REVIEW
DOI: 10.5152/TIP.2026.25031

Integration of Virtual Reality in Pharmacy Practices: An Approach for Patient Care

ABSTRACT

Virtual reality (VR) is a medium that describes the usage of a three-dimensional, computer-generated, interactive, immersive simulation environment. It is becoming an invaluable tool in patient care and pharmacy practice, providing engaging and interactive experiences that improve therapeutic outcomes and education. Virtual reality can offer innovative approaches to therapeutic interventions, education, and adherence support, allowing patients to better understand their prescriptions and picture intricate treatment procedures. In the same vein, VR can improve pharmacist skills, encourage a more patient-centered approach, and facilitate safer, more effective healthcare delivery by bridging the gap between theoretical knowledge and real-world application. From this perspective, the aim of this short review was to provide scoping highlights to the integration of VR technology in pharmacy practice and for patient education, counseling, and clinical care in pharmacy practice.

Keywords: Patient care, patient education, pharmacist, pharmacy practice, virtual reality

INTRODUCTION

Simulation has become more popular as a means of delivering experiential learning due to the growing need to offer clinical learning experiences and the associated challenges in doing so. Simulation has been shown to be superior to traditional clinical education in a number of areas, resulting in successful educational interventions that produce both immediate and long-lasting outcomes.[1] However, while simulation is becoming increasingly important in healthcare education, it demands far more resources than traditional instruction. In recent years, there has been a significant increase in study on virtual reality (VR) in healthcare settings. Current settings highlight the possibility for this field to acquire traction in the near future. It is anticipated that as technology advances, it will become more widely available, allowing developing countries to take advantage of this technology to a greater extent.[2,3]

Virtual reality is a medium that describes the usage of a three-dimensional, computer-generated, interactive, immersive simulation environment. With headsets and sensory feedback, it attempts to create a sensation of presence within a virtual environment, in which the user gives the impression of being mentally immersed or interacts with the simulation and becomes part of such environment.[2-4] Interactivity and the integration of the senses—visual, tactile, auditory, and olfactory—are the fundamental concepts in VR.[5] Users can manage things or carry out a sequence of actions and virtual characters in a realistic manner while they are fully engaged in this virtual world. It can be used with a head-mounted display (HMD), which encompasses the user in a completely immersive environment and allows them to interact with it.[6,7]

Virtual reality systems exhibit a variety of configurations and complexity. They might be as simple as a cardboard viewer and a smartphone or as complex as whole-room configurations known as cave automated virtual environments. Room-scale VR navigation gives users a far larger range of motion to physically approach virtual items, whereas seated systems require controls to navigate the environment. The HTC Vive and Oculus Rift are examples of HMD-based devices that are in the middle of the complexity spectrum. These

Anmar Al-Taie
Ranim Alsalem
Rana Suved
Shahed Astif

Clinical Pharmacy Department, Faculty of Pharmacy, Istinye University, Istanbul, Türkiye

Corresponding author:
Anmar Al-Taie
✉ altaiianmar@gmail.com, anmar.altaie@istinye.edu.tr

Received: December 23 , 2025
Revision Requested: February 12, 2026
Last Revision Received: February 19, 2026
Accepted: March 23, 2026
Publication Date: April 6, 2026

Cite this article as: Taie AA, Alsalem R, Suved R, Astif S. Integration of virtual reality in pharmacy practices: an approach for patient care. *Trends in Pharmacy*. 2026, 3, 0031, doi: 10.5152/TIP.2026.25031.

