

# Analysis of the Technological Innovation and Application Prospect of Dental Chair Under the Background of Digital Transformation

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**Abstract:** With the further development of digital transformation, dental chair technology, as a key equipment in the field of oral medicine, is experiencing unprecedented technological innovation. This paper first reviews the traditional development of dental chair technology and analyzes the bottlenecks and shortcomings of existing dental chair technology. Subsequently, the article focuses on the impact of digital transformation on dental chair technology, including intelligent, networked, personalized and other aspects of technological innovation. These innovations not only improve the performance and comfort of dental chairs, but also improve the accuracy and efficiency of oral treatment. Driven by the digital transformation, the dental chair technology has a broad future development prospect and is expected to play a greater role in the field of oral medicine. This paper also discusses the potential applications of dental chair technology in future oral medicine, including telemedicine, personalized treatment, and intelligent assisted diagnosis. Finally, the paper summarizes the significance of technological innovation in the context of digital transformation, and prospects the future development trend.

**Keywords:** Digital transformation; Dental technology; Technological innovation; Application prospect; Oral medicine.

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## 1. Introduction

With the rapid development of information technology, digital transformation has become an inevitable trend of innovation and development in various industries. The field of stomatology is no exception. The innovation of dental chair technology arises under this background. It not only represents the great progress of oral diagnosis and treatment technology, but also indicates the future development trend of oral medical services.

The traditional dental chair design is based on mechanical operation, with a relatively single function, which is difficult to meet the growing demand of personalized diagnosis and treatment. Digital transformation has provided a strong power for the upgrading of tooth chair technology. By integrating advanced computer technology, sensor technology and artificial intelligence technology, the new dental chair realizes the leap from simple mechanical operation to intelligent assisted diagnosis and treatment. The intelligence of the dental chair not only improves the efficiency of diagnosis and treatment, but also improves the medical experience of patients[1].

In the context of digital transformation, the innovation of dental chair technology is not only reflected in the upgrade of hardware, but also reflected in the development and application of software. Through big data analysis and cloud computing technology, the new dental chair can collect and analyze patients' diagnosis and treatment data in real time, providing doctors with more accurate diagnosis basis and treatment plan. At the same time, the application of virtual reality (VR) and augmented reality (AR) technology makes the diagnosis and treatment process more intuitive and vivid, which helps to enhance doctor-patient communication and improve the effect of diagnosis and treatment[2].

Looking into the future, with the continuous progress of

digital technology, dental chair technology will usher in a broader space for development. On the one hand, the continuous innovation of technology will promote the development of more intelligent and personalized; on the other hand, with the improvement of oral health awareness and the continuous expansion of oral medical market, the market demand of dental chair technology will continue to grow. Therefore, an in-depth study of the technological innovation and application prospect of dental chair under the background of digital transformation is not only helpful to promote the technological progress in the field of stomatology, but also of great significance for improving people's oral health level and promoting the healthy development of oral medical industry.

## 2. Content and Characteristics of The Technical Innovation of The Dental Chair

### 2.1. Limitations of the traditional dental chair technique

Traditional dental chair designs often focus on basic dental treatment needs such as providing light sources, water sources and attractors. However, with the rapid development of dental medicine, the functional demand for dental chairs is also increasing. For example, modern dental treatment often requires advanced imaging technology, laser therapy, computer-aided design and manufacturing (CAD / CAM), which all require the compatible functional interface and expansion ability of the dental chair. Due to their design limitations, traditional dental chairs are often difficult to meet the integration needs of these emerging technologies, thus limiting their application in modern dental treatment.

(1) Efficiency limitations

In terms of efficiency, the operation process of the

traditional dental chair is often more complicated. For example, steps such as adjusting chairs, changing instruments, cleaning and disinfecting require a certain amount of time and effort for dentists and assistants. In addition, the traditional dental chair is less automated, and many operations need to be completed manually, which not only increases the operation difficulty, but also affects the treatment efficiency[3]. In the fast-paced modern medical environment, this lack of efficiency is clearly not satisfactory.

#### (2) Comfort limitations

From the patient's perspective, the comfort of the traditional dental chairs also needs to be improved. Many traditional dental chairs do not fully consider the individual differences and comfort needs of patients, such as the Angle of chair back, height, the comfort of armrest, etc. Prolonged dental treatment may make the patient feel uncomfortable and even cause some complications, such as neck pain, muscle tension and so on. This not only affects the patient's treatment experience, but it may also negatively affect the treatment effect.

