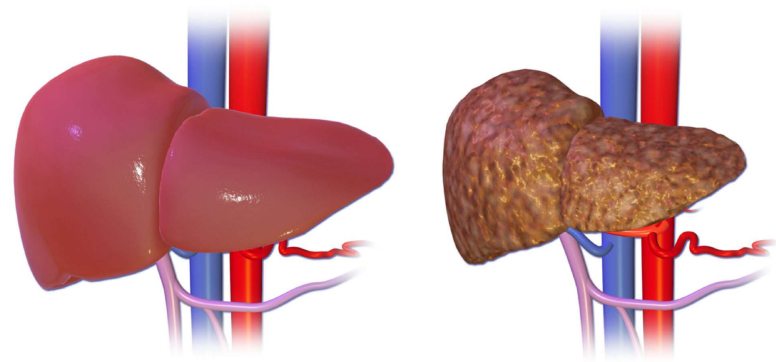


LIVER CIRRHOSIS DATASET PREDICTION WITH MODELING

Amber Kutscher

WHAT PROBLEM ARE WE SOLVING?

We are striving to solve the challenge of predicting cirrhosis stages in patients, allowing for individualized treatments and timely interventions based on the severity of the condition.



Normal Liver

Liver Cirrhosis

Image from [Yukti Herbs](#)

WHO ARE OUR STAKEHOLDERS?

MEDICAL PROFESSIONALS

These are the unsung heroes who provide healthcare services. The predictions of our algorithm can help doctors identify patients at increased risk of liver cirrhosis, allowing for targeted monitoring and early intervention. This means they can better allocate their resources and potentially save lives.

HEALTHCARE ADMINISTRATORS

These are the individuals in charge of running healthcare facilities. Early detection and intervention may result in lower hospitalization rates and healthcare costs. Healthcare administrators can improve overall healthcare system efficiency by optimizing resource allocation and reducing hospital overcrowding.

PHARMACEUTICAL COMPANIES

These organizations are critical in the development of drugs and therapies. Data analysis findings could help inform research into gender-based susceptibility and treatment efficacy. Pharmaceutical firms might concentrate their research efforts on areas with the greatest potential for effect.

A BRIEF INTRODUCTION TO OUR DATA

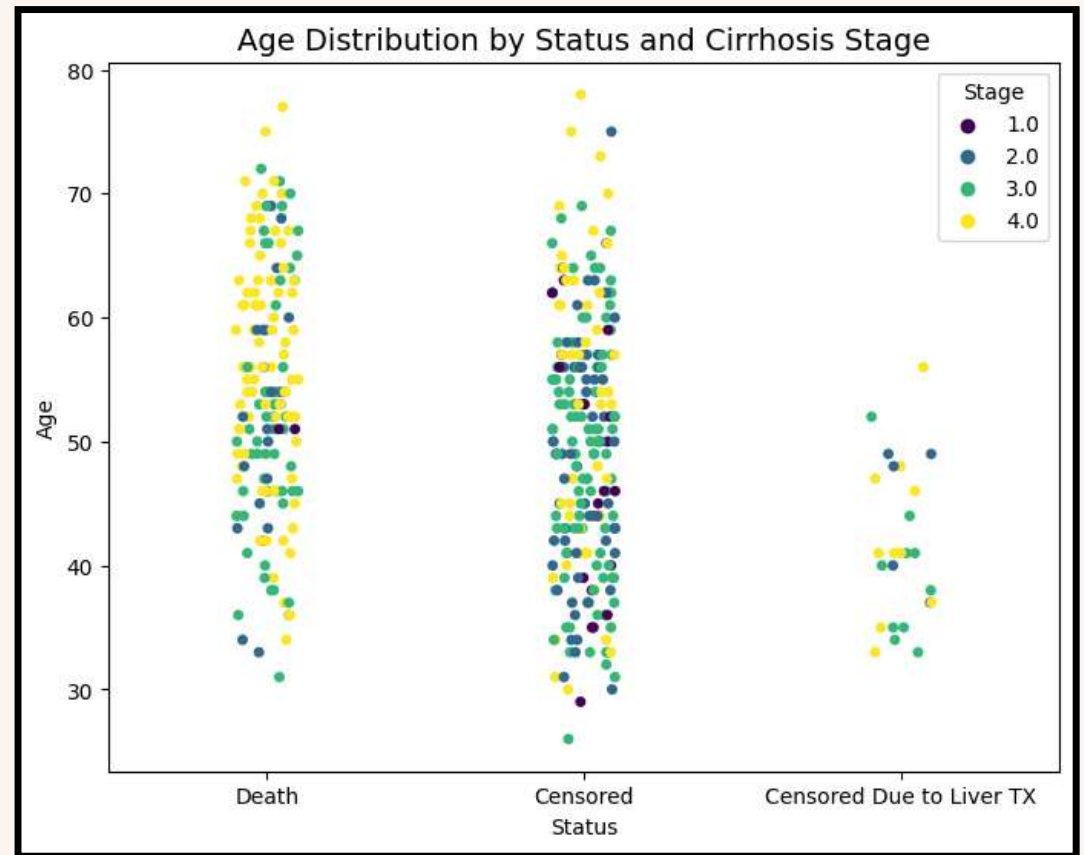
The dataset we used included 424 patients with primary biliary cirrhosis (PBC). 312 of these patients took part in a randomized study, and 112 were followed up on for survival. This dataset contains a variety of medical and demographic variables that provide a comprehensive view of the patient population.



