate change for human health and for justice issues in healthcare must also be considered on a global scale. Such questions of medical ethics and bioethics are also a matter of international law. I refer, by way of example, to the Universal Declaration on Bioethics and Human Rights, which was adopted by the 33rd General Conference of the United Nations Educational, Scientific and Cultural Organization (UNESCO) in October 2005 (UNESCO 2006; see Körtner 2019). My article will address only a limited selection of the problematic areas, which are, however, related to each other: digitisation of medicine, genome editing, personalised medicine as well as ethical problems and dilemmas of allocation in healthcare.

Digitisation of medicine

The digital age is leading to a paradigm shift in all areas of life. The change from analogue to digital communication has not been without consequences for medicine either. The combination of modern genetics and digital information processing promises great progress in the field of diagnostics and therapy of diseases. Above all, it leads to a fundamentally changed understanding of diseases and their causes. However, digitisation has also had a profound effect on the communication between doctors and patients as well as on the communication and organisation of the healthcare system as a whole. This also includes the increasing use of big data and robotics in medicine and nursing. A new level of the debate is being reached when medicine and pharmacy are no longer used solely for the treatment of diseases, but rather to improve the natural features of human beings. Enhancement and transhumanism are the keywords (eds. Boer & Fischer 2013). Furthermore, converging technologies, that is the combination of nano-, bio- and information technology with cognitive science (NBIC), surpass the conventional boundaries between animate and inanimate matter. High hopes are connected to the digitisation of medicine and the use of AI. For example, the use of AI is considered to improve the approach of evidence-based medicine and reduce costs in healthcare, that is, by saving time in diagnostics. However, the question arises as to how the time saved can be put to good use. Will physicians in the future have more time for patient consultations ('speaking' or 'narrative medicine' [the so-called '*sprechende Medizin*']) than they do now, or will the

use of AI only lead to a further increase in workload and personnel cuts in the healthcare sector (or to a shift away from the patient to the laboratories)?

The generation and collection of data presents medicine not only with technical but also with ethical problems. Estimates assume that the same amount of data are generated every 2 days as it did from the first appearance of *Homo sapiens* 120 000 years ago to 2003. The systematic collection of personal data on people's lifestyles and environment creates a tension between the interests of public health and the protection of privacy. However, the vision of a global network of big-data medicine faces serious difficulties. For example, medical data worldwide is largely incompatible with one another, partly handwritten and partly incomplete. Likewise, the language problem should not be underestimated. In addition to widely spoken languages, there are languages such as Kiswahili or Urdu. The recording of medical data is partly influenced by cultures and religions. Thus, the problem of hermeneutics also arises in medicine. Hermeneutics is the science of interpretation. However, understanding and interpretation cannot be replaced by digital algorithms, even if there are already impressive digital translation programmes such as 'DeepL':

Even with structured collected data, for example within the register, a large part of the information information that is needed to clarify the often special questions in questions in clinical research questions in clinical research, is not available. This applies all the more to unstructured data collected in an unstructured way. (Calibe et al. 2019:A 1539)

Another question is also whether ethics can even be digitised. Driverless cars or military drones that make autonomous decisions without human intervention, for instance. How should a car be programmed for situations in which human lives have to be weighed up against each other? Can morality be programmed into a car? And if so, which one? A Kantian or a utilitarian ethic? Is it possible to reach a consensus on this question in a pluralistic society, which then leads to corresponding legislation? Note that it is still humans who programme the 'moral software'! Consequently, the ultimate moral responsibility of humans cannot be delegated to machines, not even in medicine.

Deep learning not only represents technical issues but also ethical challenge in the field of AI. According to the Cambridge Dictionary, deep learning means 'a type of artificial intelligence that uses algorithms, [that is] sets of mathematical instructions or rules, based on the way the human brain operates'.¹ Artificial deep neuronal networks function like a 'black box', whose learning behaviour is partly inscrutable for humans. Is it ethically responsible to entrust the health of patients to a non-transparent computer intelligence? Blind trust in AI can certainly be dangerous. Morality and ethics cannot be digitised on a meta-level, even if a kind of morality-programme were programmed into a system. Human beings as morally

1. <https://dictionary.cambridge.org/dictionary/english/deep-learning>.

responsible subjects cannot be replaced, unless one propagates a reductionist view of humankind.

