Hospitalized patients with heart failure: integrating electronic healthcare records and external outcome data

Zhongheng Zhang , **Yan Zhao** , **Linghong Cao** , **Ziyin Xu** , **Rangui Chen** , **Lukai Lv** , **Ping Xu**

When using this resource, please cite: (show more options)

Zhang, Z., Zhao, Y., Cao, L., Xu, Z., Chen, R., Lv, L., & Xu, P. (2020). Hospitalized patients with heart failure: integrating electronic healthcare records and external outcome data (version 1.0). *PhysioNet*. https://doi.org/10.13026/3pr8-jx39.

Please include the standard citation for PhysioNet: (show more options)

Goldberger, A., Amaral, L., Glass, L., Hausdorff, J., Ivanov, P. C., Mark, R., ... & Stanley, H. E. (2000). PhysioBank, PhysioToolkit, and PhysioNet: Components of a new research resource for complex physiologic signals. Circulation [Online]. 101 (23), pp. e215–e220.

Abstract

Heart failure is a common reason for hospitalization in the elderly and it is associated with significant mortality and morbidity. To facilitate epidemiological studies of heart failure, there is a need for high quality datasets to be made available to researchers. While several heart failure datasets have been established in Western countries, there is a paucity of data available from China. Understanding differences in patient populations and healthcare systems between China and other countries is important in providing optimal care. To help address this issue, we created a retrospective heart failure dataset using electronic health data collected from patients who were admitted to a hospital in Sichuan, China between 2016 and 2019. The dataset includes 168 variables for 2,008 patients with heart failure.

Background

Heart failure is a common reason for hospitalization in the elderly and it is associated with significant mortality and morbidity. The disease affects over 6 million people in the United States, with an estimated incidence of 21 per 1000 people in the elderly [1, 2]. Studies have reported that one year mortality ranges from 20% to 60% after hospitalization for acute heart failure [3-6], depending on comorbidities and co-existing medical conditions.

Many datasets have been developed to support studies on the epidemiology of hospitalized patients with heart failure. For instance, the Cleveland in Heart Disease dataset contains 75 variables in 303 patients and it is widely used in clinical studies [7]. Another widely used dataset is

the Nationwide Inpatient Sample (NIS), a publicly available resource from the Healthcare Utilization Project (HCUP) that is supported by the Agency for Healthcare Research and Quality.

Our study aimed to establish a heart failure database by extracting data from routinely collected electronic healthcare records. Data on subsequent hospital admissions and mortality were obtained at a mandatory follow-up visit at 28 days, 3 months and 6 months (if the patient was unable to reach the clinical centre, the follow-up visit was replaced by a telephone call). The study was carried out retrospectively, enrolling patients who had been admitted to Zigong Fourth People's Hospital with heart failure between December 2016 to June 2019.

Methods

The study was conducted in Zigong Fourth People's Hospital, Sichuan, China from December 2016 to June 2019. Informed consent was waived due to retrospective design of the study. The study complies with the Declaration of Helsinki and it was approved by the ethics committee of Zigong Fourth People's Hospital (Approval Number: 2020-010)

Electronic healthcare records of consecutive patients with the diagnosis of heart failure were reviewed. Heart failure was defined according to the European Society of Cardiology (ESC) criteria [8]:

- The presence of symptoms and/or signs of heart failure. Typical symptoms include breathlessness, orthopnea, paroxymal nocturnal dyspnea, reduced excises tolerance, Fatigue, tiredness, increased time to recover after exercise and Ankle swelling. Typical signs include Elevated jugular venous pressure, hepatojugular reflux, Third heart sound (gallop rhythm) and Laterally displaced apical impulse.
- Elevated levels of BNPs (BNP >35 pg/mL and/or NT-proBNP >125 pg/mL)
- Objective evidence of other cardiac functional and structural alterations underlying heart failure.
- In case of uncertainty, a stress test or invasively measured elevated LV filling pressure may be needed to confirm the diagnosis.

