


# Patient Preferences and Their Influence on Chronic Hepatitis B-A Review

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**Abstract:** Chronic hepatitis B (CHB) is a common chronic viral infectious disease that requires long-term treatment to control the condition and prevent complications. To standardize treatment regimens for CHB, professional associations have established relevant guidelines, but they have often overlooked patient preferences. Historically, in the treatment process, medical decisions were predominantly made by physicians or health care administrators, with limited patient involvement, leading to the neglect of patient preferences. Patient attitudes, expectations, and needs are all influenced by their preferences, and patient preferences have a direct impact on treatment adherence. Understanding and respecting patient preferences are crucial to ensuring treatment effectiveness. This article will explore patient preferences in the treatment of CHB and elucidate the influence of patient preferences on treatment adherence, aiming to provide insights for the development of a more personalized and effective health care process.

**Keywords:** CHB, treatment options, patient preferences, adherence

## Introduction

Chronic hepatitis B (CHB) is a liver disease caused by infection with the hepatitis B virus (HBV). Approximately 292 million people worldwide are currently infected with HBV, and approximately 887000 people die each year from diseases associated with HBV infection.<sup>1,2</sup> HBV infection has emerged as one of the most significant global public health challenges. According to the World Health Organization's goal of "eliminating viral hepatitis as a public health hazard by 2030", by that time, the rate of new chronic hepatitis B infections should be reduced by 90%, the mortality rate should be reduced by 65%, the diagnosis rate should be 90%, and the treatment rate should be 80%. Achieving this goal will require the combined efforts of physicians and patients.

Early and standardized treatment of CHB is essential to control disease progression. The goal of CHB treatment is to maximize long-term suppression of HBV replication; reduce hepatocyte inflammation and necrosis and liver fibrous tissue proliferation; delay and reduce the occurrence of cirrhosis, liver cancer, liver function failure, and other complications; improve patients' quality of life; and prolong their survival time. Functional cure should be pursued for eligible patients.<sup>3-6</sup>

Despite the proven benefits of treating CHB, the treatment process is often health care provider-driven, with less patient involvement and less reference to patient preferences in clinical practice guidelines.<sup>7</sup> Patient preferences for CHB are poorly studied and are not well understood. Since patient preference influences the entire treatment process, we summarize the evidence related to patient preference and its associated factors to theoretically remedy the limitations of previous studies.

## The Concept of Patient Preference

Patient preferences play an important role in medical decision-making and refer to patients' personal preferences or choices regarding medical interventions, medications, or other medical decisions.<sup>8</sup> Patient preferences can be influenced by many



factors, such as perceptions of illness, attitudes toward the risks and benefits of treatment, social and cultural factors, experience, and economic status. The uniqueness of each individual implies that each patient's preferences may differ.<sup>9</sup>

Treatment regimens for CHB are often complex and long-term, and previous studies have shown that patient preferences influence the choice of treatment regimen and that patients have different preferences for treatment outcomes.<sup>10</sup> Furthermore, patient adherence determines patient outcomes, and patient adherence is influenced by patient preferences.<sup>10,11</sup> Therefore, understanding patient preferences can help physicians better understand patient needs and expectations and thus provide treatment plans that are more tailored to individual patient differences.

## Patient Preferences Influence the Choice of Treatment Options

The development of antiviral drugs for HBV has undergone a process of evolution from immune modulators to nucleos(t)ide analogs and then to nucleoside polymerase inhibitors.<sup>12</sup> Currently, the standard methods for treating chronic hepatitis B include oral nucleos(t)ide analogs and pegylated interferon-alpha (Peg-IFN- $\alpha$ ) injections.<sup>13</sup> Nucleos(t)ide analogs are currently the most commonly used anti-HBV drugs, which are effective in inhibiting viral replication but may lead to the development of drug resistance with long-term use. However, the use of Peg-IFN- $\alpha$  is limited by side effects and the duration of treatment and is expensive.<sup>12,14</sup> All these drugs have different advantages in terms of efficacy, safety, resistance and cost, and patient preferences will influence the choice of treatment options.<sup>15,16</sup>