HMDs have good display quality, affordable costs, and are comparatively simple to use and program.[8,9]

In healthcare settings, VR settings can help make difficult topics more approachable and enhance the capacity to tailor education to each individual's requirements. It has been demonstrated that using a visual aid helps people comprehend and remember critical information. For vulnerable populations, like the elderly, high-risk patients, and those with limited medical education, this is particularly true. Moreover, it may also be provided in several languages, which could benefit those who have language and literacy difficulties.[10-12]

Meanwhile, VR holds considerable promise in revolutionizing healthcare practices. It has the potential to be a useful tool for facilitating in-depth learning of medical education and training for health professionals. Results of earlier studies found a significant improvement in skill and satisfaction levels, with more efficacy for knowledge outcomes. Virtual reality has great potential to revolutionize healthcare procedures in healthcare settings. It could be a promising tool for helping healthcare professionals gain insight into medical education and training in depth. Results from previous studies showed that more effective knowledge outcomes significantly improved deeper knowledge, skill and satisfaction levels, and more interesting learning opportunities.[13,14]

Similarly, VR makes it possible to create immersive, interactive patient education experiences that captivate patients more than passive methods. It is increasingly being employed in patient education because it increases knowledge, improves patient involvement and satisfaction, and reduces discomfort and anxiety. In addition to offering immersive and engaging learning and practice settings, the results of previous studies considerably improve patient experiences. Virtual reality showed off its various benefits in patient education in these practices, which go beyond knowledge enhancement to include satisfaction with treatment and emotional well-being.[14,15] Consequently, VR can promote patients' active participation in their care while simultaneously opening up new possibilities for educational provision. From this perspective, the aim of this short review was to provide scoping highlights to the integration of VR technology in pharmacy practice and for patient education, counseling, and clinical care in pharmacy practice.

Virtual Reality Applications in Pharmacy Practice Settings

In recent years, pharmacy practice has drastically shifted from merely dispensing prescriptions to a more service-based approach that includes counseling patients on managing and preventing illnesses and providing patients instructions on proper medication use.[16,17] Pharmacists, who have long been acknowledged as the most accessible healthcare professionals, are in an excellent position to help patients change their behavior and sedentary lifestyle. As experts, pharmacists can help patients prioritize behavioral changes and find feasible goals and outcomes that they can maintain over time.[18,19]

Using VR for patient counseling and treatment can help pharmacists fulfill the process more successfully. Virtual reality systems at pharmacies can aid in the safe and efficient use of medicines by helping patients create an action plan connected to their medications and encouraging medication therapy management.[18-20] The use of VR to simulate pharmacy environments could help pharmacy trainees practice techniques or the procedures required for working in a community or hospital pharmacy setting. This enables pharmacy trainees to practice duties like medication reconciliation, inventory management, compounding medications, and prescription processing in an interactive three-dimensional world.[21,22]

Meanwhile, with the use of tools such as virtual drugstore simulations, pharmacy layout planning and market research are made possible without the need for a physical redesign by visualizing shop planograms, testing different layouts, and analyzing customer traffic patterns.[23] Virtual reality can facilitate interprofessional scenarios, enabling pharmacy trainees to collaborate with virtual teams including nurses, physicians, and others, fostering teamwork and role understanding across healthcare professions.[24] Therefore, this simulation environment aids in the understanding of safety procedures, workflow, and regulatory compliance. Table 1 presents key VR applications in pharmacy practice.

Virtual Reality Applications for Patient Education and Counseling in Pharmacy Practice

Being the first medical professionals that patients frequently seek out, pharmacists are uniquely positioned to not only recommend behavior intervention specialists but also advocate for using VR in addition to traditional behavior interventions to improve patient outcomes. Virtual reality has the potential to help patients adopt better lifestyle habits that could supplement their current self-care options. These interventions could be applied in the current pharmacy landscape for the majority of pharmacist positions. Community pharmacists, for example, may provide these services in the community pharmacy context, and clinical pharmacists who operate as part of a healthcare team may refer patients to these therapies directly.[21,25]

In terms of pharmacy applications, a virtual pharmacy must be constructed in order for patients to get prescriptions and access the relevant VR experiences if VR is to be used for clinical purposes. Virtual reality software affects treatment results, and virtual environments for medical treatments should be customized to each patient's unique symptoms.[20,26] Through the use of VR environments, pharmacy professionals can engage with complicated problems such as managing chronic diseases in immersive settings and develop empathetic communication skills.[27] In the same line, pharmacy VR apps can create risk-free