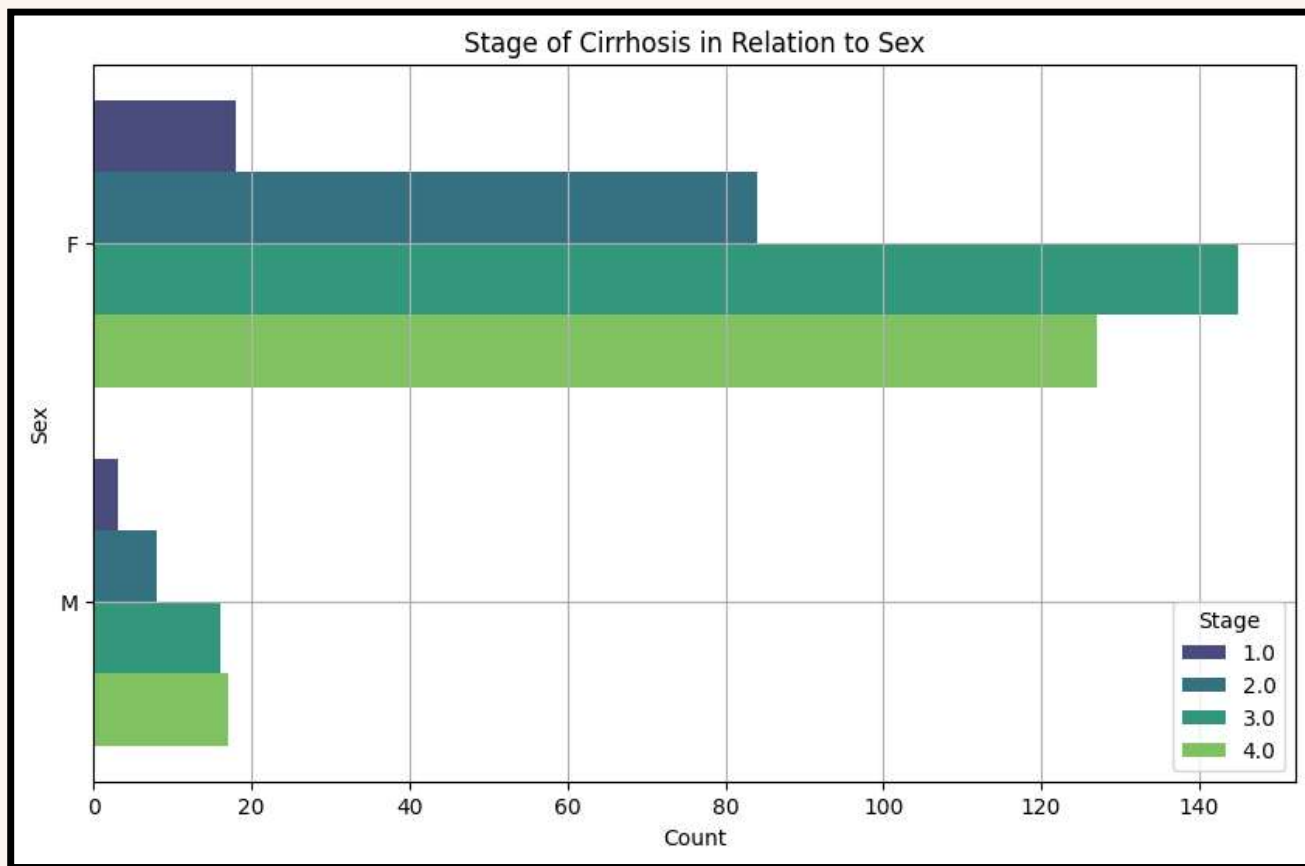
Image from [iStock](#)

