

Appendix 2

Technical Specifications of Risk Adjustors Included in the Calculation of Post-Acute Care Quality Measures

Technical specification for Depression Rating Scale (DRS):

DRS is the sum of seven MDS items e1a, e1d, e1f, e1h, e1i, e1l and e1m.

- 1) E1a-Negative statements (0, 1, 2)
- 2) E1d-Persistent anger with self or others (0, 1, 2)
- 3) E1f-expressions of what appear to be unrealistic fears (0, 1, 2)
- 4) E1h-repetitive health complaints (0, 1, 2)
- 5) E1i-repetitive anxious complaints concerns (non-health related) (0, 1, 2)
- 6) E1l-sad, pained, worried facial expressions (0, 1, 2)
- 7) E1m-Crying, tearfulness (0, 1, 2)

If any of the seven items is missing, then the DRS is set to be missing.

Technical specification for Cognitive Performance Scale (CPS):

The CPS scores range from 0 to 6, with 0 indicating intact cognitive function and 6 very severe impairment. As a covariate, we use 6 dummy variables CPS_1-CPS_6, defined below based on the value of CPS on the SNF PPS 5-day assessment:

- CPS_1 = (CPS=1); *Borderline intact;
- CPS_2 = (CPS=2); *Mild impairment;
- CPS_3 = (CPS=3); *Moderate impairment;
- CPS_4 = (CPS=4); *Moderately severe impairment;
- CPS_5 = (CPS=5); *Severe impairment;
- CPS_6 = (CPS=6); *Very severe impairment.

CPS is developed from five MDS items:

1. B1—Comatose
2. B2a—Short Term Memory
3. B4—Cognitive Skills for Decision Making
4. C4—Making Self Understood
5. G1hA—Eating ADL: Self Performance

There are three steps involved in the calculation of CPS.

1. Calculate ISC (impairment symptom count):
 - 1.1. IF B2a has a valid non-missing value (0,1) AND B4 has a valid non-missing value (0,1,2,3) AND C4 has a valid non-missing value (0,1,2,3)
THEN ISC = count (range 0 through 3) of the number of following symptoms that are present:
 - (1) short term memory problems (B2a = 1);
 - (2) modified independence or moderately impaired decision making (B4=1 or 2);
 - (3) Not always able to make self understood (C4 >0).
 - 1.2. If the value for B2a, B4. OR C4 is missing (not in range of valid non-missing values in 1.1)
THEN ISC is missing.
2. Calculate SISC (severe impairment symptom count):

- 2.1. IF B4 has a valid non-missing value (0,1,2,3) AND C4 has a valid non-missing value (0,1,2,3)
THEN SISC = count (range 0 through 2) of the number of following symptoms that are present:
 - (1) moderately impaired decision making (B4 = 2);
 - (2) only sometimes or rarely makes self understood (C4 > 1).
- 2.2. If the value for B4 or C4 is missing (not in the range of valid non-missing values in 2.1)
THEN SISC is missing.
3. Calculate CPS:
 - 3.1. CPS = 6 (very severe impairment) if either of the following 2 conditions are satisfied:
 - (1) Resident is comatose (B1 = 1).
 - (2) Resident is severely impaired in decision making (B4 = 3) AND totally depend on others for eating (G1h(A) = 4, 8, or - (unable to determine)).
 - 3.2. CPS = 5 (severe impairment) if CPS is not 6 AND resident is severely impaired in decision making (B4 = 3) AND resident is not totally dependent on others for eating (G1h(A) = 0,1,2, or 3).
 - 3.3. CPS = 4 (moderate/severe impairment) if CPS not = 5 or 6 AND SISC = 2.
 - 3.4. CPS = 3 (moderate impairment) if CPS not = 4, 5, or 6 AND ISC > 1 AND SISC = 1.
 - 3.5. CPS = 2 (mild impairment) if CPS not = 3 through 6 AND ISC > 1 and SISC= 0.
 - 3.6. CPS = 1 (borderline intact) if CPS not = 2 through 6 AND ISC = 1.
 - 3.7. CPS = 0 (intact) if CPS not = 1 through 6 AND ISC = 0.

CPS = missing if CPS not = 0 through 6. CPS will be missing when missing values on the component MDS items preclude CPS determination

Technical specification for Late loss ADL (R_ADL):

R_ADL is a summary scale of four ADLs: Bed mobility, transfer, toilet use and eating. R_ADL Is calculated from eleven MDS items. Late Loss ADL Scale has integer values from 4 to 18, with higher value indicating more severe limitations in ADL. We take R_ADL from the PPS 5-day assessment and create three dummies to use as covariates, depending on the value of R_ADL:

$$R_ADL_11T14 = (11 \leq R_ADL \leq 14);$$

$$R_ADL_15T16 = (15 \leq R_ADL \leq 16);$$

$$R_ADL_17T18 = (17 \leq R_ADL \leq 18);$$

The details of R_ADL calculation is listed below:

$$\begin{aligned} \text{Code bed mobility} &= 1 \text{ if } G1Aa = -, 0 \text{ or } 1; \\ &= 3 \text{ if } G1Aa = 2; \\ &= 4 \text{ if } (G1Aa = 3, 4 \text{ or } 8) \text{ AND } (G1Ab = -, 0, 1 \text{ or } 2); \\ &= 5 \text{ if } (G1Aa \text{ in } 3, 4 \text{ or } 8) \text{ AND } (G1Ab = 3 \text{ or } 8). \end{aligned}$$

Code transfer = 1 if G1Ba = -, 0 or 1;
= 3 if G1Ba = 2;
= 4 if (G1Ba = 3, 4 or 8) AND (G1Bb = -, 0, 1 or 2);
= 5 if (G1Ba in 3, 4 or 8) AND (G1Bb = 3 or 8).