#### (3) Technology update lags behind

In addition, the traditional dental chair technology also has an obvious lag in the technical renewal. Due to the long cycle of technology renewal, new dental treatment techniques and concepts are often difficult to quickly apply to traditional dental chairs. This not only limits the development of dental treatment technology, but also affects the market competitiveness of traditional dental chairs.

In conclusion, the traditional dental chair technology has obvious limitations in terms of function, efficiency, and comfort. To meet the needs of modern dental treatment, dental chair technology needs to be constantly innovated and upgraded to provide a more comprehensive, efficient and comfortable treatment experience.

## 2.2. Introduction of innovative technologies

With the continuous progress of medical technology, the field of dental treatment has also ushered in the wave of technological innovation. As the core equipment in dental treatment, the new dental chair technology is increasingly intelligent, accurate and comfortable, which has brought revolutionary changes to dental treatment.

#### (1) Intelligent characteristics

The intelligence of the new dental chair technology is shown in many aspects. First, the tooth chair has an advanced sensor and control system, which can monitor the patient's physiological state in real time, such as heart rate, blood pressure and breathing, to ensure the safety of the treatment process. Secondly, the intelligent dental chair can provide personalized treatment plan suggestions for patients through data analysis, and improve the accuracy and effectiveness of treatment. In addition, the dental chair is also equipped with automatic adjustment function, which can automatically adjust the chair position, light source and instruments according to the patient's body shape and comfort needs, which greatly improves the convenience and comfort of treatment[4].

#### (2) Characteristics of precision

The new dental chair technology has also made a significant breakthrough in precision. Traditional dental treatment often depends on the experience and feel of doctors, while the new dental chair realizes the accurate positioning of treatment by introducing advanced imaging technology and navigation system. Doctors can observe the three-

dimensional image of the patient's mouth in real time through the high-definition display screen on the dental chair, accurately locate the lesion site, and improve the accuracy and efficiency of treatment. In addition, the new dental chair is also equipped with a precise robotic arm and control system, which can accurately execute the doctor's operation instructions, reduce human error, and improve the stability of the treatment[5].

#### (3) Comfortable characteristics

In terms of comfort, the new tooth chair technology also spare no effort. The design of the dental chair fully considers the comfort of the patient, and adopts ergonomic modeling and materials, so that the patient can maintain a comfortable posture in the treatment process. At the same time, the dental chair is also equipped with a variety of comfortable functions, such as massage, heating and ventilation, to effectively relieve the discomfort of patients in the treatment process. In addition, the new dental chair also pays attention to the environment construction, by adjusting the indoor temperature, humidity and light, to create a comfortable and pleasant treatment environment, so that the patient in a relaxed and pleasant atmosphere to receive treatment[6].

To sum up, the intelligent, precise and comfortable characteristics of the new dental chair technology have brought about unprecedented changes to the dental treatment. It not only improves the safety and effectiveness of the treatment, but also greatly improves the comfort of the patients. With the continuous progress of the technology and the expansion of the application scope, it is believed that the new dental chair technology will play a more important role in the future of dental treatment.

## 3. The Impact of Digital Transformation on The Technological Innovation of Dental Chairs

### 3.1. Promotion of technological innovation

With the rapid development of information technology, digital transformation has become the key to enhance the competitiveness of all industries. In the field of dental medicine, the digital transformation has also provided a strong driving force for the innovation and upgrading of dental chair technology. This section will provide a detailed analysis of how digital transformation promotes innovation and upgrading in dental chair technology and the profound impact these changes can have on the dental profession.

Digital transformation has brought intelligent development opportunities for dental chair technology.

The traditional dental chair design mainly focuses on mechanical performance and comfort, but under the promotion of digital transformation, the dental chair begins to integrate more intelligent elements. For example, by integrating sensors and control systems, modern dental chairs can monitor patient physiology, such as heart rate, blood pressure and breathing, to ensure the safety of the treatment process. At the same time, the intelligent dental chair can also automatically adjust the chair position and Angle according to the needs of treatment to improve the efficiency and comfort of treatment.

(2) Digital transformation has promoted the personalized development of dental chair technology.

