The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 4, Issue 5, 2026

DIAGNOSIS AND MANAGEMENT OF CIRRHOSIS AND ITS COMPLICATIONS

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DOI: https://doi.org/10.5281/zenodo.20118778

Keywords
cirrhosis, noninvasive diagnosis, portal hypertension, transient elastography, hepatic encephalopathy, trans jugular intrahepatic portosystemic shunt, rifaximin

Article History
Received: 13 March 2026
Accepted: 23 April 2026
Published: 07 May 2026

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Abstract

Background:
Cirrhosis represents the advanced stage of chronic liver disease and is characterized by progressive fibrosis, nodular regeneration, and distortion of hepatic architecture. Alcohol use, chronic viral hepatitis, and nonalcoholic fatty liver disease remain major etiologic drivers, while portal hypertension, ascites, hepatic encephalopathy, variceal hemorrhage, and hepatocellular carcinoma account for much of the disease burden.

Objective:
To review current noninvasive diagnostic modalities and summarize evidence-based strategies for the management of cirrhosis and its major complications.

Methodology:
This narrative review synthesized recent clinical studies, practice guidelines, and expert reviews on cirrhosis diagnosis and treatment. Electronic searches were performed in PubMed, Scopus, ScienceDirect, and Google Scholar. English-language articles focused on noninvasive diagnosis, complications, treatment, follow-up, and prognosis were prioritized, with approximately 40 to 50 relevant studies and guidelines included.

Results:
The reviewed evidence supports a stepwise noninvasive approach to fibrosis staging and cirrhosis detection. FIB-4 values below 1.3 help exclude advanced fibrosis, transient elastography below 8 kPa helps rule out cirrhosis, and sequential use of APRI and FIB-4 improves diagnostic sensitivity. Among therapeutic strategies, nonselective beta-blockers reduce first decompensation in compensated cirrhosis with clinically significant portal hypertension; sodium restriction, diuretics, albumin-supported paracentesis, and TIPS remain central for ascites control; lactulose and rifaximin remain important in hepatic encephalopathy management.

Conclusion:
Early deployment of noninvasive diagnostic tools together with prompt guideline-based management is essential to improve survival and quality of life in patients with cirrhosis. Multidisciplinary care that integrates risk stratification, complication prevention, and timely escalation to interventional therapies offers the strongest opportunity for better outcomes.

INTRODUCTION

A research paper tended to be introduced with the statement of the scope, context, and general framework of the research we are discussing. It is frequently positioned with an appealing hook, e.g. an intriguing statistic, a clinically pertinent finding, or a provocative question that is immediately communicated as to why the issue is worth paying attention to. As an example, a preliminary statement can be a stipulation of the worldwide burden of an illness, or an ongoing clinical issue that is unresolved. The manner in which the introduction is set up creates a gradual transition of the reader into the subject matter of the introduction and makes it clear as to the larger relevance of the issue at the very first stage.[1]

After this introductory part, the introduction gives a background information that is necessary and well-organized. It places the research issue in the context of the scientific and clinical field, in general, by reviewing the existing literature, underlying concepts, and historical events that have influenced what is known today. Such a background condition enables the readers to value the development of knowledge and the existing status of the issue. Specifically, the introduction determines the scope and the limits of the research project and delineates the conceptual limits that the study will be conducted. Such contextualization is necessary to make sure that the readers know the significance of the topic and the need to continue their research in the field.[2]

After the contextual framework is in place, the introduction should be used to bring out clearly the importance and significance of the study. It does so by highlighting the importance of filling the identified gap and the significance that the proposed research will be making to the currently existing knowledge. The authors are encouraged to explain the need to produce the work and have it as an important contribution to the field and not as a repetition of the previous outcomes. The good explanation of significance illustrates that the study has advanced theoretical knowledge, enhanced clinical practice, or informed policy choices in the field.[3]

Moreover, the introduction must clearly explain the reason why the research question is worth exploring at the current point. This can include the growing rate of a condition, new issues in diagnosis, or the lack of consistency in current treatment plans. The author has defined these issues by describing them which gives clear information to the readers about the urgency and relevance of the research. This clarification adds more academic and practical significance to the study and solidifies its place in the academic and practical literature as well as practice.[4]

Among other theoretical significance, most scholarly recommendations imply the focus on the practical relevance of the results. Authors can describe how their findings can be used by clinicians, health care policy, or patient outcomes. This futuristic view promises readers that the study is not just an academic one only but has some implications to be made to enhance the standards of care. The introduction makes the research objectives seem more valuable and credible because it links them to a practical benefit.[5]