Table 1. Key Virtual Reality Applications in Pharmacy Practice[20-22,24,26,29-31]

Application Area	Usage and Benefits
Pharmacy education and training	Safe application of clinical and communication skills Increased confidence and involvement Practice compounding and dispensing Recognize drug problems in simulated prescriptions Manage medication interactions in real-world patient situations Develop knowledge of medication therapy management Perform virtual patient evaluations Simulate the management of chronic diseases
Interprofessional education	Collaborative virtual environments that build teamwork Interprofessional cooperation activities
Clinical assessment skills	Immersion in complicated situations, such as risk evaluations for suicide Simulations of acute care (e.g., sepsis, anaphylaxis)
Operational workflows	Workflow simulation for pharmacies Inventory control, and service provision High-alert drug management Environments for sterile compounding Procedures for identifying and reporting errors
Retail planning	Modeling and testing planograms and store designs without interfering with the real-world

situations for skill development and evaluation by allowing users to practice clinical decision-making, dispensing, and patient consultations with virtual patients.[21] On the other hand, VR has potential utility in patient self-care, and pharmacists could help patients improve patient care by recommending the use of VR programs. Elderly patients and those receiving inpatient care can use VR applications for medication management, such as wearables (e.g., Fitbit) and health tracking applications. When a patient is prescribed a new drug, the instructional usage of VR apps could be utilized to offer visual and auditory instructions regarding standard medication safety and efficacy. The VR system could show techniques or administration processes for more complicated drug regimens, like how to self-administer an injectable drug. After that, patients may virtually practice these actions using the system, which would prevent them from harming themselves or wasting medicine.[18,20] Table 2 presents the VR applications in pharmacy practice showing application areas, target population, and intended outcomes.

Virtual reality can also be used to verify that patients have a correct understanding of and are capable of using the technique they were taught through feedback. Reciting what was just experienced in a VR session right away does not guarantee that the information will be retained and applied over the long term, but it does give patients practice and the pharmacist a chance to identify misconceptions. Additionally, VR centers in pharmacies could employ computer algorithms to predict the potential health effects of both positive and negative behavioral changes made to patients. These machines

Table 2. Virtual Reality Applications in Pharmacy Practice Showing Application Areas, Target Population and Intended Outcomes[20-22,24,26,29-31]

Application Area	Target Population	Intended Outcomes
Pharmacy education and simulation training	Pharmacy students Pharmacy interns	Enhance communication Dispensing accuracy Clinical decision-making abilities
Interprofessional education	Pharmacy students Medical students Nursing students	Enhance communication, collaboration, and collaborative care achievements
Patient counseling simulation	Pharmacy students Community pharmacists	Improve patient counseling self-assurance Cultural awareness, and caring
Medication adherence training	Patients with chronic diseases	Strengthen self-management skills Knowledge of the disease circumstances Improve medication adherence
Medication therapy management training	Practicing pharmacists Pharmacy residents	Improve interprofessional collaboration Therapeutic optimization Solving of medication-related problems
Sterile compounding and aseptic technique training	Hospital pharmacists Pharmacy technicians	Improve safety, aseptic compliance, and compounding error reduction

may be configured to provide an extensive amount of data that would be used to construct projected conditions for a better understanding of how future health and disease are predicted by food, exercise, medication use, current laboratory tests, ethnicity, and family history.[20,26] Therefore, pharmacists can collaborate with patients to find behavioral modifications that can support how new habits may impact their health in the future.[28] The overall impact on pharmacy practice includes enhanced patient safety and clinical confidence, improved communication skills, boosted empathy and cultural competence, and non-drug therapeutic options. Figure 1 shows the integration of VR into pharmacy practice showing the interaction between pharmacists, patients, VR tools, and expected outcomes.

