

5.2 Death in Low-Mortality DRGs (PSI 2)

Definition	In-hospital deaths per 1,000 patients in DRGs with less than 0.5% mortality.
Numerator	Discharges with disposition of “deceased” among cases meeting the inclusion and exclusion rules for the denominator.
Denominator	Discharges, 18 years and older or MDC 14 (pregnancy, childbirth, and puerperium), in DRGs with less than 0.5% mortality rate. If a DRG is divided into “without/with complications,” both DRGs must have mortality rates below 0.5% to qualify for inclusion. Exclude patients with any code for trauma, immunocompromised state, or cancer.
Type of Indicator	Provider level
Empirical Performance	Bias: Substantial bias
Risk Adjustment	No risk adjustment

Summary

This indicator is intended to identify in-hospital deaths in patients unlikely to die during hospitalization. The underlying assumption is that when patients admitted for an extremely low-mortality condition or procedure die, a health care error is more likely to be responsible. Patients experiencing trauma or having an immunocompromised state or cancer are excluded, as these patients have higher non-preventable mortality.

Panel Review

This indicator should be evaluated separately by type of DRG when used as an indicator of quality. For example, the PSI Software reports the low-mortality DRG rate for all the included DRGs and separately by DRG type: adult medical, adult surgical (with and without an operating room procedure), pediatric medical, pediatric surgical (with and without an operating room procedure), and obstetric and psychiatric. The overall usefulness of this indicator was rated as favorable by panelists. Because the denominator includes many heterogeneous patients cared for by different services, this indicator should be stratified by DRG type (i.e., medical, surgical, psychiatric, obstetric, pediatric) when used as an indicator of quality.

Panelists noted that hospital case-mix may affect the rate of death in low mortality DRGs, and patients referred from skilled nursing

facilities, those with certain comorbidities, and older patients may be at higher risk of dying. They advocated risk adjustment for comorbidities and age.

Panelists advocated that this indicator not be subject to public reporting because of the potential bias and questions about the extent of preventability.

Literature Review

Based on two-stage implicit review of randomly selected deaths, Hannan et al. found that patients in low-mortality DRGs (<0.5%) were 5.2 times more likely than all other patients who died (9.8% versus 1.7%) to have received “care that departed from professionally recognized standards,” after adjusting for patient demographic, geographic, and hospital characteristics.⁴³ In 15 of these 26 cases (58%) of substandard care, the patient’s death was attributed at least partially to that care. The association with substandard care was stronger for the DRG-based definition of this indicator than for the procedure-based definition (5.7% versus 1.7%, OR=3.2). The project team was unable to find other evidence on the validity of this indicator.

⁴³ Hannan EL, Bernard HR, O’Donnell JF, Kilburn H, Jr. A methodology for targeting hospital cases for quality of care record reviews. *Am J Public Health* 1989;79(4):430-6.

Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Death in Low-mortality DRGs generally performs well on several different dimensions, including reliability, bias, relatedness of indicators, and persistence over time.

Reliability. The signal ratio—measured by the proportion of the total variation across hospitals that is truly related to systematic differences (signal) in hospital performance rather than random variation (noise)—is high, relative to other indicators, at 94.2%, suggesting that observed differences in risk-adjusted rates likely reflect true differences across hospitals.

The signal standard deviation for this indicator is lower than many indicators, at 0.00439, indicating that the systematic differences (signal) among hospitals is low and less likely associated with hospital characteristics. The signal share is high, relative to other indicators, at 0.04237. The signal share is a measure of the share of total variation (hospital and patient) accounted for by hospitals. The lower the share, the less important the hospital in accounting for the rate and the more important other potential factors (e.g., patient characteristics).

Minimum bias. The project team assessed the effect of age, gender, DRG, and comorbidity risk adjustment on the relative ranking of hospitals compared to no risk adjustment. They measured (1) the impact of adjustment on the assessment of relative hospital performance, (2) the relative importance of the adjustment, (3) the impact on hospitals with the highest and lowest rates, and (4) the impact throughout the distribution. The detected bias for Death in Low-mortality DRGs is high, indicating that the measures are biased based on the characteristics observed. (It is possible that characteristics that are not observed using administrative data may be related to the patient's risk of experiencing an adverse event.) Risk adjustment is important for this indicator.

Source

This indicator was originally proposed by Hannan et al. as a criterion for targeting “cases that would have a higher percentage of quality of care problems than cases without the criterion,

as judged by medical record review.”⁴⁴ An alternative form of this indicator focused on “primary surgical procedures,” rather than DRGs, with less than 0.5% inpatient mortality.

⁴⁴ Hannan et al. 1989.