### Patient Preference for Treatment Efficacy

When choosing a treatment regimen for chronic hepatitis B, patients generally prioritize treatment efficacy. Approximately 77.5% of patients would choose the most effective drug regardless of cost.<sup>17</sup> Long-term treatment efficacy is the main driver of patient choice, and women appear to prefer regimens with superior efficacy.<sup>17,18</sup> Patients prefer regimens that provide a functional cure over lifelong treatment options, although a functional cure is difficult to achieve.<sup>15,18</sup> Studies have shown that patients who achieve a functional cure in a limited period of time have better adherence to medication and better overall safety of treatment, which is a key factor in treatment outcomes.<sup>18–20</sup>

Although the likelihood of functional cure is positively correlated with the treatment regimen chosen, there are no data available on how to evaluate drugs that may increase functional cure in patients compared to existing treatment options.<sup>5,18,20</sup> To develop preferred treatment options for patients, a better understanding of the characteristics of CHB treatment options and the associated trade-offs is necessary.<sup>15</sup>

### Patient Preference for Therapeutic Drugs

The acceptability of Peg-IFN- $\alpha$  and antiviral drugs in patients with CHB varies. Nucleos(t)ide analogs are easy to use and well tolerated, and most patients receiving antiviral therapy use them.<sup>13</sup> Peg-IFN- $\alpha$  is less accepted, with only 3% to 11% of patients receiving Peg-IFN- $\alpha$ , which may be due to the specific side effects of Peg-IFN- $\alpha$  and its high cost.<sup>21,22</sup> This result may also be related to patient preferences for drug administration. Research showed that patients preferred tablets as the preferred route of administration.<sup>17,18</sup> They also preferred monotherapy, with once-daily oral regimens. Even weekly injectable therapy was less preferred by some patients.<sup>17</sup> Some patients even chose their treatment regimen based on the route of administration, and this preference is particularly emphasized by elderly patients.<sup>18</sup>

In addition, Chinese herbal medicine (CHM) is also a commonly used alternative approach for chronic disease patients. The use of CHM may help alleviate liver fibrosis and cirrhosis.<sup>23</sup> Some studies have shown that CHM treatment or a combination of traditional Chinese and Western medicine can significantly reduce the risk of liver cell carcinoma in CHB and decrease the mortality rate in cirrhosis.<sup>24</sup> Antiviral treatment has been well established as effective for CHB, and current medical guidelines do not support the use of CHM in treating CHB.<sup>25</sup> Currently, there is a lack of research on patient preferences for CHM treatment in CHB, and patient preferences for this type of medication await further validation.

### Patient Preference for Drug Safety

Drug safety is an important consideration for patients when choosing a treatment regimen for chronic hepatitis B. Patients hope to choose a drug that has a good safety profile, meaning that it will not cause serious adverse effects or impair the function of other vital organs during use.<sup>26</sup> Current adverse reactions to Peg-IFN- $\alpha$  include flu-like

syndrome early in treatment, mild to moderate skin reactions, and varying degrees of mental and emotional changes during treatment, in addition to possible bone marrow suppression.<sup>21,22</sup> Although most patients tolerate the adverse effects of Peg-IFN- $\alpha$  treatment, this has been a factor in the refusal of some patients to be treated with Peg-IFN- $\alpha$ .<sup>27</sup> In contrast, nucleos(t)ide analogs are safer; an example of such is entecavir, which was associated with serious adverse effects in only 0.2% of patients in a global multicenter cohort study with a 10-year follow-up.<sup>28</sup>

Patients prefer treatment regimens with good safety and resistance.<sup>18</sup> Long-term stable regimens can maintain viral suppression without causing serious drug resistance problems or side effects.<sup>26</sup> Studies have shown that 48.1% of patients are willing to take antiviral drugs under close monitoring if they have known side effects. If the side effects are tolerable, 47.5% of patients agree to continue taking the drug. For patients with prior experience with drug side effects, drug safety is an important factor in considering treatment options.<sup>17</sup>

