Classifying severity of illness by using clinical findings

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The medical illness severity grouping system (MEDISGRPS) is a hospital quality and cost control system that classifies patients at admission into severity of illness groups based on objective clinical findings (Brewster et al., to be published). This system can be used to describe physician and hospital-specific performance in terms of patient outcomes (effectiveness) and resource use (efficiency).

Effectiveness analyses focus on patients not achieving the expected results as indicated by mortality and morbidity measures, and are the basis for attempts to set effectiveness or quality standards. To accomplish this, MEDISGRPS starts with the severity classification at admission and then measures changes in severity of illness during the hospital stay.

Efficiency analyses examine the resource use of patients within the same admission severity group, after excluding patients with subsequent morbidity, and in order to keep effectiveness issues separate from efficiency issues.

The MEDISGRPS key clinical findings (KCF’s) are objective evidence of an abnormal situation based on clinical laboratory, radiology, pathology, and physical examination findings. Each finding is assigned to a severity group based on the indicated potential for organ failure. Group 0 is for patients with no key clinical findings. Group 1 indicates minimal findings where there is low potential for organ failure. Group 2 indicates either acute findings with unclear potential for organ failure, or severe findings with high potential for organ failure but when such failure is probably not imminent. Group 3 patients have both severe and acute findings. Group 4 is for critical findings, indicating the presence of organ failure.

To illustrate MEDISGRPS results, the following example is taken from a study at Saint Vincent Hospital, Inc., a 578-bed teaching hospital in Worcester, Massachusetts, that includes 16,428 consecutive medical or surgical admissions between October 1982 and June 1983. In this study, admission severity grouping (review 1) was done after the third hospital day, because it usually takes that long for the clinical data to get into the medical record. A second severity classification (review 2) was done after the ninth day to determine if there were any key clinical findings present subsequent to review 1. Morbidity was thus defined as one or more subsequent key clinical findings in Severity Group 2, 3, or 4 that occurred from the fourth to the ninth hospital day. Patients discharged before review 2 were classified as nonmorbid.

For the most common reasons for admissions, this study’s results demonstrate a statistically significant direct relationship between admission severity and in-hospital mortality and morbidity (Chi-square: \( p < .01 \)). The strength of this relationship between admission severity and health outcomes indicates the validity of the MEDISGRPS.

Our results also show a statistically significant direct relationship between admission severity group and total charges, ancillary charges, and length of stay (analysis of variance F statistic: \( p < .01 \)). Although this is an important finding, other factors (for example, physician practice pattern variations) influence resource use in addition to admission severity, and thus the relationship between admission severity and resource use is not as meaningful as a test of validity as the relationship of admission severity to health outcomes.

Table 1 shows study results for patients whose chief reason for admission was shortness of breath. The mortality and morbidity rates, as well as mean total charges, ancillary charges, and length of stay, increase monotonically with higher admission severity. Also, within each severity group, mean total charges for patients with subsequent morbidity are two to three times higher than for nonmorbid patients. The statistical results (t-tests) indicate that the difference in mean total charges of adjacent severity groups are significantly different \( (p < .01) \) except for Groups 0 and 1. The charge differences between morbid and nonmorbid patients within each severity group are also statistically significant.

This study’s analysis of diagnosis-related groups (DRG’s) demonstrates significant charge and length-of-stay differences among severity groups and between morbid and nonmorbid patients within the same DRG.

Reference

Brewster, A. C., Karlin, B. C., Hyde, L. A., et al.: “Medical Illness Severity Grouping System (MEDISGRPS): A Clinically-Based Approach to Classifying Hospital Patients at Admission.” MediQual Systems, Inc., Westboro, Massachusetts. To be published.
### Table 1
**Effectiveness and efficiency measures by MEDISGRPS\(^1\)**

**severity groups—shortness of breath chief reason for admission:**

**Saint Vincent Hospital: October 1982-June 1983**

| Admission severity group | Number of patients | Mean total charges | Mean ancillary charges | Mean length of stay (days) | In hospital, percent mortality | Review 2, percent morbidity | Morbidity status | Mean total charges |
|--------------------------|--------------------|--------------------|------------------------|---------------------------|-------------------------------|---------------------------|------------------|-------------------|
| All groups               | 1,080              | $3,856             | $1,904                 | 9.6                       | 3.9                          | 22.8                      | Morbid           | $734              |
|                          | 0                  | 14                 | 296                    | 2.1                       | 0                             | 0                         | Nonmorbid        | $1,840            |
|                          | 1                  | 299                | 930                    | 6.3                       | 1.0                           | 8.1                       | Morbid           | 5,751             |
|                          | 2                  | 363                | 1,725                  | 9.3                       | 8.6                           | 19.2                      | Nonmorbid        | 4,161             |
|                          | 3                  | 362                | 2,756                  | 12.3                      | 11.5                          | 37.5                      | Morbid           | 2,860             |
|                          | 4                  | 22                 | 5,100                  | 18.9                      | 54.2                          | 54.5                      | Nonmorbid        | 3,697             |
|                          | 4                  | 4                  |                        |                           |                               |                           | Morbid           | 13,287            |
|                          |                    |                    |                        |                           |                               |                           | Nonmorbid        | 4,801             |

\(^1\)Medical illness severity grouping system.

\(^2\)Analysis of variance: F statistic, p < .01.

\(^3\)Chi Square: p < .01.

\(^4\)t test, p < .01.