CONCLUSION

In conclusion, this scoping review revealed that the integration of VR in pharmacy practice and patient care is a revolutionary step toward more engaging, interactive, and efficient healthcare delivery. Virtual reality technologies can improve patient education, adherence, and engagement through experiential learning, while they can help improve pharmacists' training by enabling realistic modeling of complicated scenarios without endangering patients. In addition, VR becomes an expanding approach to encourage patients to actively participate in their care for better disease control, enhancing patient satisfaction and engagement in disease management and quality of life. Virtual reality has the potential to become a crucial tool in contemporary pharmacy, bridging the gap between theoretical understanding and real-world application and ultimately promoting safer, more patient-centered care as the technology becomes more widely available and evidence of its effectiveness increases. Therefore, VR can play a transformative role in shaping the future of pharmacy practice to improve patient outcomes as well as clinical competency.

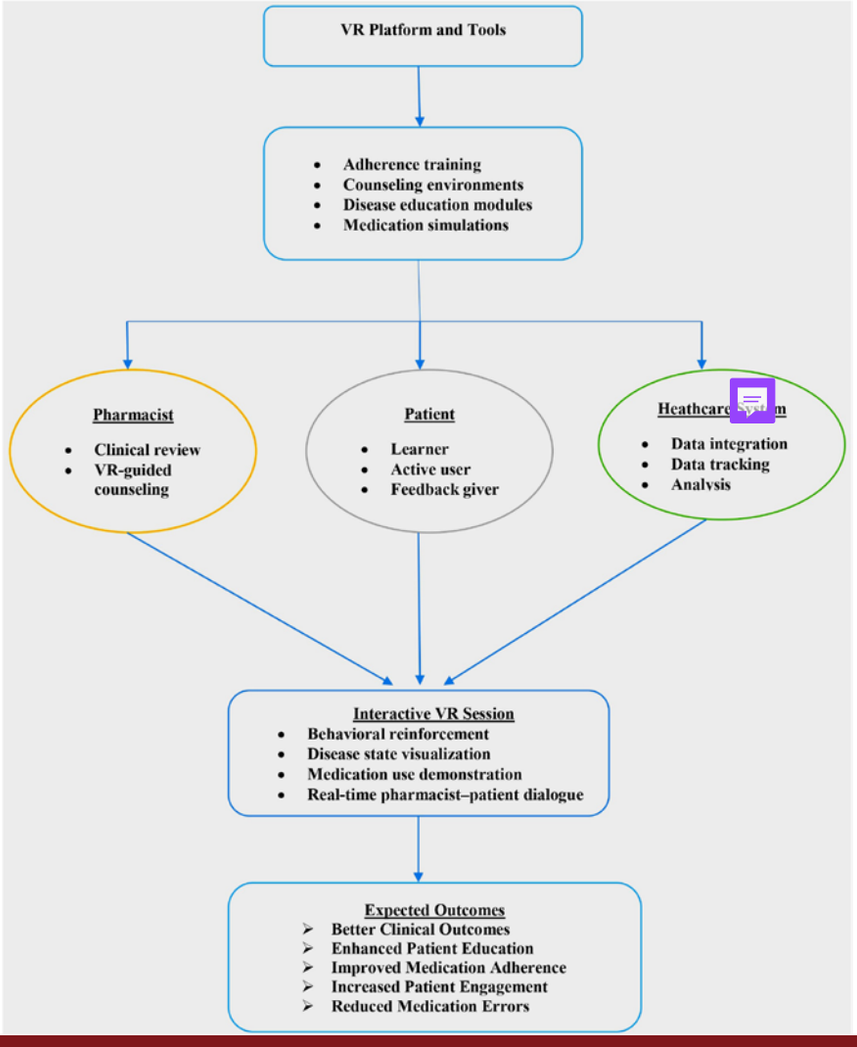

Figure 1. Integration of virtual reality (VR) into pharmacy practice showing the interaction between pharmacists, patients, VR tools, and expected outcomes.

