



# A Study on Virtual Reality in Healthcare

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**Abstract:** Virtual reality (VR), is a representation of artificial reality created entirely in 3D graphics using information technology. VR makes it possible to experience the real world by sending sensory data to the brain via a special system. The purpose of virtual medicine is to minimize direct contact and effects on the human body during treatment. Given the increased availability of high-quality electronic devices, their enormous computing power, and the ever-evolving Internet infrastructure, progress in this area is only a matter of time. Because of this, the purpose of this article is to identify VR applications in medicine as well as some of the ways that virtual reality can be used to educate and support medical professionals as well as to improve their lives and heal patients.

**Keywords:** Virtual Reality (VR), Healthcare, Medical training, Devices in VR

## I. INTRODUCTION

Recent years have seen significant progress in medical technology, among others with regard to new, minimally invasive methods closely linked to virtual reality. VR is based on creating computer representations of objects, spaces, and events. In short, it's a real-world simulation, a high-quality user interface with real-time simulations and interactions through multiple sensory channels. At present, there are many different ways to create a full or partially virtual world.

Depending on what real and virtual objects are presented in the image, there are four basic categories: reality, the real world; augmented reality, where computer-generated data merge into a real-world image; augmented virtuality, where real-life data are merged into a computer-generated world; and VR, where the world is created entirely by a computer. It should be mentioned that in order to create a fully immersive virtual environment, simulations of other senses including sound, smell, taste, and touch are also necessary for addition to visuals.

Virtual medicine aims to reduce direct contact with and impact the human body. Therefore, it can be used by both medical students who want to learn new techniques and experienced doctors and therapists who want to provide optimal, minimally invasive, effective, and safe treatment methods for their patients. VR offers new ways to develop, interact and interact with other people in social skills through customizable, realistic, fully textured, and animated 3D avatars.

## II. THE ROLE OF VIRTUAL REALITY IN THE MEDICAL INDUSTRY

VR technology benefits both patients and physicians. Virtual reality can offer personalized treatment possibilities, not just based on the physician's own knowledge and intuition. At the heart of modern medicine is this type of human-computer interaction (HCI).

### 1) VR FOR PRACTITIONERS:

The VR healthcare system is intended for use by healthcare professionals to improve patient care and assist physicians in a more personalized way. Ease of use and powerful processing power allows physicians to provide care more efficiently. This will ultimately save the medical industry costs, improve patient care, and increase revenue.

### 2) VR FOR PATIENTS:

Virtual reality has the potential to improve health care dramatically. Unlike television and other 2D media, which are by definition non-interactive, VR can imitate and express a patient's presence in a comfortable "video game-like" setting. In fact, people can literally enter and experience an unrealized environment.



### III. DEVICES USED IN VIRTUAL REALITY

Virtual reality is an excellent support in the patient evaluation process. It provides visual clues to receive feedback and enables patients to be in the right position to evaluate and manage their symptoms.

#### 1) HEAD-MOUNTED DISPLAY

HMD products such as Oculus Rift, HTC Vive, Gear VR, and Google Cardboard are devices with a headband attached to the user's head with a display lens and headphones attached. Objects are presented in front of the user on head-mounted displays, creating an immersive virtual reality experience.

#### 2) SMART GLASSES

A new generation of intelligent devices, smart glasses are used in healthcare to help physicians provide accurate medical procedures and diagnostic tests to improve clinical outcomes. Google Glass, is a set of glasses that may be used to record videos and visualize data.

#### 3) TACTILE GLOVES

Special gloves are designed to allow natural interaction with virtual environments. These are one of the latest developments in the VR world, but they already have the potential to transform the healthcare industry. Tactile gloves can reproduce surgical simulations and make the learning process more immersive and effective.

### IV. VIRTUAL REALITY IN TRAINING AND SUPPORTING HEALTHCARE PROFESSIONALS

#### MEDICAL TRAINING:

Virtual reality has the ability to carry you inside the human body. You can access and view areas that are otherwise unreachable. At the moment, medical students are studying corpses, which are hard to come by and (obviously) behave very differently from real patients. However, in VR, you can create training scenarios that recreate common surgical procedures by displaying details of every part of the body with a stunning 360° CGI reconstruction. Medical Realities is one of the companies that pioneered the use of virtual reality to provide high-quality surgical training. They capture real surgery in 4K 360° video from multiple angles and combine it with a CGI model of the manipulated anatomy to provide an immersive, interactive training experience.



Fig 1. Visualizing the brain

#### TREATMENT:

#### PATIENT EDUCATION:

Being able to see the inside of the human body with virtual reality is convenient not only for doctors but also for patients. VR can guide patients to surgical planning by virtually stepping into patient-specific 360° VR anatomical and pathological reconstruction. The result is a better understanding of the treatment and greater patient satisfaction.

**ROBOTIC SURGERY:**

Robotic surgery is a recent innovation in which surgery is performed using robotic devices such as: A robot arm controlled by a human surgeon. This translates into a low risk of complications during surgery and quick intervention. The robot apparatus is precise. This results in a smaller incision, less blood loss, and a quicker recovery.

**MENTAL HEALTH AND PSYCHOTHERAPY:**

You can use VR's unique ability to move to another location to create powerful simulations of psychologically difficult scenarios. Therapists no longer have to accompany their clients on walks to crowded shopping streets and skyscrapers, for example. Situations that are unrealistic or impossible to reproduce, such as possible flights or tragic events behind PTSD, can be imagined with the click of a mouse. Coaching in the field, which was very effective with so many obstacles, can now be evaluated step by step according to the difficulty level and repeated as many times as needed.



Fig 2. VR being used for physical therapy

**DISEASE AWARENESS:**

AbbVie, a pharmaceutical research and development business, has produced a virtual reality experience to educate medical professionals about Parkinson's disease patients' daily struggles. This knowledge has been displayed at pharmaceutical industry trade shows. People may put on headsets and see how persons with Parkinson's disease traversed virtual supermarkets and interacted with others.



Fig 3. The AbbVie Parkinson's experience

**V. FUTURE OF VR IN HEALTHCARE**

Virtual reality (VR) is more than just a buzzword in the gaming industry. It promises to revolutionize the way treatment is managed and doctors are trained. The healthcare VR market is projected to grow to \$ 3.8 billion by 2023, according to a report by a global industry analyst. According to another report from Grand View Research, the market is projected to grow to a whopping \$ 5.1 billion by 2025. The main drivers are the rapid technological advances in healthcare IT and the growing demand for simulation training and rehabilitation.

**VI. CONCLUSION**

Now and in the future, virtual reality is ready to increase its footprint. This facilitates efficient assessment, training, education, and treatment of previously known complex diseases. It provides a safe space for patient-physician interaction and collaboration without justifying pharmacological and invasive therapies. All of this while supporting large-scale medical research. With a trial-and-error approach, intelligent healing is within reach. Virtual reality is tomorrow's healthcare solution, almost at our fingertips. Create a detailed virtual model of the patient's anatomy. It helps doctors move effectively and display 3D virtual images from different angles. VR is a new technology that can also be used in hospitals and clinics for rehabilitation and training approaches. Applications of this technology are in Virtual Guides to achieve various other virtual goals in the medical field. It appears to be a useful device that promotes physical fitness and aids in the well-being of patients and medical professionals. Innovative and fascinating medical discoveries are made possible by this technology.

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