## Patient Preference for Treatment Cost

Since most patients with CHB require lifelong treatment, cost is an important factor in patients' choice of treatment options.<sup>22</sup> A study of patient preferences for CHB showed that cost was the second most important consideration after treatment outcome.<sup>17</sup> There was a statistically significant difference between patients with treatment experience and those receiving first-time treatment, who were more concerned about the cost of treatment.<sup>17</sup> However, cost preferences may vary by country due to differences in reimbursement systems. The cost and accessibility of HBV treatment is always an important consideration in the treatment process, especially in resource-poor areas. More research needs to focus on the economic and social aspects of treatment to ensure the sustainability and widespread use of treatment options.<sup>2,29,30</sup>

In addition to treatment efficacy, drug selection, safety, and cost, the duration of drug therapy and follow-up are also factors that patients consider. Patient preference influences acceptance of a treatment plan, which in turn influences treatment outcomes.<sup>10</sup> Patients are more likely to adhere to treatment if the health care provider offers a treatment plan that is consistent with their personal preferences and lifestyles. This negotiation model of treatment choice helps patients better understand the risks and benefits of treatment and increases adherence and satisfaction with treatment.<sup>31</sup> New treatment options and drugs have emerged in recent years to better account for patient preferences, such as Peg-IFN- $\alpha$  in combination with oral nucleotides. These new treatment options often have higher cure rates, fewer side effects, and shorter treatment times and may be more in line with patient preferences and needs.<sup>29</sup>

## Patient Preferences Affect Treatment Adherence

Treatment of CHB usually requires long-term drug therapy and regular follow-up. Treatment adherence is important for patients with CHB. It refers to the extent to which patients use their medications and follow other treatment regimens correctly and consistently as recommended by their physicians.<sup>32</sup> The level of patient compliance will directly affect the outcome and prognosis of the disease, but the compliance of HBV patients is only approximately 60%.<sup>33–37</sup> Patient preference is one of the most important factors affecting patient adherence to treatment.<sup>10,11,38</sup>

Several studies have found a positive correlation between patient preference for treatment regimens and adherence to treatment.<sup>17,18,39</sup> When patients are satisfied and agreeable with their treatment regimen, they are more likely to comply with their prescriptions and to maintain continuous medication therapy.<sup>10</sup> Patients' preferences for the appearance, dosage form, and usage of medications are also strongly associated with medication adherence. Satisfying patients' preferences for medications can improve their acceptance of and adherence to treatment, thereby improving treatment outcomes.<sup>39</sup> Conversely, if patients do not like a treatment, they may show lower adherence to the treatment plan, which may affect treatment outcomes. In addition, patient preference for treatment duration and frequency may also affect adherence.<sup>35</sup> Rationalizing the timing and frequency of treatment to meet patients' needs may promote better adherence to treatment plans.<sup>9,17,18</sup> Patient preferences can also influence the psychological and behavioral processes involved in treatment, patient trust and acceptance of treatment, and adherence and satisfaction with treatment, which can also influence the production and maintenance of treatment outcomes.<sup>40</sup> In clinical practice, enhancing patient education and effective communication are also key strategies to improve patient adherence to medication.<sup>41</sup>

These results provide an important reference for physicians and decision-makers. The advantages and disadvantages of different treatment modalities and individual patient differences need to be taken into account when formulating treatment

plans and providing treatment education to better meet patient expectations and needs and to improve patient satisfaction and adherence. However, there is a lack of research on patient preferences in CHB. Further practice and exploration are needed to understand the specific effects of patient preferences on treatment adherence and to apply them to actual clinical management.

## How to Consider Patient Preferences in Treatment

Consideration of patient preferences is particularly important in the treatment of CHB. Patient preferences may have an impact on their choice of treatment, adherence to treatment, and treatment outcomes. The following are some suggestions on how to take patient preferences into account.

