

Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Heart Failure (HF) Hospitalization

Evidence: Summary of the Empirical Data

Heart failure (HF) prevalence approaches 10 per 1,000 people in the 65 years and older population each year (NHLBI 2007) and is the most common discharge diagnosis among the elderly (Jessup and Brozena 2003). Prevalence of HF in the U.S. is estimated at more than 6 million cases (Mozaffarian 2015, Lloyd-Jones 2009; Jackson 2018; Benjamin 2020), and is suspected to be the leading cause of death in people over age 65. The lifetime risk of HF is estimated at 1 in 5 at 40 years of age, and the prevalence in the aging US population is expected to increase by 46% by 2030 (Heidenreich 2013). Total direct medical costs of HF were estimated at \$30.7 billion in 2012 and are projected to increase by about 127% to \$69.7 billion by 2030 (Jackson 2018; Heidenreich 2013).

Figure 1. HF Mortality Logic Model



The goal of this measure is to directly improve patient outcomes by measuring risk-standardized rates of mortality. Measurement of patient outcomes, including mortality, allows for a broad view of quality of care that encompasses more than what can be captured by individual process-of-care measures. As described below, mortality is likely to be influenced by a broad range of clinical activities such as the prevention of complications and the provision of evidenced-based care.

According to the 2015 AHA update report, one in nine deaths has HF mentioned on the death certificate. In 2011, HF any-mention mortality on death certificates was 284,388, and HF was determined to be the underlying cause in 58,309 of those deaths in 2011 (Mozaffarian 2015, National Center for Health Statistics 2011). There are about 870,000 new HF cases annually (Mozaffarian 2015). Survival after HF diagnosis has improved over time; however, the death rate remains high with about 50% of people diagnosed with HF dying within 5 years (Mozaffarian 2015, Levy et al. 2002, Roger et al. 2004, Jackson et al. 2018). Among Medicare beneficiaries, the overall one-year HF mortality rate declined slightly from 1998 to 2008 but remained high at 29.6% of the population (Chen et al. 2011). Rates of mortality decline were uneven across states.

Clinical experience suggests that the care for these patients is highly variable, and studies suggest quality gaps in hospital care—particularly in the transition to outpatient care (Albert 2009, Jha 2005; Patel et al., 2018). Moreover, there is substantial inter-hospital variation in the risk of death that is not clearly explained by differences in case mix (Lahewala et al., 2018; Roshanghalb et al., 2019; Desai et al., 2018). Measurement of patient outcomes allows for a broad view of quality of care that encompasses more than what can be captured by individual process-of-care measures. Complex and critical aspects of care, such as communication between providers, prevention of and response to complications, patient safety, and coordinated transitions to the outpatient environment, all contribute to patient outcomes but are difficult to measure by individual process measures.

The HF mortality measure is thus intended to inform quality-of-care improvement efforts, as individual process-based performance measures cannot encompass all the complex and critical aspects of care within a hospital that contribute to patient outcomes. Many stakeholders, including patient organizations, are interested in outcomes measures that allow patients and providers to assess relative outcomes performance for hospitals.

The diagram above indicates some of the many care processes that can influence mortality risk. Numerous studies have demonstrated that appropriate and timely treatment for HF patients can reduce the risk of mortality within 30 days of hospital admission (Hunt 2009, Jha 2007; Kao 2016). Other studies have highlighted how coordinated care for HF patients has been effective in reducing all-cause mortality after HF admission. For instance, the Project RED intervention, an intervention focused on reinforcing coordination of follow-up appointments and testing, medication reconciliation, patient discharge planning, patient education, and post-admission services and durable medical equipment, has showed promise in reducing mortality and costs of care for HF patients (Patel et al., 2018). Additionally, trials of interventions which improve patient education upon discharge have been shown to improve survival for HF patients (McAllister 2001). Evidence that hospitals have been able to reduce mortality rates through these quality-of-care initiatives illustrates the degree to which hospital practices can affect mortality rates.