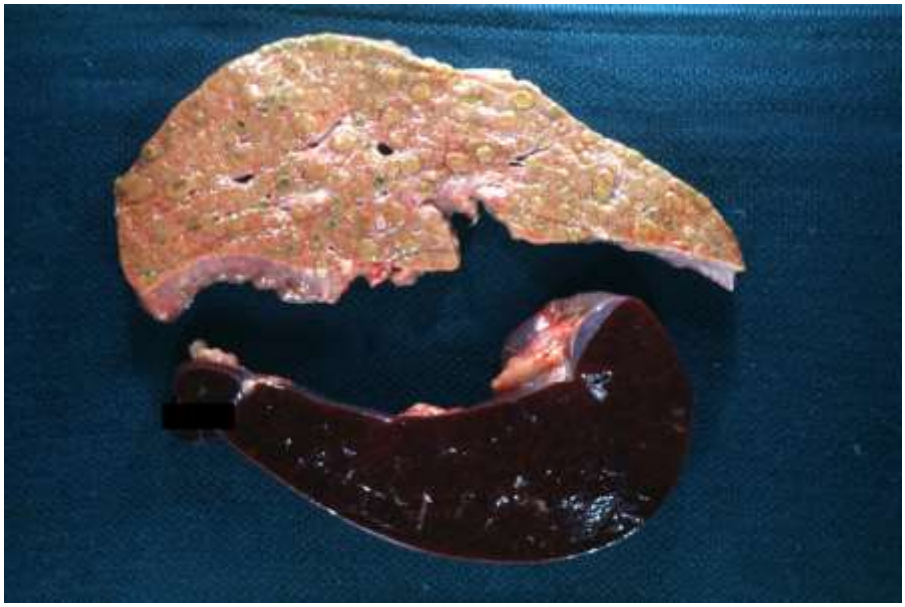

Figure 1: The image is most probably a gross pathology specimen of cirrhosis of the liver, with enlarged congested spleen

Intimately related to significance is the description of relevance to a specific academic or professional audience. In the introduction, the relevance and need of the research to the clinician, researcher, educator or policymaker in the field should be clearly indicated. Categorizing the main beneficiaries of the research assists in putting the research impact into perspective and making sure that the readers see the the overall implication of the work. This applicability can be in the form of enhancing the quality of diagnosis, optimizing treatment plans, or lessening the burden of the disease.[6]

There is also an extensive introduction that goes into more detail concerning the practical implications of the research findings. The guidelines to write academic papers underline the importance of clarifying the positive impact of research on the population intended to receive it and justify how the outcomes can improve the existing practice. As an illustration, emerging knowledge may result in a change of treatment guidelines, screening courses, or even more efficient allocation of health care resources. The presentation of these practical advantages would enhance the claim that the study will be a significant addition to the academic body of knowledge and patient care outcomes.[7]

Table 1: Table: Prevalence of Cirrhosis and Major Contributing Factors According to the Past Studies.

The second vital part of the introduction is the statement of purpose which must be clearly stated. In this section, the main aim and objectives of the study are defined in a clear and direct manner. A clearly stated purpose statement the purpose of this study is to evaluate, or this review aims to summarize., will lead the reader to the primary focus of the study. Tavakol et al. mention that the introduction must give readers the idea of the research question, aims and objectives, thus, establishing the expectations of the rest of the paper.[8]

Precision and conciseness are necessary in stating the intent. It is recommended that the authors should limit the study to a single main idea or a defined purpose to prevent ambiguity. This can involve defining the population of interest, the intervention or diagnostic procedure under investigation and the expected outcomes measures. The clear definition of these elements will provide the coherence of the entire manuscript and will enable the readers to evaluate whether the objectives were fulfilled.[9]

When developing the purpose statement, there should be neutrality and precision. Objectivity and academic integrity is achieved with a neutral language like to explore or to evaluate or to assess. The scientific tone of the introduction is enhanced by avoiding the excessive statements or biased wording. At the conclusion of this section, the reader must have a full knowledge of what the study intends to achieve and how it intends to make a contribution to the existing knowledge.[10]

The Introduction Is progressively leading to the presentation of the underlying rationale of the study. An effective introduction will determine gaps, contradictions, or shortcomings of the past literature in order to explain why the new study is needed. These weaknesses underscore the need to further research the matter and make the current research a logical and necessary continuation of the academic study.[11]