While medicine was classically understood as an art, it has increasingly become a technique. Technology determines the nature of modern natural sciences and thus also a science-oriented medicine. It may be that a revolution in medicine through the combination of genetics or genomics and digitisation opens up completely new chances for curing diseases. Older disease models are partly considered to be outdated. Some researchers may even speak of myths and consider the current scientific progress a form of demythologisation, a kind of medical enlightenment 2.0. However, an enlightened medicine – that is one that is founded on the impulses of enlightenment and humanism – requires a constant readiness for self-criticism and a critical awareness of the dialectical consequences of enlightenment and medical progress.

Criticism as a decisive motive of the enlightenment includes scepticism towards rash promises of salvation. After all, it cannot be ruled out that digitalised medicine will not also produce new myths. Genetic engineering will not have any miracle cures for multifactorial diseases, and even if the chances of somatic gene therapy are significantly increased by genome editing procedures, there is reason to be sober.

In the course of these discussions, it should be remembered that in ancient times ethics was regarded as the life science par excellence. Unlike today's life sciences, however, ethics cannot be digitised. Nor can the ethically responsible physician be replaced by the digital calculations of algorithms that decide on the use of therapeutic measures. Rather, this kind of belief in technology is itself a myth, which needs clarification if humanitarianism is to remain a basic principle of medicine.

Genome editing

Genome editing with the help of the CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) genome scissors is about to revolutionise the life sciences and medicine, also in combination with the induced pluripotent stem cell (iPSC) technique. Another scientific breakthrough has been achieved with the creation of synthetic mouse embryos, when this technique will be applied to humans is only a matter of time. The hype surrounding the emerging possibilities of genetic engineering and gene therapy is so pervasive that ethical reflection on the benefits and disadvantages, short-term opportunities and long-term consequences and risks can hardly keep up.

It was in 2014 that a working group led by Emmanuelle Charpentier and Jennifer Doudna published the first article on the development and use of the CRISPR/Cas method. In 2015, the journal *Science* named the new method the 'breakthrough of the year'. Five years later both scientists received the Nobel Prize in Chemistry.

In 2018, Chinese biotechnologist Jiankui He shocked the global public with the news that two healthy girls had been

born in China after he had altered the girls' genetic make-up in the course of artificial insemination using the CRISPR/Cas9 gene scissors in such a way that they remain immune to human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) for their entire lives. He was internationally criticised for blatantly disregarding standards of research-ethics. One year after the birth of the two girls, researchers also doubt the success of this gene therapy experiment. However, the genie of an uncontrolled development, driven by scientific ambition but also by economic interests, is out of its bottle, no matter how much international research organisations rely on ethical standards, mechanisms of self-control or moratoria.

Whether the genetic manipulation carried out by He can be justified as a therapeutic procedure at all is debatable. After all, the embryos in question are said to have been healthy. Nobody knows whether the girls would ever have contracted AIDS. Whether the genetic modification is an aetiological protective against AIDS is not medically proven, and moreover, there are other preventive measures, such as vaccinations.

Treating a healthy person or a healthy embryo without a concrete reason is fundamentally unethical, especially if there is a risk of developing other health problems later on as a result of the procedure. However, in order to exclude serious hereditary diseases, there is the method of pre-implantation diagnostics, which is now also permitted in Austria within narrow limits.

Critics of genome editing fear, not without good reason, that the new method is another step towards designer babies (and human enhancement). In addition, the genetic modifications are transferred to the descendants. It is therefore not only a question of the individual well-being of a child but also of possible health risks for future generations.

