

Research on Infringement of Artificial Intelligence Medical Robot

Chen Mingsung^{1,a*}, Qian Wei^{2,b}

¹Department of Public Administration, Nanfang College of Sun Yat-sen University, Guangzhou, Guangdong, 510000, China

²Department of Public Administration, Nanfang College of Sun Yat-sen University, Guangzhou, Guangdong, 510000, China

*Corresponding author. Email: 306470714@qq.com

ABSTRACT

with the rapid development of artificial intelligence, intelligent medical robots have been used in the medical field to assist medical staff in diagnosing and treating diseases. Due to the lag of legislation, the current liability for medical damage and product liability in China is difficult to solve the liability of infringement of intelligent medical robots. It is advisable to refer to the European Union's civil law rules for robots and Russia's green act to bring the infringement of intelligent medical robots into the category of highly dangerous liability system, strengthen the producer's burden of proof for defects, and set up a compulsory insurance system and compensation fund to separate producer's liability so that the victims can get better relief.

Keywords: intelligent medical robot; legislative status; tort; legal regulation

1. PREFACE

With the development of Internet of things, big data, cloud computing, mobile Internet and other new information technologies, the medical industry has gradually turned to the development of intelligent medical robots relying on Algorithms and big data, in addition to the traditional research and development of medical devices. At present, intelligent medical robots are playing an increasingly important role in medical image recognition, disease assistant diagnosis, health management, disease prediction, drug research and development. In terms of intelligent diagnosis and treatment, IBM has developed Watson robot which can diagnose cancer especially, and its diagnostic accuracy rate can exceed that of doctors; in terms of intelligent operation, intuitive surgical company has developed the minimally invasive surgical robot with the highest technical level in the world, which can replace doctors to perform the minimally invasive operation with greater difficulty.

Since the birth of artificial intelligence, its theory and technology are becoming more and more mature, and its application field is also expanding. Intelligent medical robot not only brings technological change to the medical field but also raises a series of problems. For example, the U.S. Food and drug administration received more than 200 complaints in 2007, alleging that medical-surgical robots caused burns, cuts, infections, and even 89 deaths. The intelligent medical robot based on big data and algorithm is different from the traditional medical device products. Due to its strong learning ability, algorithm errors and program loopholes in the process of diagnosis

and treatment, it may cause medical damage. How to regulate the tort liability caused by an intelligent medical robot has gradually caused the whole society Attention?

2. THE LEGAL STATUS OF INTELLIGENT MEDICAL ROBOT

The analogy between intelligent robot and natural person is not from its external physical or physical characteristics. The intelligent robots are not similar to human beings in appearance, but they are also associated with human beings. From the current discussion, the comparison between intelligent robot and human is focused on its "intelligence". If the intelligent robot is defined as an electronic person, on the one hand, the intelligent robot is also the person in law; on the other hand, the person in this law is neither natural person nor legal person, but a new category electronic person. If the intelligent robot is the same as the natural person and legal person, it can be the person in the law, which means that there must be some commonness between them. So, in what ways are intelligent robots similar to natural or legal persons, so that they need to be endowed with legal personality or legal subject status?

To solve the problem of liability fixation of infringement of intelligent medical robot, it is the first task to define the person who bears the liability of infringement of artificial intelligence. The definition of its legal subject status is related to whether the intelligent medical robot can bear the liability of infringement independently. Also, no matter how the intelligent robot takes responsibility, the ultimate responsible person is human, which makes its "legal personality" redundant and unnecessary. At present,

the intelligent robot is still in the development stage of weak artificial intelligence. Although it has certain autonomous learning and decision-making ability, it is always the result of human algorithm design and moves within the range preset by the designer. On the semantic and logical level, based on the development of science and technology, human beings have produced and manufactured artificial intelligence using corresponding means and tool imitation, with the intention of improving human working and living ability. According to this, the characteristics of artificial intelligence are that it is not a natural person in a general sense, but it has some elements of human beings; intelligence is an important characteristic of it, but it always needs artificial design and programming. Therefore, an intelligent robot will not affect the current civil subject system. The intellectual property rights, personality rights, infringement and other issues generated by the intelligent robot can be adjusted by using the current legal framework, and the parts that cannot be adjusted can be modified appropriately, without the need to add a new legal subject to bring unnecessary confusion to the whole legal system. It can be considered that the intelligent robot will develop into a strong person. In the stage of industrial intelligence and super artificial intelligence, the qualification of a legal subject should be given.