Code toilet use = 1 if G1Ia = -, 0 or 1;
= 3 if G1Ia = 2;
= 4 if (G1Ia = 3, 4 or 8) AND (G1IB = -, 0, 1 or 2);
= 5 if (G1Ia in 3, 4 or 8) AND (G1Ib = 3 or 8).

Code eating = 3 if K5a (Parental/IV) = 1 OR
if K5b (tube feeding) = 1 AND K6a (% intake via parental or
tube feeding)= 3 or 4 OR
if K5b = 1 AND K6a = 2 AND K6b (fluid intake /day) >=2;
= 1 if G1Ha = -, 0 or 1;
= 2 if G1Ha = 2
= 3 if G1Ha = 3, 4 or 8.

R_ADL = SUM (bed mobility, transfer, toilet use, eating).

Technical specification for Clinically Complex Scale (R_CLN):

R_CLN is derived from RUG-III classification, ranging from 0 to 3. As a covariate, we used 3 dummy variables based on the value of R_CLN on the SNF PPS 5-day assessment:

R_CLN_1 = (R_CLN=1);
R_CLN_2 = (R_CLN=2);
R_CLN_3 = (R_CLN=3);

Four steps are involved in the calculation of R_CLN. The steps are listed in detail below.

1. If the resident has any of the nine conditions, then she/he has “special care qualification”.
 - 1) Two or more PU of any type OR stage 3 or 4 ulcer [(Sum of M1a through M1e >=2) OR (M2a>=3)], where M1a through M1e are non-valid if less than 0 or greater than 9
AND
two or more skin care (sum of M5a M5c M5d M5e M5g M5h >=2).
 - 2) Feeding tube with parental intake AND aphasia [(K5b=1 AND K6a>=3) OR K5b=1 AND K6a=2 AND K6b>=2] AND I1r=1)
 - 3) Surgical wounds OR open lesions other than ulcers, rashes, cuts (M4g=1 OR M4c=1)
AND
Surgical wound care OR application of dressing or application of ointment (M5f=1 OR M5g=1 OR M5h=1)
 - 4) Respiratory therapy for 7 days (P1bda=7)
 - 5) Cerebral palsy AND ADL score >=10 (I1s=1 AND R_ADL>=10)

- 6) Fever (J1h=1)
AND
Vomiting OR weight loss OR tube feeding with high parental/enteral intake
OR pneumonia OR dehydrated (J1o=1 OR K3a=1 OR [(K5b=1 AND
K6a>=3) OR (K5b=1 AND K6a=2 AND K6b>=2)] OR I2e=1 OR J1c=1)
- 7) Multiple sclerosis AND ADL score >=10 (I1s=1 AND R_ADL>=10)
- 8) Quadriplegia AND ADL score>=10 (I1z=1 AND R_ADL>=10)
- 9) Radiation therapy (P1ah=1)

2. If the resident has any of following conditions, then she/he has “clinically complex qualification”.

- 1) Coma (B1=1) AND not awake (N1a, b, c = 0) AND completely ADL dependent (G1aA, G1bA, G1hA, G1iA= 4 or 8)
- 2) Diabetes mellitus (I1a=1) AND injection 7 days (O3=1) AND Physician order changes >= 2 days (P8>=2)
- 3) Hemiplegia (I1v) AND R_ADL>=10
- 4) Pneumonia (I2e=1)
- 5) Septicemia (I2g=1)
- 6) Dehydration (J1c=1)
- 7) Internal bleeding (J1j=1)
- 8) Tube feeding [(K5b=1 AND K6a>=3) OR K5b=1 AND K6a=2 AND K6b>=2]
- 9) Burns second or third degree (M4b=1)
- 10) Infection of foot (M6b=1 OR M6c=1) AND with treatment (M6f=1)
- 11) Chemotherapy (P1aa=1)
- 12) Dialysis (P1ab=1)
- 13) Oxygen therapy (P1ag=1)
- 14) Transfusions (P1ak=1)
- 15) Number of Days in last 14, Physician Visit/order changes: Visits >= 1 day and changes >= 4 days (1<=P7<=14 AND 4<=P8<=14) OR Visits >= 2 days and changes >= 2 days (2<=P7<=14 AND 2<=P8<=14).

If a resident has none of the 15 conditions, then his R_CLN=0, otherwise proceed to the second step.

3. Calculate the RUG-III ADL scores (i.e., R_ADL).

4. Derive the R_CLN scale:

R_CLN = 0 if no clinically complex qualification

If has clinical complex qualification OR (has special care qualification AND R_ADL<7) then

R_CLN=1 if 4<=R_ADL<=11;

R_CLN=2 if 12<=R_ADL<=16;

R_CLN=3 17<=R_ADL<=18.

Technical specification for RUG Nursing Case Mix Index (R_CMIP):

The RUG Nursing Case Mix Index (R_CMIP) is developed from Resource Utilization Group III and is used as a risk adjustor for some of the PAC QMs. Because the technical specification of CMI is very lengthy (48 pages), we do not include the specification here. The SAS codes for generating R_CMIP can be provided upon request.