VISUALIZATION 1: AGE DISTRIBUTION BY STATUS AND CIRRHOSIS STAGE

The stripplot to the right demonstrates that, when compared to those with censored status and those with censored due to liver transplant status, more patients in late stages of liver cirrhosis did not survive (died). This research emphasizes the importance of early care and monitoring for patients in advanced stages.



VISUALIZATION 2: STAGE OF CIRRHOSIS IN RELATION TO SEX



The countplot displayed to the left indicates that women may be more susceptible to liver cirrhosis due to differences in how their bodies metabolize chemicals such as alcohol, as well as the potential influence of hormones. This realization emphasizes the need of gender-specific considerations in liver health management.

MODEL STRENGTHS AND LIMITATIONS

Logistic Regression, our chosen classification model, delivered strong results across precision, recall, F1 score, and accuracy. This makes it the top choice for our problem, particularly in the critical context of medical applications, where maintaining balance and interpretability are paramount.

In summary:

Accuracy reveals how often our model is generally correct.

Precision assesses how often our model is correct when it predicts "yes."

Recall evaluates how often our model detects all crucial elements.

F1 Score combines precision and recall to gauge overall performance.

LIMITATIONS AND FUTURE STEPS



Image from [news-medical](#)

We acknowledge certain limitations:

- Because the dataset is so old (1974-1984), it may not accurately reflect current medical procedures and patient profiles, thereby restricting model applicability.
- The dataset may be missing critical cirrhosis-related factors, thus possibly leaving out important contributors to the condition.
- Data discrepancies in some cirrhosis stages may influence the accuracy of predictions, and this should be addressed as a priority.
- While environmental and lifestyle factors may increase cirrhosis risk, they are not represented in the dataset. Incorporating these elements would provide a more comprehensive understanding.

RECOMMENDATIONS

GENDER-SPECIFIC HEALTH MANAGEMENT

Recognize the potential gender-based differences in liver health susceptibility highlighted by the analysis. Tailoring health-management measures to meet the unique needs of men and women could greatly improve patient outcomes and treatment quality.

TREATMENT OPTIMIZATION

Look into why some patients did not respond effectively to specialized treatment. Refine treatment protocols based on these findings to enhance the chances of positive outcomes across all stages of cirrhosis.

EARLY INTERVENTION AND MONITORING

Implement proactive surveillance for patients with advanced cirrhosis, with an emphasis on early intervention to enhance outcomes. To avoid complications, prioritize regular examinations and timely medical care.

CONTINUOUS MODEL ENHANCEMENT

Updating and refining prediction models with new data on a regular basis ensures their accuracy and applicability in real-world circumstances. This ongoing updating ensures that the model remains relevant and effective.

FOR FUTURE STEPS, WE RECOMMEND:

- Collecting up-to-date information for a more accurate representation of patient profiles and practices, ensuring that the model remains relevant to modern healthcare practices.
- Identifying and incorporating new relevant factors, such as lifestyle and environmental data, to improve predictions.
- Using techniques to address data imbalances and improve model performance, which will result in more reliable predictions.
- Integrating external data for a holistic understanding of cirrhosis risk factors, which may lead to more accurate models..
- Exploring advanced methods such as neural networks to capture complex patterns to see if they improve model performance.
- Real-world validation by testing models with real patient data to ensure practical value and applicability.
- Making complex models understandable for medical professionals.
- Establishing a process for regular modifications based on new data and insights to ensure the continuous accuracy and relevance of the model.



Image from [news-medical](#)

A series of thin, light-brown lines forming an abstract geometric pattern in the top-left corner of the slide. The lines intersect to create various polygonal shapes, some of which are nested within others.

THANK YOU

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GitHub Repository: [Liver Cirrhosis
Dataset Prediction with Modeling](#)