3.THE CURRENT SITUATION AND APPLICATION DILEMMA OF LEGISLATION AND REGULATION IN CHINA

Artificial intelligence work object cannot bear legal responsibility independently. The legal liability includes criminal, civil and administrative liability, including the liability of limited behavior and property liability. Even if the consequences of human damage caused directly by intelligent medical robots are very serious, because the artificial intelligence work object has no liability ability in itself, it cannot bear legal liability. As the intelligent medical robot does not have an independent civil subject qualification, we can consider it into the category of medical equipment products, and use the current tort liability law and product quality law to regulate it. However, intelligent medical robots are not traditional medical devices. The lag of legislation leads to a series of problems in the application of current laws and regulations.

3.1 Liability of medical tort and its application dilemma

Medical tort liability is the medical damage liability stipulated in article 54-64 of tort liability law of China, including medical ethics damage liability, medical technology damage liability, medical management damage liability and medical product damage liability.

The components of medical tort liability include: medical institutions and medical staff have illegal diagnosis and treatment behavior in the diagnosis and treatment activities; patients are damaged; there is a causal relationship between diagnosis and treatment behavior and patients' damage; medical institutions and their medical staff have a fault. Therefore, for example, when medical institutions and medical personnel use intelligent medical robots for diagnosis and treatment, due to improper instructions and illegal operation of medical personnel, the robot causes damage to patients. Of course, medical tort liability should be applied, and medical institutions should bear the fault liability.

Although the intelligent medical robot is based on the data provided by the manufacturer or designer for learning, and its algorithm is also pre-set. Still, it has strong learning ability and can learn continuously in the process of diagnosis and treatment, forming its independent judgment, even beyond the original design range of the designer. If there is no illegal diagnosis and treatment behavior of medical institutions and medical personnel, and they have also done their reasonable duty of care, it is only because the intelligent medical robot is operating out of the original set procedures and rules, or when the medical personnel make diagnosis and treatment according to the wrong decision of the intelligent medical robot, it is difficult to think that there is the fault of the medical personnel, diagnosis and treatment behavior and patient damage. There is a causal relationship between them, and it is impossible to investigate the fault responsibility of medical institutions.

3.2 Product liability and applicable difficulties

Because "with the development of technology and the evolution of algorithms, the decision-making of intelligent products may be difficult to predict and explain, leading to the identification of fault tort liability will become more difficult.". An intelligent medical robot is a kind of medical product used by medical staff to assist diagnosis and treatment. We can consider whether we can bring its defects into the current product liability category. According to the provisions of Article 59 of tort liability law and articles 41-44 of product quality law, when the intelligent medical robot causes personal and property damage to the patient due to defects, the patient can directly claim compensation from the intelligent medical robot manufacturer or medical institution. After the patient claims compensation from the medical institution, the medical institution can claim compensation from the responsible producer. With the rapid development of science and technology, especially in the field of artificial intelligence, as long as the producer quotes the exemption clause to prove that there are reasons for exemption, the fault of the intelligent medical robot will not be attributed to the producer.