First, doctors should maintain a good relationship with their patients, establish a foundation of trust and communication, and understand their patients' preferences and wishes for different treatment options.<sup>9,10,39</sup> Moreover, they should respect their patient's wishes, pay attention to their patient's needs, and provide support and assistance to their patient. Research has found that the quality of physician–patient communication and relationships plays an important role in patient adherence to treatment. Patients are more likely to follow their doctor's recommendations if the doctor provides clear treatment goals, explains treatment options, and answers their questions.<sup>42,43</sup>

Second, doctors should provide patients with different treatment options so that they can understand the advantages and disadvantages of each treatment option, as well as the possible risks and benefits. Physicians should actively communicate and share decisions with patients. Physicians should encourage patients to participate in treatment decisions by providing adequate information, sharing the decision-making authority, and negotiating treatment options so that patients can make their own choices.<sup>9,44</sup>

Follow-up monitoring is an important issue in long-term HBV management, and physicians should reevaluate treatment regimens with patients and possibly make adjustments if treatments are not effective. There is a lack of uniform guidelines to determine the best monitoring strategy during and after treatment. In addition, more studies are needed to assess the long-term effects of treatment, including aspects of liver disease progression, incidence of liver cancer, and patient survival.<sup>45</sup>

## Discussion

The treatment of CHB has consistently presented a significant challenge in the field of medicine. Despite substantial progress made over the past several decades, including the introduction of antiviral medications and the widespread implementation of vaccines, there are still certain limitations in the current state of CHB treatment.<sup>19</sup> Presently, CHB treatment predominantly revolves around antiviral drugs such as nucleoside analogs and interferon. These medications effectively inhibit viral replication but often fall short of completely eradicating the virus.<sup>1</sup> Patients frequently require long-term or even lifelong treatment, which not only imposes a financial burden but also raises concerns about the development of drug resistance.<sup>30</sup> Current research in HBV treatment is directed toward gaining a deeper understanding of the immune tolerance mechanisms between the hepatitis B virus (HBV) and the host, developing novel antiviral medications, exploring immunotherapy, gene therapy, and other avenues to achieve the complete clearance and cure of HBV.<sup>46</sup>

Additionally, different patients exhibit varying responses to treatments, and their needs and expectations diverge. Personalized treatment is poised to become a crucial management strategy in the future, with patient preferences emerging as a key factor in effectively implementing personalized treatment strategies.<sup>44</sup> In recent years, there has been a growing emphasis on patient preferences, with research demonstrating their influence on treatment plan selection, treatment compliance, and treatment outcomes, among other factors.<sup>43,44,47</sup> Understanding and respecting patient preferences are paramount in ensuring the success of personalized treatments. In CHB treatment, the development of personalized treatment strategies necessitates a comprehensive consideration of patient preferences to enhance treatment compliance, quality of life, and ultimately, treatment effectiveness.<sup>17</sup> Despite the widespread recognition of personalized treatment in HBV management, research on patient preferences in CHB remains relatively scarce, and there is a lack of accurate predictive models to determine patient responses to different treatment approaches. Further research is needed in the future to gain a deeper understanding of pathological variances and predictive factors for treatment responses among different patients, thereby achieving more precise personalized treatment.<sup>48</sup>窗体顶端

## Conclusion

This review describes CHB patient preferences and their impact on treatment adherence and provides recommendations for health care providers. When choosing a treatment plan, patients are most concerned about treatment effectiveness and tend to prefer options that can achieve functional cure, although this goal is currently challenging to attain. Drug safety is of paramount importance in patients' treatment choices, especially for those who have previously experienced medication side effects. Convenience is also an important factor in a patient's choice of regimen, and this has been confirmed in other chronic diseases. Patients with CHB require long-term, often lifelong treatment, and the sustainability and accessibility related to the treatment cost can influence the choice of treatment plans for these patients. There are few studies on CHB patient preferences, and this article only summarizes the evidence from existing research. Furthermore, patient preferences may change in the future and thus need to be verified in further studies.

## Disclosure

The authors report no conflicts of interest in this work.