Furthermore, experiments are being conducted at the expense of the health of expectant mothers. The Chinese researchers who report failed experiments are reluctant to give precise details. Even if women were to volunteer for such experiments at the risk of miscarriages or other pregnancy risks, it would be a violation of human dignity and fundamental human rights.

If the reports from China are correct, the responsible researchers have violated elementary rules of good scientific practice. These include adherence to the principles of research-ethics, as laid down in the Declaration of Helsinki of the World Medical Association, but also in other international agreements for the protection of human rights in the field of modern biomedicine, including the Council of Europe's Convention on Human Rights in Biomedicine (MRB) of 1997, also known as the Oviedo Convention (Council of Europe 1997).

Experiments on humans require the approval of an ethics committee without which in turn no research results can be

published in serious scientific journals. Apparently, however, voluntary ethical commitments by scientific societies are not always sufficient to ensure that ethical rules are actually observed. State legislation is reaching its limits because research today is conducted in a global network. Different standards mean that ethically questionable research is carried out in countries with lower levels of protection.

In the international race, China is trying to take the lead. Although the biotechnologist He was banned from his profession and dismissed from his position at the university, there are generally fewer concerns in China than in other countries when it comes to genetic engineering and embryo research.

So it is again Chinese doctors who report on the allegedly successful application of genome editing in an Acute Lymphoblastic Leukemia (ALL)-patients infected with HIV. Similar to the two 'gene-edited babies', the infection was fought by transplanting genetically modified bone marrow stem cells. The case of the 'Berlin patient' Timothy Ray Brown serves as a model. However, whether his cure is to be causally attributable to the stem cell transplantation has not conclusively been scientifically proven. In the present case of the patient treated in China, no cure could be achieved. However, the researchers justified their experiment by saying that it is a 'proof of concept' experiment and that the method used shows no side effects even after 2 years.

Technically and ethically, the experiment is controversial. While on the one hand it is argued that the safety profile is acceptable and the non-maleficence principle has been sufficiently observed, critics consider the experiment to be hasty because it cannot be ruled out that genome editing might lead to undesired genetic alterations in patients in the long term.

Many of the questions and problems of technology assessment now being discussed are not new. They were already deliberated in the genetic engineering debate of the 1980s and 1990s. However, the depth of intervention in the genetic material that is now possible adds a new dimension to the discussion. Enhancing humans with the help of genetic scissors such as CRISPR or TALENS (Transcription Activator-Like Effector Nuclease) is rightly considered a taboo internationally. As long as the long-term effects of genetic surgery on humans cannot be assessed, it is not merely gene therapy that raises concerns. For example, genetic scissors do not always cut as precisely as hoped. Furthermore, have changes in the genome, which lead to an increased risk of cancer, also been observed after such procedures. Although newer versions of the CRISPR genetic scissors are now available, these have not yet been used on the Chinese patient. Therefore, it is not yet known how safely and precisely they work.

The repeatedly demanded moratoria are only of limited effect against excessive scientific ambition and a lacking

sense of responsibility. However, a certain deceleration of gene therapy research is not only in the interest of the test persons and patients, but ultimately also serves the progress of scientific practice that is aware of its responsibility to society as a whole – including the well-being of future generations. Therefore, the gene therapy currently riding on the fast lane needs a speed limit, at least in some areas.

Even in animal and plant breeding, changes in the genetic material by means of the genetic scissors are not unproblematic. Negative effects on the ecosystem and biodiversity are quite conceivable. In a sensational ruling at the end of July 2018, the European Court of Justice ruled that plant varieties manipulated with CRISPR/Cas nine genetic scissors are to be classified as genetically modified organisms to which strict safety requirements apply.²

Can we really say that a completely new life form is invented by modern life science? I think this is an exaggeration. Besides the fact that synthetic biology meanwhile is able to construct a synthetic genome and to transfer it into a bacterium that will function and proliferate science is not able to construct a complete new organism without using biological material, which already exists. Until now biotechnology depends on organic continuity.

The fundamental question is how society can be involved in the complex biopolitical and bioethical debate. The social and cultural consequences of life increasingly being understood as a technical product rather than a gift are serious. It is not only that our understanding of human dignity is at stake but questions also arise concerning animal protection and animal ethics.