In addition, it is difficult to identify the defects of intelligent medical robots in practice. In general, as a scientific and technological product, the harm caused by a

robot is largely due to the subjective fault of the robot manufacturer and the seller, including the lack of warning signs on the product and the failure to fulfil the due duty of care. Article 46 of China's product quality law stipulates product defects. Product defects refer to unreasonable risks of products endangering the safety of people and other people's property. Products with national and industrial standards to protect human health and personal and property safety refer to those that do not conform to the standards. According to the principle of "who claims, who proves", the victim is the patient to prove the unreasonable danger of intelligent medical robot. However, intelligent medical robot involves complex algorithm and program problems. Even professional research and development personnel may not fully understand the operation of its system and the existing unreasonable danger, let alone ordinary patients without professional knowledge. Also, at present, China has not formulated the relevant national standards and industry standards of intelligent medical robots, which is more unfavourable to the proof of its defects.

4. SUGGESTIONS ON LEGAL REGULATION OF INFRINGEMENT OF INTELLIGENT MEDICAL ROBOT

Because the current medical damage liability and product liability system in China is difficult to solve the problem of tort liability of intelligent medical robots, the author will base on the current legislation in China, and draw lessons from the legislative experience of EU and Russia, and put forward some suggestions on the tort liability regulation of intelligent medical robots.

4.1 Establish the admittance standard of intelligent medical robot

According to the regulations on the supervision and administration of medical devices in China, medical devices refer to the instruments, equipment, instruments, in vitro diagnostic reagents, calibrators, materials and other similar or related articles directly or indirectly used for the human body, including the required computer software, whose effect is mainly obtained by physical means, not by pharmacology, immunology or metabolism Obtain, or although there are these ways to participate, but only play a supporting role. In terms of clinical access, the relevant technologies of intelligent medical robots must comply with the provisions of traditional medical devices, and the listing license, device registration and clinical trials must comply with the minimum standards of medical devices. As a highly intelligent medical device, the intelligent medical robot can assist or even replace medical staff in diagnosis and treatment activities, so it is not enough to only meet the accessibility standards of traditional medical devices. The author thinks that when the intelligent medical robot independently diagnoses, the

similar medical staff can take the diagnosis level of the medical staff of the natural person as to its reference standard. In to maximize the protection of patients' interests, the highest diagnosis and treatment level that the medical staff of the natural person can achieve should be taken as the standard [4]. The diagnosis and treatment activities can only be carried out when it reaches the corresponding diagnosis and treatment level through the test.

4.2 Include high-risk liability

Due to the strong independence of intelligent medical robot, it is difficult to prove the existence of causality when it causes medical accidents. However, as the biggest beneficiary of the intelligent medical robot, the producer may evade the legal responsibility, so it is necessary to strengthen the producer's responsibility. Referring to the method of defining intelligent robots that human beings can't completely control as highly dangerous sources in the grishen act of Russia, we can bring the infringement caused by intelligent medical robots with certain independence into the category of highly dangerous liability in the tort liability law of China. Article 69 of tort liability law of China is a general provision for highly dangerous activities, which has great inclusiveness and provides a basis for the infringement of new intelligent medical robots to be included in highly dangerous liability. When the intelligent medical robot applies to high-risk liability, the producer shall bear strict liability, that is, when the robot with high autonomy causes infringement damage, regardless of whether the producer has fault, the producer shall bear the infringement liability; the high-risk liability will help to improve the producer's duty of care in the design and production stage and reduce the occurrence of infringement damage.

4.3 Strengthen producer's burden of proof

When the intelligent medical robot infringes the rights of medical products due to its defects, the producers and medical institutions bear no-fault liability. Although the victim does not need to prove the existence of the fault of the infringer, it still needs to prove that the intelligent medical robot has defects, damage facts and the causal relationship between the defects and damage facts. Due to the speciality and complexity of the intelligent medical robot, the burden of proving its defects will make the patients without any professional knowledge unable to get the proper relief. The producer participates in the design and production stage of the robot and has a better understanding of its system, algorithm, manufacturing and parts than the patient. It is more reasonable for the producer to bear the burden of proof for the existence of defects of the intelligent medical robot. The author thinks that the unreasonable danger of intelligent medical robot can be identified from the subjective and objective

perspectives of patients. Firstly, the expectation value of patients for intelligent medical robot is evaluated, that is, whether the risk of intelligent medical robot exceeds the reasonable expectation of patients and whether there are excessive manufacturing and design of intelligent medical robot by professionals Risk identification.