It is highly advised that academic guidelines should indicate the research gap in the last section of the introduction. This is done by clearly stating areas where evidence is either deficient, inconsistent or not well applied in clinical practice. The fact that the author reduces the discussion to a certain unresolved issue proves that the author is aware of the current scholarship but stresses the novelty and significance of the current research.[12]

To illustrate, it is possible to frame the thesis with a distinct research gap that will enable the introduction to give the necessary context and direction. This is a systematic tightening of the focus which enhances logical progression between background discussion and research objectives. It makes sure that the reader realizes what is known but also what is unknown, thus supporting the need of the ongoing investigation.[13]

To sum up, the successful introduction incorporates the background information, significance, relevance, and clear objectives into the logically structured narrative. It outlines the research problem in its overall educational and clinical setting and underlines the reason why the issue demands further consideration. Most significantly, it clearly outlines the knowledge gap that is currently present and explains the way the proposed research is expected to fill this gap. Within the introduction, it should be clear to a reader what the purpose of the study is, what scholarly and practical usefulness it will have, and what gap it will address in the literature..

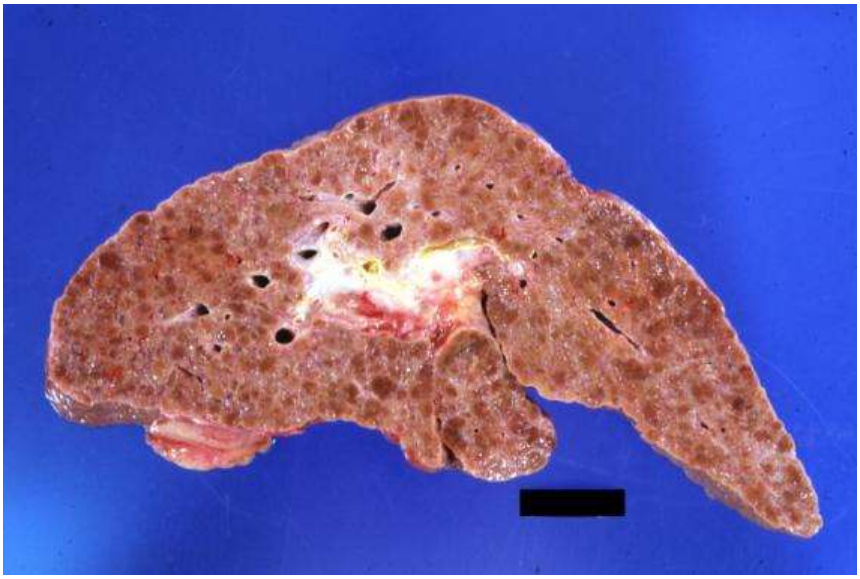

Figure 2: Gross pathological appearance of cirrhosis of the liver showing irregular nodularity and fibrotic distortion of the hepatic parenchyma.

AIMS AND OBJECTIVES

- To assess the efficacy of clinical, laboratory, and imaging methods in the accurate diagnosis of cirrhosis and in the assessment of disease severity.
- To ascertain the prevalence and forms of major complications associated with cirrhosis, including ascites, hepatic encephalopathy, and variceal bleeding.

METHODOLOGY

The literature search was conducted in PubMed, Scopus, ScienceDirect, and Google Scholar over a three-month period following synopsis approval. Approximately 40 to 50 relevant studies and guidelines were selected. Included sources were English-language publications focusing on noninvasive diagnostic methods such as elastography, FIB-4, and APRI, as well as publications addressing management strategies and major cirrhosis-related complications. Case reports, editorials, letters to the editor, unpublished data, studies unrelated to cirrhosis or its complications, and non-English publications were excluded.