Life sciences, biomedicine and the reformed heritage

The crucial question is what it will mean to be human in the future and who we want to be. Who gives people the right to dispose of other people and the fate of the unborn? Respect for human beings and their dignity means sparing them. The more biomedical knowledge increases, the greater the lack of knowledge and the more an attitude of humility is needed in research and world-shaping.

A one-sided technical understanding of life is highly problematic. Modern science follows the dictum of Gianbattista Vico: 'verum et factum convertuntur' (Löwith 1968). Modern reason accepts only what it can reconstruct. But by reconstructing or manipulating an organism, for example, synthetic biology or other natural phenomena we do not yet understand what the meaning of life is. Biological and physiological explanation and the understanding of life are different things, and we should remember that in antiquity ethics, we are the life science. Ethics means the

2. See Court of Justice of the European Union, Press Release No 111/18, 25.07.2018, <https://curia.europa.eu/jcms/upload/docs/application/pdf/2018-07/cp180111en.pdf>.

theory of human conduct of life in which also science and research are embedded.

Articulated in talk of the creatureliness of human beings and of their being created in the image of God is an understanding of existence, open to faith, that claims even in the present day to be a possible human self-interpretation. Helpful for a better understanding of this is the distinction between instrumental knowledge (*Verfügungswissen*) and orientational knowledge (*Orientierungswissen*) (cf. Mittelstraß 1982, 2001). Our way of living and our conduct do not find their fundamental orientation in abstract principles, but in meaningful stories, in metaphors and symbols. Belief in creation and the assurance of one's own creatureliness also reside at this level:

In this context we may remember that an open-minded approach to modern science belong to reformed heritage. According to Calvin the spirit of God is the only source of knowledge and truth. However, Calvin makes a distinction between the spirit in creation and the spirit of sanctification which is connected with the justification by faith alone while being distinguished from it. The impact of God's spirit is present not only in faith but also in the creation as whole according to the law of creation.³

Limiting however Calvin adds:

Lest any one, however, should imagine a man to be very happy merely because, with reference to the elements of this world, he has been endued with great talents for the investigation of truth, we ought to add, that the whole power of intellect thus bestowed is, in the sight of God, fleeting and vain whenever it is not based on a solid foundation of truth. (loc. cit.)³

Calvin refers to Augustine and the scholastics who have explained that humans have lost the gift of grace, with the consequence that also the natural gifts are corrupted by sin.

Not that they can be polluted in themselves in so far as they proceed from God, but that they have ceased to be pure to polluted man, lest he should by their means obtain any praise. (loc. cit.)³

That means that science is by no means a source of salvation. It participates in humans' involvement in sin. This theological insight is also relevant for bioethics and ethics in medicine if we are thinking about the moral responsibility not only of the single researcher on the individual level but of research and science as social systems in the context of social ethics (Körtner 2017:294f.):

To deal with his own as well as others life has to be justified ethically; in a theological perspective face-to-face with God. The question therefore is: What forms of world- and self-handling are in accordance with man being a creation of God as well as created in his image and what forms contradict it? Part of an ethical and religious way of life is a conscious way of dealing with the human body. Manipulation in the natural constitution of the human person can be in tune with the commitment to God but can also be in opposition. Biotechnological and medical-technical manipulations are not as such an attack on the integrity of

creation. To the contrary! They can equally be the practical expression of faithfulness to creation trying to live according to the biblical designation of man under the condition of the scientific-technological age. (p. 295)

Personalised medicine

The development from genetics to genomics and pharmacogenomics leads to the emergence of personalised medicine (Prainsack 2017). The goal is to find the right medication or therapy for the right individual. This is also known as 'P4 medicine'. It is predictive, preventive, personalised, and participatory (ed. Deutscher Ethikrat 2013; Hood 2009). The latter is exemplified by patients who actively use the internet to find information on their illness or health risks as well as to connect with other people who are also affected. Self-help groups may also influence scientific research, for example, by using crowdfunding to promote research into new drugs.