4.4 Compulsory insurance system and Compensation Fund Project

Taking strict responsibility for producers not only effectively relieves the rights of victims, but also increases the responsibility of producers, which may hit producers' enthusiasm for production and is not conducive to the development of intelligent robots in the medical field. According to the European Union's "rules of robot civil law", the producer's liability risk can be effectively dispersed through compulsory insurance system and compensation fund project. Specifically, the manufacturer of the intelligent medical robot can force insurance for the robot when it is put on the market. When the intelligent medical robot causes medical damage, it is not necessary to determine who is responsible for the tort liability, and the insurance company directly fills the damage of the victim. The fund may be donated by the society or set up by a specific person. To supervise the use of the fund, a special robot registration agency can be set up to register the relevant information of the intelligent medical robot, and record the donation and use of the fund under the corresponding robot. The registration system is convenient for the public to consult and understand the specific use of the fund at any time. Its transparency can ensure that the fund is used exclusively to prevent the illegal use of the fund and the operation of the secret box.

5. CONCLUSION

From the current law, the subject of tort liability can only be civil, artificial intelligence itself is difficult to become a new subject of tort liability. Even so, the determination of AI tort liability also faces many practical problems. After the infringement, who is the owner of artificial intelligence, who should be responsible for it, does not seem to be controversial in law. However, the specific behavior of artificial intelligence is controlled by the process. It is questionable whether the owner or the software developer is responsible for the infringement. Whether it is necessary for the law to formulate special tort liability rules for therapeutic robots, these issues are worthy of further study. In reality, the imputation principle of AI tort liability may involve more dangerous liability or no-fault liability. However, in the future, we need to consider whether the application of artificial intelligence technology belongs to highly dangerous

operation (such as UAV), which determines whether it is applies to the liability of highly dangerous operation. At present, the judgment of causality, fault and other elements in AI tort liability have become increasingly complex. On the one hand, due to the twists and turns of the development of new technology itself, the intelligent robot is in the rising stage of intelligent technology, which needs to be developed in the process of exploration, on the other hand, due to the lack of clear provisions on the tort liability of intelligent robot-human damage in China. There are still objections to the personality of the intelligent robot in this paper. The main body of liability for damage caused by intelligent robot includes producers, designers, sellers, owners and users. Different principles of liability fixation should be applied to the above bodies, and their respective components should be judged according to the principles of liability fixation. The establishment of compulsory liability insurance supplemented by the existing tort liability law system can be effectively solved Tort liability for damage caused by an intelligent robot.

REFERENCES

- [1] ZhangJie,Song Lili.Legal regulation of infringement of intelligent medical robot.Theory Research.2019 (6) : 91-92
- [2] ZhongTong.A Study on the Civil Liability for Damage Caused by Artificial Intelligent Products.Journal of Social Sciences.2018 (4) : 103-112.
- [3] ZhengGe.The Future of Artificial Intelligence and the Law.Citizen and Law.2017 (12) : 11-15.
- [4] Yang Lixin.Understanding and Application of General Terms of Liability for Medical Damage.Studies in Law and Business.2012 (5) : 65-71.
- [5] Li Xingchen.Legal Liability of Artificial Intelligence Medical Service Medicine and Jurisprudence.2018 (4) : 8-12.
- [6] Lun Yi.Preliminary thinking on the problems related to artificial intelligence governance.Information and Communications Technology and Policy.2018 (6) : 5-9.
- [7] Liu Yunsheng.The Construction of Modern Personality Theory and the Civil Legal Position of Artificial Intelligence.Law Science of Artificial Intelligence.2018 (1) .