



Editorial

A Novel Backward Stepwise Logistic Regression and Classification and Regression Tree Model to Predict 180-day Clinical Outcomes in Hepatitis B Virus-acute-on-chronic Liver Failure Patients

Shima Ghavimi 

Division of Gastroenterology and Hepatology, Department of Medicine, Marshall University, Joan C. Edwards School of Medicine, Huntington, WV, USA

Received: 21 June 2021 | Revised: 1 July 2021 | Accepted: 7 July 2021 | Published: 22 July 2021

Citation of this article: Ghavimi S. A novel backward stepwise logistic regression and classification and regression tree model to predict 180-day clinical outcomes in hepatitis B virus-acute-on-chronic liver failure patients. *J Clin Transl Hepatol* 2021;9(4):456–457. doi: 10.14218/JCTH.2021.00240.

As the era of precision and personalized medicine is gaining exponential positive gain in the field of medicine, there is a positive shift towards a more evidence-based patient care approach for patients with hepatological diseases. One factor that is crucial in any physician's decision-making efforts involves the application of novel innovative approaches that can enhance predicting survival outcome. Acute-on-chronic liver failure (ACLF) is a perfect example of how liver can rapidly deteriorate, and the hepatitis B virus (HBV) is one crucial culprit. Patients can experience organ failure that leads to their mortality, and in this article the authors clearly described the use of backward stepwise logistic regression (LR) and classification and regression tree (CART) analysis to derive two predictive models and then compared them with the model of end-stage liver disease (MELD) score for novel prognostic models of the 180-day outcome for patients with HBV-ACLF.

This innovative study showed the novel predictive models to be superior to MELD score, providing Hepatologists and Gastroenterologists with a new guiding technique in their evidence-based patient-centered care approach for their clinical treatment decision-making. Of note, one of the leading causes of chronic liver failure in Asia is HBV¹ and the current leading therapeutic intervention for cure is liver transplantation (LT).^{2–4}

However, due to decline of health of patients with ACLF, some of the patients become delisted from the organ transplantation list because they are not well enough to undergo LT. Currently, MELD score is the most used for patients on the LT list, although several other scoring modalities are available.⁵ Current and recent advancements in Hepatol-

ogy generated the finding for HBV-ACLF having a window of 30 to 90 days, with respect to the scoring system used. In the article of interest, the authors introduced a predictive module of 180-day outcome for patients based upon multiple variables that are not currently used in the MELD score. Also, there are other scoring systems that have been introduced for HBV-ACLF recently; although, the authors created a CART system scoring that is easier for the clinician to interpret and, in turn, for the patient to receive the paramount care they deserve. Ultimately, the research demonstrated that both LR and the CART model appeared to perform better than the MELD score.

There are, however, some factors and limitations within the study (as properly mentioned in the article), ranging from not having a mid-data report and not having a larger cohort for studying their novel scoring models. I believe if a consensus can be developed by having multiple LT centers around the globe adapt this novel scoring module, we can achieve a better understanding and more precise scoring system developed for patients with HBV-ACLF requiring LT. These novel models which the authors have described and investigated may be helpful for Transplant Hepatologists, Gastroenterologists and Health Care teams who need to make essential clinical decisions for patients with HBV-ACLF.

Funding

None to declare.

Conflict of interest

The authors have no conflict of interests related to this publication.

References

- [1] Davlidova S, Haley-Johnson Z, Nyhan K, Farooq A, Vermund SH, Ali S. Prevalence of HIV, HCV and HBV in Central Asia and the Caucasus: a systematic review. *Int J Infect Dis* 2021;104:510–525. doi:10.1016/j.ijid.2020.12.068.
- [2] Cotter TG, Sundaram V. Living donor liver transplantation in acute-on-

Abbreviations: ACLF, acute-on-chronic liver failure; CART, classification and regression tree; HBV, hepatitis B virus; LT, liver transplantation; MELD, model of end-stage liver disease.

*Correspondence to: Shima Ghavimi, 1249 15th Street, 2nd & 3rd Floor, Huntington, WV 25701, USA. ORCID: <https://orcid.org/0000-0002-1760-5925>. Tel: +1-304-691-1000, E-mail: Ghavimi@marshall.edu

Ghavimi S.: Prognostic model for clinical outcome in HBV-ACLF patients

- chronic liver failure: encouraging outcomes but with important caveats. *Liver Transpl* 2021. doi:10.1002/lt.26208.
- [3] Li X. Emergent liver transplantation for patients with acute-on-chronic liver failure. *Dig Liver Dis* 2021. doi:10.1016/j.dld.2021.05.011.
- [4] Vipani A, Lindenmeyer CC, Sundaram V. Treatment of severe acute on chronic liver failure: management of organ failures, investigational therapeutics, and the role of liver transplantation. *J Clin Gastroenterol* 2021. doi:10.1097/MCG.0000000000001568.
- [5] Liu F, Zou Z, Shen L, Wu W, Luo J, Lankford S, *et al*. A prediction model for outcome in patients with HBV-ACLF based on predisposition, injury, response and organ failure. *Sci Rep* 2020;10(1):20176. doi:10.1038/s41598-020-77235-3.