Some of the ethical issues are listed that arise concerning personalised medicine; however, because of space, they cannot be discussed further here:

- information about one's own genome will become part of individual health care.
- As a result, the individual responsibility for the link between genome and lifestyle will increase. One possible socio-ethical consequence may be that health risks will increasingly be considered an individual concern, which may lead to an exclusion from insurance cover that has so far been guaranteed by the community of compulsorily insured persons.
- While biobanks raise a wealth of ethical and legal questions, medical research, in the field of oncology, is no longer conceivable without them today.

Concerns include personal protection, rights of access and use as well as the question of who benefits in the individual cases. A further question is; to what extent and when is there a societal claim to the collection of genetic data from individuals and how the balance between personal rights (data protection and the right not to be informed) and the obligation of solidarity towards relatives and the community of the insured can be maintained.

Ethical problems and dilemmas of allocation in healthcare

One of the basic problems of any health system is the just distribution of and access to existing resources. Allocation issues that arise at the macro level, the meso level and the micro level of healthcare are still taboo or not discussed politically with the necessary transparency. The avoidance of decision-making in the establishment of allocation criteria at the meso- and macro levels results in that the burden of the problems of resource distribution are ultimately borne by patients and individual doctors.

³Translated by Henry Beveridge (The Institutes of the Christian Religion [Christian Classics Ethereal Library], Grand Rapids, MI, <http://www.ccel.org/ccel/calvin/institutes.pdf?url=>).

Medical progress exacerbates the problem of how to achieve justice in the healthcare system: Is equal access for all guaranteed without restriction, even with new costly diagnostic and therapeutic procedures? The question of costs must be openly debated, as must the possible effects on the insurance system and the distribution of resources in the healthcare system.

Allocation always presupposes a *shortage* of resources. However, this shortage is not only caused by undersupply but also by oversupply. One of the core problems of allocation in healthcare is the unfair distribution of oversupply. The reduction thereof should not be confused with an undersupply. The system of case rates and target agreements, combined with intensified competition between hospitals, leads, for instance, to an increase in the number of surgeries that do not appear to be justified from a purely medical perspective.

Allocation problems arise not only from the development of new cost-intensive therapies and medications but also from the widening of the medical field. In addition to criteria of justice in the healthcare system, our concepts of sickness and health, that is, the legitimate and teleological categories of medicine (including the category of 'non diseases'), must therefore also be discussed.

However, as far as the criterion of justice is concerned, there are different concepts of justice. As in ethics in general, in medical ethics, too, a distinction must be made between distributive justice, justice of exchange (*iustitia commutativa*), justice for the common good, fairness (Rawls 1999), participatory justice and justice of empowerment.

One form of allocation is the concept of triage, that is the process of prioritising the use of resources in emergency medicine based on the patient's chances of survival. Visible tendencies to transfer this paradigm of utility maximisation to everyday medical practice must be criticised. Previous notions of justice in healthcare fall by the wayside.

It is true that the use of resources in the context of a community of solidarity occasionally requires justification. However, the criterion must by no means be the presumed benefit of the patient for the public:

The [...] problem that sometimes arises, [namely,] that not all people can maximize the overall benefit to the same degree and therefore would have to be moved down on the priority list, shows [...] that the 'routinisation [of the concept] of triage' contradicts previous ideas of justice in health care. (Wallner 2007:316)

Effectiveness and efficiency must not be determined unilaterally according to economic criteria of profit maximisation or deficit minimisation but must be patient-centred. This applies in particular to the treatment of patients with so-called 'orphan diseases' (less than five cases per 10 000 inhabitants). In addition to the problem of orphan drugs (cf. *the US Orphan Drug Act [ODA] of January 1983*), the development and manufacturing of which under normal

conditions is extremely expensive and unprofitable, questions of medical economics also arise when pharmaceutical drugs are used for conditions other than those defined at the time of their approval. In any case, the unilateral orientation towards resource input is ethically unacceptable.