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author.

Artificial Intelligence Usage Statement: The authors declared that no Artificial Intelligence Tool was used in the preparation of the manuscript.

Ethics Committee Approval: Ethical committee approval was not required this study as neither human nor animal participants were used in the present review.

Informed Consent: Verbal or written informed consent was not obtained for this study.

Peer-review: Externally peer-reviewed.

Author Contributions: .Concept – A.A.T.; Design – A.A.T.; Supervision – A.A.T.; Resources – A.A.T., R.A., R.S., S.A.; Materials – A.A.T., R.A., R.S., S.A.; Data Collection and/or Processing – A.A.T., R.A., R.S., S.A.; Analysis and/or Interpretation – A.A.T.; Literature Search – A.A.T., R.A., R.S., S.A.; Writing – A.A.T., R.A., R.S., S.A.; Critical Review – A.A.T.

Declaration of Interests: The authors have no conflicts of interest to declare.

Funding: The authors declare that this study received no financial support.

References

1. Elendu C, Amaechi DC, Okatta AU, et al. The impact of simulation-based training in medical education: a review. *Med (Baltim)*. 2024;103(27):e38813. **[CrossRef]**
2. Pottle J. Virtual reality and the transformation of medical education. *Future Healthc J*. 2019;6(3):181-185. **[CrossRef]**
3. Snoswell AJ, Snoswell CL. Immersive virtual reality in health care: systematic review of technology and disease states. *JMIR Biomed Eng*. 2019;4(1):e15025. **[CrossRef]**
4. Xiong J, Hsiang EL, He Z, et al. Augmented reality and virtual reality displays: emerging technologies and future perspectives. *Light Sci Appl*. 2021;10(1):216. **[CrossRef]**
5. Rubio-Tamayo JL, Gertrudix Barrio M, García García F. Immersive environments and virtual reality: systematic review and advantages in communication. *Interact Simul Multimod Technol Interact*. 2017;21:1-20.
6. Servotte JC, Goosse M, Campbell SH, et al. Virtual reality experience: immersion, sense of presence, and cybersickness. *Clin Simul Nurs*. 2020;38:35-43. **[CrossRef]**
7. van der Linde-van den Bor M, Slond F, Liesdek OCD, et al. The use of virtual reality in patient education related to medical somatic treatment: a scoping review. *Patient Educ Couns*. 2022;105(7):1828-1841. **[CrossRef]**
8. Garrett B, Taverner T, Gromala D, et al. Virtual reality clinical research: promises and challenges. *JMIR Serious Games*. 2018;6(4):e10839. **[CrossRef]**
9. Ratamero EM, Bellini D, Dowson CG, et al. Touching proteins with virtual bare hands: visualizing protein-drug complexes and their dynamics in self-made virtual reality using gaming hardware. *J Comput Aid Mol Des*. 2018;32(6):703-709. **[CrossRef]**
10. Radianti J, Majchrzak TA, Fromm J, et al. A systematic review of immersive virtual reality applications for higher education: design elements, lessons learned, and research agenda. *Comput Educ*. 2020;147:103778. **[CrossRef]**
11. Jawed S, Amin HU, Malik AS, et al. Classification of visual and non-visual learners using electroencephalographic alpha and gamma activities. *Front Behav Neurosci*. 2019;13:86. **[CrossRef]**
12. Garcia-Retamero R, Cokely ET. Communicating health risks with visual aids. *Curr Dir Psychol Sci*. 2013;22(5):392-399. **[CrossRef]**
13. Kouijzer MMTE, Kip H, Bouman YHA, et al. Implementation of virtual reality in healthcare: a scoping review on the implementation process of virtual reality in various healthcare settings. *Implement Sci Commun*. 2023;4(1):67. **[CrossRef]**