In the traditional dental treatment, the design of dental

chairs often lacks personalized considerations, and the digital transformation allows the dental chairs to be customized according to the individual differences of the patients. For example, through 3D printing technology, dental chair accessories can be made that perfectly match the patient's mouth shape, thus improving the accuracy and effect of treatment. In addition, through big data analysis, the design of the dental chair can also be optimized according to patients' use habits and preferences, so as to improve patients' medical experience.

(3) Digital transformation has promoted the remote development of dental chair technology.

In the context of digital transformation, dental medicine has begun to be combined with telemedicine technology, and dental chair technology is no exception. Through integrated telecommunication technology, dental chairs can enable real-time interaction with doctors, patients and other medical devices, enabling remote diagnosis and treatment. This remote dental chair technology not only expands the scope of dental medical services, but also provides more convenient and efficient medical services for patients.

To sum up, digital transformation has played a positive role in promoting the innovation and upgrading of dental chair technology. Through the development of intelligence, personalization and remote distance, dental chair technology not only improves the efficiency and safety of dental treatment, but also improves the medical experience of patients. In the future, with the deepening of the digital transformation, the dental chair technology will usher in more innovation opportunities, and inject new vitality into the sustainable development of the dental medical industry.

## **4. Future Tooth Chair, Technology Development Trend**

With the continuous progress of science and technology, dental chair technology, as an important part of the dental medicine field, is facing unprecedented development opportunities. From the traditional dental treatment chair to the modern intelligent dental chair, the technological innovation not only improves the efficiency of oral treatment, but also brings a more comfortable and personalized treatment experience for patients. In the future, the development of dental chair technology will pay more attention to remote diagnosis and treatment, personalized treatment and other directions, and inject new vitality into the field of stomatology.

### **4.1. Application of remote diagnosis and treatment technology**

With the emergence of remote diagnosis and treatment technology, oral medical services are able to break through regional restrictions and realize resource sharing. With the combination of high-definition cameras, sensors and Internet technology, doctors can remotely control dental chairs, providing real-time, efficient diagnostic and treatment services for patients. This not only alleviates the problem of uneven distribution of medical resources, but also provides timely and convenient oral medical services for patients in remote areas. In the future, with the further development of 5G, Internet of Things and other technologies, remote diagnosis and treatment technology will play a more important role in the field of dental chair, and realize the popularization and optimization of oral medical services.

### **4.2. Need for personalized treatment**

With the increase of people's attention to oral health, personalized treatment has gradually become an important trend of oral treatment. The personalized development of dental chair technology will pay more attention to the individual differences and needs of patients. For example, through 3D printing technology, personalized dental instruments and treatment plans can be customized according to the patient's oral structure, improving the accuracy and comfort of treatment. At the same time, the intelligent dental chair can also provide personalized oral health management and prevention suggestions for patients through big data analysis and artificial intelligence technology, to achieve the comprehensive optimization of oral health.

### **4.3. Technology integration and innovation**

In the future, the development of dental chair technology will pay more attention to the integration of multidisciplinary crossover. Through in-depth cooperation with computer science, biomedical engineering, materials science and other fields, dental chair technology will achieve more innovative breakthroughs. For example, the application of virtual reality (VR) and augmented reality (AR) technology can provide patients with a more realistic treatment experience and reduce anxiety during treatment. In addition, with the development of biomaterials and regenerative medicine, dental chair technology is also expected to achieve more natural tooth restoration and regeneration, bringing more perfect treatment effect for patients.

## **5. Conclusion**

Digital transformation not only improves the accuracy and efficiency of dental chair technology, but also achieves a qualitative leap in comfort, security and user experience. In the future, with the application of artificial intelligence, big data and other advanced technologies, the dental chair technology will be able to more accurately meet the personalized needs of patients, and realize the intelligent management of the diagnosis and treatment process. At the same time, the digital transformation has also created favorable conditions for the popularization and promotion of dental chair technology. Through the construction of the network platform and the realization of remote diagnosis and treatment, the dental chair technology is expected to break through the regional restrictions, so that more people can enjoy high-quality and efficient oral medical services. However, technological innovation also brings new challenges. How to ensure medical safety, protect patients' privacy, and improve the skills of medical personnel while ensuring the advanced technology requires us to constantly explore and improve in practice.

To sum up, under the background of digital transformation, the technological innovation and application prospects of the dental chair are broad and full of challenges. We have reasons to believe that in the near future, dental chair technology, with its unique charm, will play a more important role in the field of oral medicine and contribute greater strength to human oral health.

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