References

- Albert NM, Yancy CW, Liang L, et al. Use of aldosterone antagonists in heart failure. *JAMA*. 2009;302(15):1658-1665.
- Benjamin EJ, Muntner P, Alonso A, et al. Heart Disease and Stroke Statistics-2019 Update: A Report From the American Heart Association [published correction appears in *Circulation*. 2020 Jan 14;141(2):e33]. *Circulation*. 2019;139(10):e56–e528. doi:10.1161/CIR.0000000000000659.
- Chen J, Normand SL, Wang Y, Krumholz HM. National and regional trends in heart failure hospitalization and mortality rates for Medicare beneficiaries, 1998–2008. *JAMA*. 2011;306:1669–1678.
- Desai NR, Ott LS, George EJ, et al. Variation in and Hospital Characteristics Associated With the Value of Care for Medicare Beneficiaries With Acute Myocardial Infarction, Heart Failure, and Pneumonia. *JAMA Netw Open*. 2018;1(6):e183519. Published 2018 Oct 5. doi:10.1001/jamanetworkopen.2018.3519.
- Heidenreich PA, Albert NM, Allen LA, et al. Forecasting the impact of heart failure in the United States: a policy statement from the American Heart Association. *Circ Heart Fail*. 2013;6(3):606–619. doi:10.1161/HHF.0b013e318291329a.
- Hunt SA, Abraham WT, Chin MH, Feldman AM, Francis GS, Ganiats TG, Jessup M, Konstam MA, Mancini DM, Michl K, Oates JA, Rahko PS, Silver MA, Stevenson LW, Yancy CW; American College of Cardiology Foundation; American Heart Association. 2009 Focused update incorporated into the ACC/AHA 2005 Guidelines for the Diagnosis and Management of Heart Failure in Adults A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines Developed in Collaboration With the International Society for Heart and Lung Transplantation. *J Am Coll Cardiol*. 2009 Apr 14;53(15):e1-e90.
- Jackson SL, Tong X, King RJ, Loustalot F, Hong Y, Ritchey MD. National Burden of Heart Failure Events in the United States, 2006 to 2014. *Circ Heart Fail*. 2018;11(12):e004873. doi:10.1161/CIRCHEARTFAILURE.117.004873.
- Jessup M, Brozena S. Medical progress: heart failure. *N Engl J Med* 2003;348:2007–18.
- Jha AK, Li Z, Orav EJ, Epstein AM. Care in U.S. Hospitals — The Hospital Quality Alliance Program. *New England Journal of Medicine*. 2005;353(3):265-274.
- Jha AK, Orav EJ, Li Z, Epstein AM. The inverse relationship between mortality rates and performance in the Hospital Quality Alliance measures. *Health Aff (Millwood)* 2007 Jul-Aug;26(4):1104-10.
- Kao, D.P., J. Lindenfeld, D. Macaulay, H.G. Birnbaum, J.L. Jarvis, U.S. Desai, and R.L. Page, 2nd, Impact of a Telehealth and Care Management Program on All-Cause Mortality and Healthcare Utilization in Patients with Heart Failure. *Telemed J E Health*, 2016. 22(1): p. 2-11.
- Lahewala S, Arora S, Tripathi B, et al. Heart failure: Same-hospital vs. different-hospital readmission outcomes [published correction appears in *Int J Cardiol*. 2020 Jun 15;309:100]. *Int J Cardiol*. 2019;278:186-191. doi:10.1016/j.ijcard.2018.12.043.
- Levy D, Kenchaiah S, Larson MG, Benjamin EJ, Kupka MJ, Ho KK, Murabito JM, Vasan RS. Long-term trends in the incidence of and survival with heart failure. *N Engl J Med*. 2002;347:1397–1402.
- Lloyd-Jones D et al, American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics--2010 update: a report from the American Heart Association. *Circulation*. 2010 Feb 23;121(7):e46-e215. Epub 2009 Dec 17.

McAllister FA, Lawson FME, Teo KK, Armstrong PW: A systematic review of randomized trials of disease management programs in heart failure. *Am J Med* 2001, 110:378-384

Mozaffarian D, Benjamin EJ, Go AS, et al. Heart disease and stroke statistics--2015 update: a report from the American Heart Association. *Circulation*. 2015;131(4):e29-322.

National Center for Health Statistics. Mortality Multiple Cause Micro-data Files, 2011. Public-use data file and documentation. NHLBI tabulations.

http://www.cdc.gov/nchs/data_access/Vitalstatsonline.htm#Mortality_Multiple. Accessed July 3, 2014.

National Heart, Lung, and Blood Institute. Unpublished tabulation of NHANES, 1971-1975, 1976-1980, 1988-1994, 1999-2002, 2003-2006, and extrapolation to the U.S. population, 2007.

Pandey A, Patel KV, Liang L, et al. Association of Hospital Performance Based on 30-Day Risk-Standardized Mortality Rate With Long-term Survival After Heart Failure Hospitalization: An Analysis of the Get With The Guidelines-Heart Failure Registry. *JAMA Cardiol*. 2018;3(6):489-497. doi:10.1001/jamacardio.2018.0579.

Patel PH, Dickerson KW. Impact of the Implementation of Project Re-Engineered Discharge for Heart Failure patients at a Veterans Affairs Hospital at the Central Arkansas Veterans Healthcare System. *Hosp Pharm*. 2018;53(4):266-271. doi:10.1177/0018578717749925.

Roger VL, Weston SA, Redfield MM, Hellermann-Homan JP, Killian J, Yawn BP, Jacobsen SJ. Trends in heart failure incidence and survival in a community-based population. *JAMA*. 2004;292:344-350.

Roshanghalb A, Mazzali C, Lettieri E. Multi-level models for heart failure patients' 30-day mortality and readmission rates: the relation between patient and hospital factors in administrative data. *BMC Health Serv Res*. 2019;19(1):1012. Published 2019 Dec 30. doi:10.1186/s12913-019-4818-2.