14. Kim HY, Kim EY. Effects of medical Education Program using virtual reality: a systematic review and meta-analysis. *Int J Environ Res Public Health*. 2023;20(5):3895. **[CrossRef]**
15. Iqbal AI, Aamir A, Hammad A, et al. Immersive technologies in healthcare: an in-depth exploration of virtual reality and augmented reality in enhancing Patient Care, medical education, and training paradigms. *J Prim Care Community Health*. 2024;15:21501319241293311. **[CrossRef]**
16. Al-Taie A. Reported patients' practices, knowledge and attitudes regarding common cold in the community: a cross-sectional study. *Adv Hum Biol*. 2021;11(2):157-162. **[CrossRef]**
17. Arueyingho OV, Al-Taie A, McCallum C. Scoping review: machine learning interventions in the management of healthcare systems. *Digit Health*. 2024;10:20552076221144095. **[CrossRef]**
18. Nuffer W, Smith SM, Trinkley K. Integrating virtual reality to expand the public health role of community pharmacists. *J Am Pharm Assoc (2003)*. 2013;53(2):152-158. **[CrossRef]**
19. Dascal J, Reid M, IsHak WW, et al. Virtual reality and medical inpatients: a systematic review of randomized, controlled trials. *Innov Clin Neurosci*. 2017;14(1-2):14-21.
20. Fox BI, Felkey BG. Virtual reality and pharmacy: opportunities and challenges. *Hosp Pharm*. 2017;52(2):160-161. **[CrossRef]**
21. Ventola CL. Virtual reality in pharmacy: opportunities for clinical, research, and educational applications. *P T*. 2019;44(5):267-276.
22. Fertleman C, Aubugeau-Williams P, Sher C, et al. A discussion of virtual reality as a new tool for training healthcare professionals. *Front Public Health*. 2018;6:44. **[CrossRef]**
23. Almeman A. The digital transformation in pharmacy: embracing online platforms and the cosmeceutical paradigm shift. *J Health Popul Nutr*. 2024;43(1):60. **[CrossRef]**
24. Mergen M, Graf N, Meyerheim M. Reviewing the current state of virtual reality integration in medical education - a scoping review. *BMC Med Educ*. 2024;24(1):788. **[CrossRef]**
25. Kayin I, Al-Taie A, Elmasri J. Evaluation of pharmacy students' experience toward internship practices in community pharmacy: a cross-sectional study from Türkiye. *Educ Med*. 2025;26(6):101098. **[CrossRef]**
26. Gustafsson M, Englund C, Gallego G. The description and evaluation of virtual worlds in clinical pharmacy education in Northern Sweden. *Curr Pharm Teach Learn*. 2017;9(5):887-892. **[CrossRef]**
27. Khan HU, Ali Y, Khan F, Al-Antari MA. A comprehensive study on unraveling the advances of immersive technologies (VR/AR/MR/XR) in the healthcare sector during the COVID-19: challenges and solutions. *Heliyon*. 2024;10(15):e35037. **[CrossRef]**
28. Al-Taie A, Hafida M, Abdulsattar M, et al. Scoping insights into artificial intelligence-driven treatment of diabetes mellitus in

clinical practice. *Egypt J Intern Med*. 2026;38(1):1-12. **[CrossRef]**
29. Alkhudair N, Alrayes F, Alsehli D, et al. Virtual reality in experiential pharmacy education: a quasi-experimental study. *Saudi Pharm J*. 2024;32(5):102028. **[CrossRef]**
30. Coyne L, Merritt TA, Parmentier BL, et al. The past, present, and future of virtual reality in pharmacy education. *Am J Pharm Educ*. 2019;83(3):7456. **[CrossRef]**
31. Mistry D, Brock CA, Lindsey T. The present and future of virtual reality in medical education: a narrative review. *Cureus*. 2023;15(12):e51124. **[CrossRef]**