## References

1. MacLachlan JH, Cowie BC. Hepatitis B virus epidemiology. *Cold Spring Harb Perspect Med*. 2015;5(5):a021410–a021410. doi:10.1101/cshperspect.a021410
2. Lozano R, Naghavi M, Foreman K, et al. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the global burden of disease study 2010. *The Lancet*. 2012;380(9859):2095–2128. doi:10.1016/S0140-6736(12)61728-0
3. Lok AS, Zoulim F, Dusheiko G, Ghany MG. Hepatitis B cure: from discovery to regulatory approval. *Hepatology*. 2017;66(4):1296–1313. doi:10.1002/hep.29323
4. Coffin CS, Zhou K, Terrault NA. New and old biomarkers for diagnosis and management of chronic hepatitis b virus infection. *Gastroenterology*. 2019;156(2):355–368.e3. doi:10.1053/j.gastro.2018.11.037
5. Kim WR. Emerging therapies toward a functional cure for hepatitis b virus infection. *Gastroenterology*. 2018;14(7):439–442.
6. Pham EA, Perumpail RB, Fram BJ, Glenn JS, Ahmed A, Gish RG. Future therapy for hepatitis b virus: role of immunomodulators. *Curr Hepatol Rep*. 2016;15(4):237–244. doi:10.1007/s11901-016-0315-9
7. Lampertico P, Agarwal K, Berg T, et al. EASL 2017 clinical practice guidelines on the management of hepatitis B virus infection. *J Hepatol*. 2017;67(2):370–398. doi:10.1016/j.jhep.2017.03.021
8. Amelung V, Stein V, Suter E, Goodwin N, Nolte E, Balicer R, *Handbook Integrated Care*. Springer International Publishing; 2021. doi:10.1007/978-3-030-69262-9
9. Belay YA, Yitayal M, Atnafu A, Taye FA. Patients' preferences for antiretroviral therapy service provision: a systematic review. *Cost Eff Resour Alloc*. 2021;19(1):56. doi:10.1186/s12962-021-00310-7
10. Reginster JY, Rabenda V, Neuprez A. Adherence, patient preference and dosing frequency: understanding the relationship. *Bone*. 2006;38(4):S2–S6. doi:10.1016/j.bone.2006.01.150
11. Allard N, Dev A, Dwyer J, Srivatsa G, Thompson A, Cowie B. Factors associated with poor adherence to antiviral treatment for hepatitis B. *J Viral Hepat*. 2017;24(1):53–58. doi:10.1111/jvh.12582
12. Terrault NA, Lok ASF, McMahon BJ, et al. Update on prevention, diagnosis, and treatment of chronic hepatitis B: AASLD 2018 hepatitis B guidance. *Hepatology*. 2018;67(4):1560–1599. doi:10.1002/hep.29800
13. Grossi G, Viganò M, Loglio A, Lampertico P. Hepatitis B virus long-term impact of antiviral therapy nucleot(s)ide analogues (NUC s). *Liver Int*. 2017;37(S1):45–51. doi:10.1111/liv.13291
14. Wang WX, Jia R, Jin XY, et al. Serum cytokine change profile associated with HBsAg loss during combination therapy with PEG-IFN- $\alpha$  in NAS-suppressed chronic hepatitis B patients. *Front Immunol*. 2023;14(1121778). doi:10.3389/fimmu.2023.1121778
15. Chien RN, Liaw YF. Current trend in antiviral therapy for chronic hepatitis B. *Viruses*. 2022;14(2):434. doi:10.3390/v14020434
16. Krause A, Haberkorn U, Mier W. Strategies for the treatment of HBV/HDV. *Eur J Pharmacol*. 2018;833:379–391. doi:10.1016/j.ejphar.2018.06.030
17. Lim SG, Aung MO, Chung SW, Soon CS, Mak BH, Lee KH. Patient preferences for hepatitis B therapy. *Antivir Ther*. 2013;18(5):663–670. doi:10.3851/IMP2482
18. Hardtstock F, Sbarigia U, Kocaata Z, Wilke T, Sylvester SV. Preferences of patients with chronic hepatitis b – A discrete choice experiment on the acceptability of functional cure. *Patient Prefer Adherence*. 2020;14:613–624. doi:10.2147/PPA.S238833
19. Tang LSY, Covert E, Wilson E, Kottlilil S. Chronic hepatitis b infection: a review. *JAMA*. 2018;319(17):1802. doi:10.1001/jama.2018.3795
20. Tan M, Bhadoria AS, Cui F, et al. Estimating the proportion of people with chronic hepatitis B virus infection eligible for hepatitis B antiviral treatment worldwide: a systematic review and meta-analysis. *Lancet Gastroenterol Hepatol*. 2021;6(2):106–119. doi:10.1016/S2468-1253(20)30307-1
21. Al Ashgar H, Peedikayil M, Al Quaiz M, et al. HBsAg clearance in chronic hepatitis B patients with add-on pegylated interferon alfa-2a to ongoing tenofovir treatment: a randomized controlled study. *Saudi J Gastroenterol*. 2017;23(3):190. doi:10.4103/sjg.SJG\_541\_16
22. Huang Y, Qi M, Liao C, et al. Analysis of the efficacy and safety of pegylated interferon- $\alpha$ 2b treatment in inactive hepatitis B surface antigen carriers. *Infect Dis Ther*. 2021;10(4):2323–2331. doi:10.1007/s40121-021-00511-w
23. Tsai TY, Livneh H, Hung TH, Lin IH, Lu MC, Yeh CC. Associations between prescribed Chinese herbal medicine and risk of hepatocellular carcinoma in patients with chronic hepatitis B: a nationwide population-based cohort study. *BMJ Open*. 2017;7(1):e014571. doi:10.1136/bmjopen-2016-014571
24. Tsai TY, Hung TH, Livneh H, Lin IH, Lu MC, Yeh CC. Chinese herbal medicine therapy and the risk of mortality for chronic hepatitis B patients with concurrent liver cirrhosis: a nationwide population-based cohort study. *Oncotarget*. 2018;9(26):18214–18223. doi:10.18632/oncotarget.24383