Nonetheless, must money and medical resources be handled responsibly in the context of a community of solidarity. This includes the application of the principles of evidence-based medicine. Medical or other services are to be assessed as inefficient if their general or indication-specific effectiveness is not proven, if they are less effective than alternative measures that incur the same costs, or do not outperform a more cost-effective alternative in terms of efficacy.

However, the problem of medical rationalisation-measures is the following:

Since even the smallest positive marginal yield of a medical procedure still promotes health, demands from physicians and the wider public for the use of comparatively less efficient forms of therapy are not uncommon. (Von Der Schulenburg & Greiner 2000:241)

Ethical objections are also raised against the allocation of expensive drugs by lottery. In the beginning of February, Novartis began raffling off the 2 million-euro Zolgensma drug for the treatment of 100 infants and children up to 2 years of age suffering from spinal muscular atrophy (SMA). The drug, which was approved in the USA in 2019, has not yet been approved in Europe. Treatment with Zolgensma is regarded as gene therapy. According to the manufacturer, a single administration of the drug is expected to lead to complete healing, which, however, has not yet been conclusively proven.

Critics accuse the pharmaceutical company of not making more doses available. They speak of a 'survival lottery' which should be denounced as a pure marketing campaign. Novartis defends itself by saying that they are currently unable to supply a higher number and that the lottery procedure had been reviewed by an ethics committee. However, criticism is also being voiced about the high launch price of the new drug. Novartis contends that over a 10-year period, Zolgensma is only half as expensive as Spinraza, which must be injected every four months.

German medical ethicist, Dieter Birnbacher, advocates for patients being selected according to an algorithm similar to the one used in organ transplantation.⁴ Not all children would tolerate the new therapy option. Nevertheless, Birnbacher is right to point out an ethical dilemma. On the one hand, the lottery procedure provides equal opportunities in the face of extremely scarce resources. On the other hand, it remains a matter of pure luck whether a child receives the new drug or not. Even if only medical award criteria are applied, it is to be expected that those children who do not show certain characteristics will be disadvantaged in the

4.Cf. <https://www.deutschlandfunkkultur.de/novartis-verlost-medikament-gegen-sma-ist-dieser-zwei-100.html>.

sense that they will continue to be treated with conventional forms of therapy. Even if the decision is entrusted to ethics committees, comprehensive justice cannot be achieved.

Similar problems arise – especially in the field of oncology – with other drugs that are revolutionising medicine but are extremely expensive. High launch prices are being justified by high development costs. In the long-term, the new drugs may become cheaper. For the individual patient, there is hope that if not cured, they will be able to survive much longer with improved quality of life. Thanks to new therapeutic approaches, cancer is in many cases becoming a chronic disease. However, survival has its price, which, with long-term medication, can be between 12 000 and 30 000 euros per patient per month. Considering that average life expectancy is increasing globally, the number of people who develop cancer in their lifetime also increases statistically. Therefore, while the costs of new therapies may decrease over the years, the number of patients who need treatment increases.

Medical treatment is repeatedly faced with ethical dilemmas. Moreover, medical progress not only creates new and better solutions to medical problems it also raises new ethical questions that did not exist before. Intensive-care medicine, reproductive medicine and medical genetics have enormously expanded the scope of the medical field, while simultaneously producing new dilemmas that those affected have to deal with morally and psychologically.

The problem of organ shortages in transplantation medicine, for example, is not the cause but the consequence of this progress. As organ transplantation becomes a routine, the need for donor organs increases. The more patients, who were previously excluded from transplantation because of the high risks involved, become potential recipients, the greater the need for donor organs will become.

The purpose of medical ethics lies in identifying such dilemmas and developing ethical decision-making processes that help us to deal with such dilemmas to some extent. Ethics cannot eliminate or fundamentally prevent such dilemmas. At best, it helps us to live with them.

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Authors' contributions

U.H.J.K. is the sole author of this article.

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Disclaimer

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