Updated Predictive Models for Risk Adjusting Home Health Agency Outcome Measures

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Current Predictive Models

- Implemented in 2003 using OASIS data from calendar year 2001.

- Used logistic regression approach to predict each outcome measure.

- Predictor variables chosen from among 143 measures of patient condition and other characteristics as measured at start or resumption of care.

Current Predictive Models

- Criteria for inclusion of a risk factor in a model included:
  - Contribution of risk factor to explanatory power of model, and
  - Clinical plausibility of regression coefficient.
- For some outcome measures, models were estimated within different sub-populations.

Current Outcome Reports

- Risk-adjusted Outcome Report includes 30 measures for which the predictive power of the risk model met a threshold of $R^2 \geq 0.10$.

- Remaining measures appear, without risk adjustment, on the Descriptive Outcome Report.

- Selected measures appear on Home Health Compare.

2008 Predictive Models

- Data are from January 2003 – June 2005
- Developed using a sample of 500,000 episodes of care.
- Validated using a separate sample of 1,000,000 episodes of care.
- New risk factors include:
  - Diagnosis indicators based on V & E diagnosis codes.
  - Additional indicators for payer/HMO status.
  - For improvement/stabilization measures, start/resumption of care value for underlying OASIS item is represented as multiple dichotomous indicators for each possible value (dummy variables) to capture nonlinear effects.
  - Dummy variables included for unknown or not applicable values.

2008 Predictive Models

- Selected risk factors eliminated:
  - Length of stay (not a patient characteristic).
  - Age scale replaced by dummy variables for age range categories.

- Inclusion criteria for risk factors remained the same, i.e.
  - Contribution of risk factor to explanatory power of model, and
  - Clinical plausibility of regression coefficient.

Categories of Risk Factors (Predictor Variables)

- Independence in activities of daily living (e.g., bathing, management of oral medications)

- Physiological functioning (e.g., urinary incontinence, dyspnea)

- Psychological/Behavioral functioning (e.g., confusion frequency)

- Acute & chronic conditions (e.g., orthopedic, chronic pain)

- Diagnostic groupings based on ICD9 codes (e.g., respiratory)

- V and E code groupings (e.g., physical therapy)

- Caregiver and living situation (e.g., primary caregiver)

Comparison of 2003 & 2008 Models

- Predictive power criteria: $R^2 \geq 0.10$ or C-statistic ≥ 0.70
    - 2003: Models for 30 measures meet one or both criteria.
    - 2008: Models for 34 measures meet one or both criteria.
    - 2008: Models for 7 measures met neither criteria
        - Median R^2 = 0.06
        - Median C-statistic = 0.65
- Number of measures for which models were estimated on stratified sub-populations
    - 2003: Models for 11 measures were as estimated on sub-populations.
    - 2008: No models estimated on sub-populations.
- Average Number of Risk Factors per Model
    - 2003: 42 risk factors (predictor variables) per model.
    - 2008: 50 risk factors (predictor variables) per model.

Changes to OBQI Reports

- All OBQI outcome measures will be risk-adjusted using the 2008 Models.
- The current OBQI Descriptive Outcome Report will be eliminated.
- The current OBQI Risk-Adjusted Outcome Report with be modified to include all 41 measures.
- The seven OBQI outcome measures for which the predictive models did not meet the criteria $R^2 \geq 0.10$ or C-statistic ≥ 0.70 will be designated with an asterisk to highlight the fact that they have less robust risk adjustment.

Likely Effect on Outcome Measures

- Negligible effect on national averages (<0.5%)
- Most agencies' risk-adjusted outcome rates will be comparable to those calculated using the current risk models.
- Comparison of 2003 Model vs. 2008 Model Results (2003-2005 data)
  - On average, the decile rank on Home Health Compare outcome measures did not change for 86% of home health agencies (range: 71% to 96%).
  - Similar consistency was observed for other OBQI measures (84% to 91% had no change in decile rank).

Implementation Timeline

- <u>May 13, 2008</u> CMS Open-Door Presentation.

- <u>May-July 2008</u> IFMC updates software for calculating OBQI outcome measures and generating OBQI reports.

- <u>June 2008</u> CMS posts documentation of 2008 models and updates related Web pages.

- <u>Late July 2008</u> National repository data updated using 2008 risk models.

- <u>August 2008</u> OBQI reports using 2008 models available to agencies and surveyors.

- <u>September 2008</u> Home Health Compare updated with outcome data using new risk models.