25. Yim HJ, Kim JH, Park JY, et al. Comparison of clinical practice guidelines for the management of chronic hepatitis B: when to start, when to change, and when to stop. *Clin Mol Hepatol*. 2020;26(4):411–429. doi:10.3350/cmh.2020.0049
26. Wang CS, Lin PJ, Cheng CL, Tai SH, Kao Yang YH, Chiang JH. Detecting potential adverse drug reactions using a deep neural network model. *J Med Internet Res*. 2019;21(2):e11016. doi:10.2196/11016
27. Janssen HLA, van Zonneveld M, Senturk H, et al. Pegylated interferon alfa-2b alone or in combination with lamivudine for HBeAg-positive chronic hepatitis B: a randomised trial. *Lancet (London, England)*. 2005;365(9454):123–129. doi:10.1016/S0140-6736(05)17701-0
28. De Fraga RS, Van Vaisberg V, Mendes LCA, Carrilho FJ, Ono SK. Adverse events of nucleos(t)ide analogues for chronic hepatitis B: a systematic review. *J Gastroenterol*. 2020;55(5):496–514. doi:10.1007/s00535-020-01680-0
29. Zampino R. Hepatitis B virus burden in developing countries. *World J Gastroenterol*. 2015;21(42):11941. doi:10.3748/wjg.v21.i42.11941
30. Ginzberg D, Wong RJ, Gish R. Global HBV burden: guesstimates and facts. *Hepatol Int*. 2018;12(4):315–329. doi:10.1007/s12072-018-9884-8
31. Eliasson L, Clifford S, Mulick A, Jackson C, Vrijens B. How the EMERGE guideline on medication adherence can improve the quality of clinical trials. *Br J Clin Pharmacol*. 2020;86(4):687–697. doi:10.1111/bcp.14240
32. Chung MK, Kim SS, Cheon YH, et al. Patient perspectives and preferences regarding gout and gout management: impact on adherence. *J Korean Med Sci*. 2021;36(32):e208. doi:10.3346/jkms.2021.36.e208
33. Chotiayaputta W, Peterson C, Ditah FA, Goodwin D, Lok ASF. Persistence and adherence to nucleos(t)ide analogue treatment for chronic hepatitis B. *J Hepatol*. 2011;54(1):12–18. doi:10.1016/j.jhep.2010.06.016
34. Lee SB, Jeong J, Park JH, et al. Low-level viremia and cirrhotic complications in patients with chronic hepatitis B according to adherence to entecavir. *Clin Mol Hepatol*. 2020;26(3):364–375. doi:10.3350/cmh.2020.0012
35. Wang L, Chen P, Zheng C. Poor adherence is a contributor to viral breakthrough in patients with chronic hepatitis B. *Infect Drug Resist*. 2018;11:2179–2185. doi:10.2147/IDR.S186719
36. Abreu RM, Bassit LC, Tao S, et al. Long-term virological and adherence outcomes to antiviral treatment in a 4-year cohort chronic hbv study. *Antivir Ther*. 2019;24(8):567–579. doi:10.3851/IMP3338
37. Tütüncü EE, Güner R, Gürbüz Y, et al. Adherence to nucleoside/nucleotide analogue treatment in patients with chronic hepatitis B. *Balk Med J*. 2017;34(6):540–545. doi:10.4274/balkanmedj.2016.1461