DISCUSSION

The literature synthesized in the thesis shows that noninvasive diagnosis has moved from a supportive role to a central position in cirrhosis care. Pavlov et al. reported high pooled sensitivity for transient elastography in alcoholic liver disease, particularly as a rule-out tool for advanced fibrosis and cirrhosis, and suggested a pragmatic cirrhosis threshold near 12.5 kPa.This is clinically important because it supports early triage away from routine biopsy in appropriately selected patients.[14]

Diagnostic performance is further improved when elastography is used in a tiered pathway. Hsu et al. demonstrated that magnetic resonance elastography outperformed transient elastography across multiple fibrosis thresholds in NAFLD, supporting a model in which transient elastography remains an accessible first-line screen and magnetic resonance elastography serves as a higher-accuracy confirmatory tool where resources allow. Connoley et al. added a blood-based dimension to this pathway by showing that the Enhanced Liver Fibrosis test can function as both a diagnostic and prognostic instrument in alcohol-related liver disease, with potential to reduce biopsy use when combined with clinically meaningful thresholds. [15]

The thesis also highlights how risk prediction in cirrhosis increasingly relies on combinations of noninvasive markers rather than single tests. Maurice et al. validated the Baveno VI rule for identifying compensated cirrhotic patients at low risk of clinically important varices, while Augustin et al. showed that expanded Baveno VI thresholds could spare more endoscopies without materially increasing the risk of missing varices needing treatment.[17,18] Song et al. extended this concept by showing that spleen stiffness measurement correlates with hepatic venous pressure gradient and performs well for detecting clinically significant portal hypertension, although standardization remains a prerequisite for wider clinical use .[16]

Surveillance is another area in which diagnostic strategy influences outcomes. Tzartzeva et al. found that ultrasound alone has limited sensitivity for early-stage hepatocellular carcinoma, whereas the addition of alpha-fetoprotein improves sensitivity at the cost of lower specificity. This finding reinforces that surveillance success in cirrhosis depends not only on test availability but also on patient selection, disease morphology, and the ability to balance false positives against earlier tumor detection.[17]

With respect to treatment, the thesis evidence strongly supports a proactive rather than purely reactive model of care. In the PREDESCI trial, Villanueva et al. demonstrated that nonselective beta-blockers reduced first decompensation in compensated cirrhosis with clinically significant portal hypertension, with much of the benefit driven by prevention of ascites. [21] This shifts the therapeutic target upstream to portal-pressure reduction before overt decompensation occurs. By contrast, the simvastatin trial summarized by Abraldes et al. suggested a possible mortality signal without a significant reduction in rebleeding, meaning that adjunctive statin therapy remains promising but not definitive.[18]

The management of acute variceal bleeding and refractory ascites also illustrates the move toward early, selective intervention. Lv et al. showed that early TIPS placement improved transplantation-free survival in advanced cirrhosis with acute variceal bleeding without a clear increase in hepatic encephalopathy. Bureau et al. similarly showed that covered TIPS improved transplant-free survival in recurrent ascites compared with serial large-volume paracentesis plus albumin and substantially reduced procedural burden. Together, these studies suggest that TIPS should be viewed not only as salvage therapy but also as a planned strategy in carefully selected patients.[19]

Albumin-based therapy emerges from the thesis as an area where context matters. Caraceni et al. reported improved survival with long-term albumin administration in decompensated cirrhosis with ascites in the ANSWER trial, supporting the idea that albumin may have disease-modifying effects beyond volume expansion . However, ATTIRE, summarized from China et al., found no benefit from target-driven inpatient albumin correction and raised concern about more serious adverse events with liberal infusion.These apparently conflicting findings are not truly contradictory; instead, they suggest that long-term outpatient albumin strategies and short-term inpatient target correction address different clinical questions and should not be treated as interchangeable.[20]

For specific complications, the reviewed studies support tailored therapy. Wong et al. showed that terlipressin improved verified reversal of type 1 hepatorenal syndrome but at the cost of more serious adverse events, especially respiratory complications, emphasizing the need for careful selection and monitoring. Bureau et al. demonstrated that rifaximin reduced overt hepatic encephalopathy after TIPS, even though short-term transplant-free survival did not significantly differ. Bajaj et al. provided proof of concept that fecal microbiota transplantation may reduce recurrent hepatic encephalopathy and improve cognitive outcomes, but the evidence remains early and highly selected. Praharaj et al. suggested that rifaximin may be comparable to norfloxacin for primary spontaneous bacterial peritonitis prophylaxis and superior for reducing recurrence and hepatic encephalopathy in secondary prophylaxis.[21]

Emerging disease-modifying strategies remain exploratory. Puente et al. reported a favorable signal for rivaroxaban in preventing portal-hypertension-related complications or death/transplant, although statistical certainty was limited and bleeding risk remains an unresolved concern. This suggests that modulation of coagulation and portal-hypertension biology may represent a future therapeutic direction, but the evidence is not yet mature enough for routine adoption.[22]