Data Description

Baseline clinical characteristics were measured on the day of hospital admission, which included body temperature, pulse, respiration rate, systolic blood pressure, diastolic blood pressure, mean arterial blood pressure, weight, height, body mass index (BMI), type of heart failure, New York Heart Association (NYHA) cardiac function, Killip Grade (Class 1: no rales, no 3rd heart sound; Class 2: rales in <½ lung field or presence of a 3rd heart sound; Class 3: Rales in >½ lung field–pulmonary edema; Class 4: cardiogenic shock determined clinically), Glasgow Coma Scale (GCS).

Echocardiographic findings include left ventricular ejection fraction (LVEF), left ventricular end diastolic diameter, mitral valve peak E wave velocity (m/s), mitral valve peak A wave velocity (m/s), E/A, tricuspid valve regurgitation velocity, and tricuspid valve regurgitation pressure.

Usage Notes

Data was collected with the goal of developing a model to predict emergency readmission of discharged heart failure patients. Another use might be to carry out a descriptive study to compare this patient population with similar cohorts of patients in other hospitals and countries.

A limitation of the dataset is that it is collected from a single center, so models developed using the data may not be generalizable. It should also be noted that the data has been aggregated into a single row per hospitalization, so only high level representations of patient stays are provided. The dataset does not offer time series data over the hospitalization.

Conflicts of Interest

The authors have no conflicts of interest to declare.

References

1. Benjamin, E. J. et al. Heart Disease and Stroke Statistics-2017 Update: A Report From the American Heart Association. Circulation 135, e146–e603 (2017).
2. Fang, N., Jiang, M. & Fan, Y. Ideal cardiovascular health metrics and risk of cardiovascular disease or mortality: A meta-analysis. Int. J. Cardiol. 214, 279–283 (2016).
3. Lombardi, C. et al. In-hospital and long-term mortality for acute heart failure: analysis at the time of admission to the emergency department. ESC Heart Fail ehf2.12847 (2020). doi:10.1002/ehf2.12847
4. Ye, S.-D. et al. Association between anemia and outcome in patients hospitalized for acute heart failure syndromes: findings from Beijing Acute Heart Failure Registry (Beijing AHF Registry). Intern Emerg Med 151, 457 (2020).
5. Braunschweig, F. et al. New York Heart Association functional class, QRS duration, and survival in heart failure with reduced ejection fraction: implications for cardiac resynchronization therapy. Eur. J. Heart Fail. 19, 366–376 (2017).
6. Al-Jarallah, M. et al. Incidence and impact of cardiorenal anaemia syndrome on all-cause mortality in acute heart failure patients stratified by left ventricular ejection fraction in the Middle East. ESC Heart Fail 6, 103–110 (2019).
7. Detrano, R. et al. International application of a new probability algorithm for the diagnosis of coronary artery disease. Am. J. Cardiol. 64, 304–310 (1989).
8. Ponikowski, P. et al. 2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC). Developed with the special contribution of the Heart Failure Association (HFA) of the ESC. European journal of heart failure 18, 891–975 (2016).

Contents

Share

Access

Access Policy:
Only logged in users who sign the specified data use agreement can access the files.

License (for files):
PhysioNet Restricted Health Data License 1.5.0

Discovery

DOI:
https://doi.org/10.13026/3pr8-jx39

Topics:
heart failure   electronic health record   china

Corresponding Author

Zhongheng Zhang
Department of Emergency Medicine, Sir Run Run Shaw Hospital, Zhejiang University School of Medicine, Hangzhou, 310016, China..
zh_zhang1984@zju.edu.cn

Files

Total uncompressed size: 1.4 MB.

Access the files

- Download the ZIP file (389.4 KB)
- Download the files using your terminal:

```
wget -r -N -c -np --user robinz08 --ask-password
https://physionet.org/files/heart-failure-zigong/1.0/
```

Folder Navigation: <base>

Name	Size	Modified
[LICENSE.txt](#)	2.3 KB	2020-09-08
[SHA256SUMS.txt](#)	234 B	2020-09-09
[dat.csv](#)	1.4 MB	2020-09-08

Name	Size	Modified
[dataDictionary.csv](#)	8.2 KB	2020-08-03