38. Kvarnström K, Westerholm A, Airaksinen M, Liira H. Factors contributing to medication adherence in patients with a chronic condition: a scoping review of qualitative research. *Pharmaceutics*. 2021;13(7):1100. doi:10.3390/pharmaceutics13071100
39. Mühlbacher AC, Bridges JFP, Bethge S, et al. Preferences for antiviral therapy of chronic hepatitis C: a discrete choice experiment. *Eur J Health Econ*. 2017;18(2):155–165. doi:10.1007/s10198-016-0763-8
40. Neame R, Hammond A. Beliefs about medications: a questionnaire survey of people with rheumatoid arthritis. *Rheumatology*. 2005;44(6):762–767. doi:10.1093/rheumatology/keh587
41. Wade R, Paton F, Woolacott N. Systematic review of patient preference and adherence to the correct use of graduated compression stockings to prevent deep vein thrombosis in surgical patients. *J Adv Nurs*. 2017;73(2):336–348. doi:10.1111/jan.13148
42. Elnaem MH, Rosley NFF, Alhifany AA, Elrggal ME, Cheema E. Impact of pharmacist-led interventions on medication adherence and clinical outcomes in patients with hypertension and hyperlipidemia: a scoping review of published literature. *J Multidiscip Healthc*. 2020;13:635–645. doi:10.2147/JMDH.S257273
43. Marahrens L, Kern R, Ziemssen T, et al. Patients' preferences for involvement in the decision-making process for treating diabetic retinopathy. *BMC Ophthalmol*. 2017;17(1):139. doi:10.1186/s12886-017-0526-z
44. Holmes E, Baker G, Jacoby A, Ring A, Marson A, Hughes D. 1151 Patients' preferences for anti-epileptic drugs (aeds). *J Neurol Neurosurg Psychiatry*. 2017;88(Suppl 1):A3.3–A4. doi:10.1136/jnnp-2017-ABN.10
45. Scheller L, Hilgard G, Anastasiou O, et al. Poor clinical and virological outcome of nucleos(t)ide analogue monotherapy in HBV/HDV co-infected patients. *Medicine (Baltimore)*. 2021;100(28):e26571. doi:10.1097/MD.00000000000026571
46. Bartoli A, Gabrielli F, Tassi A, Cursaro C, Pinelli A, Andreone P. Treatments for HBV: a glimpse into the future. *Viruses*. 2021;13(9):1767. doi:10.3390/v13091767
47. Liu Y, Su M, Lei Y, Tian J, Xue L, Zhang L. Patient preferences for cardiac rehabilitation – a systematic review. *Patient Prefer Adherence*. 2023;17:75–88. doi:10.2147/PPA.S392417
48. Bhat SA, Ahanger IA, Kazim SN. Forthcoming developments in models to study the hepatitis b virus replication cycle, pathogenesis, and pharmacological advancements. *ACS Omega*. 2023;8(16):14273–14289. doi:10.1021/acsomega.2c07154

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