Overall, the Hamza review thesis supports an integrated model of cirrhosis care in which accessible noninvasive diagnosis, risk-based surveillance, timely prevention of decompensation, and selective escalation to interventional therapy are combined rather than applied in isolation. The strongest practical implication is that cirrhosis management is most effective when organized as a continuum: early identification, structured surveillance, prevention of first complications, and evidence-based treatment of decompensated events.[23]

CONCLUSION

Cirrhosis remains a complex and progressive liver disease with a substantial global burden and high complication-related morbidity and mortality. The evidence synthesized from the Hamza review thesis indicates that contemporary care depends on two parallel advances: first, the increasing accuracy and clinical utility of noninvasive diagnostic pathways; and second, the availability of better targeted medical and interventional therapies for portal hypertension, ascites, hepatic encephalopathy, variceal bleeding, and hepatorenal syndrome. When these approaches are applied within a multidisciplinary model of care, they offer meaningful opportunities to improve survival, reduce hospital burden, and enhance quality of life in patients with cirrhosis.

Limitation:

This manuscript is derived from a review-based thesis and therefore shares the same limitations as

the source review. Its conclusions depend on the quality, consistency, and methodological rigor of previously published studies. Variability in study design, sample size, diagnostic criteria, and healthcare setting may limit direct comparability across studies. In addition, not all relevant studies may have been accessible, and the lack of primary data collection prevents direct assessment of patient outcomes or control of confounding variables.

Recommendations:

Regular screening of high-risk populations using clinical assessment, laboratory evaluation, and noninvasive imaging should be strengthened to promote earlier diagnosis of cirrhosis. Healthcare institutions should adopt standardized diagnostic pathways and complication-management protocols, especially for ascites, hepatic encephalopathy, variceal bleeding, and hepatorenal syndrome. Wider access to evidence-based therapies, combined with continued research on safer and more precise diagnostic and therapeutic tools, is necessary to improve prognosis and quality of life in patients with cirrhosis.

REFERENCES

Younossi ZM, Koenig AB, Abdelatif D, Fazel Y, Henry L, Wymer M. Global epidemiology of nonalcoholic fatty liver disease Meta-analytic assessment of prevalence, incidence, and outcomes. Hepatology. 2016;641:73–84. https://pubmed.ncbi.nlm.nih.gov/26707365/

Younossi ZM, Golabi P, de Avila L, Paik JM, Srishord M, Fukui N, et al. The global epidemiology of NAFLD and NASH in patients with type 2 diabetes: A systematic review and meta-analysis. J Hepatol. 2019;714:793–801. https://pubmed.ncbi.nlm.nih.gov/31279902/

Chalasani N, Younossi Z, Lavine JE, Charlton M, Cusi K, Rinella M, et al. The diagnosis and management of nonalcoholic fatty liver disease: Practice guidance from the American Association for the Study of Liver Diseases. Hepatology. 2018;671:328–357 https://pubmed.ncbi.nlm.nih.gov/28714183/

Cusi K. Role of obesity and lipotoxicity in the development of nonalcoholic steatohepatitis: Pathophysiology and clinical implications. Gastroenterology. 2012;1424:711–725. https://pubmed.ncbi.nlm.nih.gov/22326434/

Tilg H, Moschen AR. Evolution of inflammation in nonalcoholic fatty liver disease: The multiple parallel hits hypothesis. Hepatology. 2010;525:1836–1846.https://pubmed.ncbi.nlm.nih.gov/21038418/

Bellentani S, Scaglioni F, Marino M, Bedogni G. Epidemiology of non-alcoholic fatty liver disease. Dig Dis. 2010;281:155–161. https://pubmed.ncbi.nlm.nih.gov/20460905/

Adams LA, Waters OR, Knuiman MW, Elliott RR, Olynyk JK. NAFLD as a risk factor for the development of diabetes and the metabolic syndrome. Hepatology. 2009;511:180–186. https://pubmed.ncbi.nlm.nih.gov/19877169/

Mantovani A, Byrne CD, Bonora E, Targher G. Nonalcoholic fatty liver disease and risk of incident type 2 diabetes: A meta-analysis. Diabetes Care. 2018;412:372–382. https://pubmed.ncbi.nlm.nih.gov/29273685/

Targher G, Bertolini L, Rodella S, Tessari R, Zenari L, Lippi G, et al. Nonalcoholic fatty liver disease is independently associated with an increased prevalence of cardiovascular disease in type 2 diabetic patients. Diabetes Care. 2007;308:2119–2121.

https://pubmed.ncbi.nlm.nih.gov/17519430/

Byrne CD, Targher G. NAFLD: A multisystem disease. J Hepatol. 2015;621 Suppl:S47–S64. : https://pubmed.ncbi.nlm.nih.gov/25920090/

Rinella ME. Nonalcoholic fatty liver disease: A systematic review. JAMA. 2015;31322:2263–2273. https://pubmed.ncbi.nlm.nih.gov/26057287/

European Association for the Study of the Liver EASL, European Association for the Study of Diabetes EASD, European Association for the Study of Obesity EASO. Clinical practice guidelines for the management of non-alcoholic fatty liver disease. J Hepatol. 2016;646:1388–1402. https://pubmed.ncbi.nlm.nih.gov/27062661/

World Health Organization. Obesity and overweight. Geneva: World Health Organization; 2023. Available from: https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight

Pavlov CS, Casazza G, Nikolova D, Tsochatzis E, Gluud C. Systematic review with meta-analysis: diagnostic accuracy of transient elastography for staging of fibrosis in people with alcoholic liver disease. Aliment Pharmacol Ther. 2016;435:575-585. doi:10.1111/apt.13524.

Hsu C, Caussy C, Imajo K, Chen J, Singh S, Kaulback K, et al. Magnetic Resonance vs Transient Elastography Analysis of Patients With Nonalcoholic Fatty Liver Disease: A Systematic Review and Pooled Analysis of Individual Participants. Clin Gastroenterol Hepatol. 2019;174:630-637.e8. doi:10.1016/j.cgh.2018.05.059.

Connoley D, Patel PJ, Hogan B, Tanwar S, Rhodes F, Parkes J, et al. The Enhanced Liver Fibrosis test maintains its diagnostic and prognostic performance in alcohol-related liver disease: a cohort study. BMC Gastroenterol. 2021;211:268. doi:10.1186/s12876-021-01795-5.

Maurice JB, Brodkin E, Arnold F, Navaratnam A, Paine H, Khawar S, et al. Validation of the Baveno VI criteria to identify low risk cirrhotic patients not requiring endoscopic surveillance for varices. J Hepatol. 2016;655:899-905. doi:10.1016/j.jhep.2016.06.021.

Augustin S, Pons M, Maurice JB, Bureau C, Stefanescu H, Ney M, et al. Expanding the Baveno VI criteria for the screening of varices in patients with compensated advanced chronic liver disease. Hepatology. 2017;666:1980-1988. doi:10.1002/hep.29363.

Song J, Huang J, Huang H, Liu S, Luo Y. Performance of spleen stiffness measurement in prediction of clinical significant portal hypertension: A meta-analysis. Clin Res Hepatol Gastroenterol. 2018;423:216-226. doi:10.1016/j.clinre.2017.11.002.

Tzartzeva K, Obi J, Rich NE, Parikh ND, Marrero JA, Yopp A, et al. Surveillance Imaging and Alpha Fetoprotein for Early Detection of Hepatocellular Carcinoma in Patients With Cirrhosis: A Meta-analysis. Gastroenterology. 2018;1546:1706-1718.e1. doi:10.1053/j.gastro.2018.01.064.

Villanueva C, Albillos A, Genescà J, Garcia-Pagan JC, Calleja JL, Aracil C, et al. Beta blockers to prevent decompensation of cirrhosis in patients with clinically significant portal hypertension PREDESCI: a randomised, double-blind, placebo-controlled, multicentre trial. Lancet. 2019;39310181:1597-1608. doi:10.1016/S0140-67361831875-0.

Abraldes JG, Villanueva C, Aracil C, Turnes J, Hernandez-Guerra M, Genesca J, et al. Addition of Simvastatin to Standard Therapy for the Prevention of Variceal Rebleeding Does Not Reduce Rebleeding but Increases Survival in Patients With Cirrhosis. Gastroenterology. 2016;1505:1160-1170.e3. doi:10.1053/j.gastro.2016.01.004.

Lv Y, Yang Z, Liu L, Li K, He C, Wang Z, et al. Early TIPS with covered stents versus standard treatment for acute variceal bleeding in patients with advanced cirrhosis: a randomised controlled trial. Lancet Gastroenterol Hepatol. 2019;48:587-598. doi:10.1016/S2468-12531930090-1.