

Mortality Risk Score (MRS3)

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Background on Scale Development

- Scale measurement
 - To predict mortality among nursing home residents using routinely collected data (MDS3)
- Range of values: 1-20
 - 46 items (Cognitive and Physical Function, Diagnoses, Health Conditions)
 - 21 items – bivariate association, OR of 30-day mortality > 1.2 ($p < 0.0001$), conducted with facility fixed effects
 - 17 items - backwards, stepwise regression model predicting 30-day mortality ($p \leq 0.2$)
 - Weights:
 - OR ≥ 1.2 and < 1.5 a weight 1 (5 items);
 - OR ≥ 1.5 and < 2.5 a weight of 2 (7 items)
 - OR ≥ 2.5 a weight of 3 (5 items).
 - Age - $< 65 = 1$, $65-74 = 2$, $75-84 = 3$, $85-94 = 4$, $95+ = 5$
 - Possible range 0 – 39, top coded to 20

Background on Scale Development

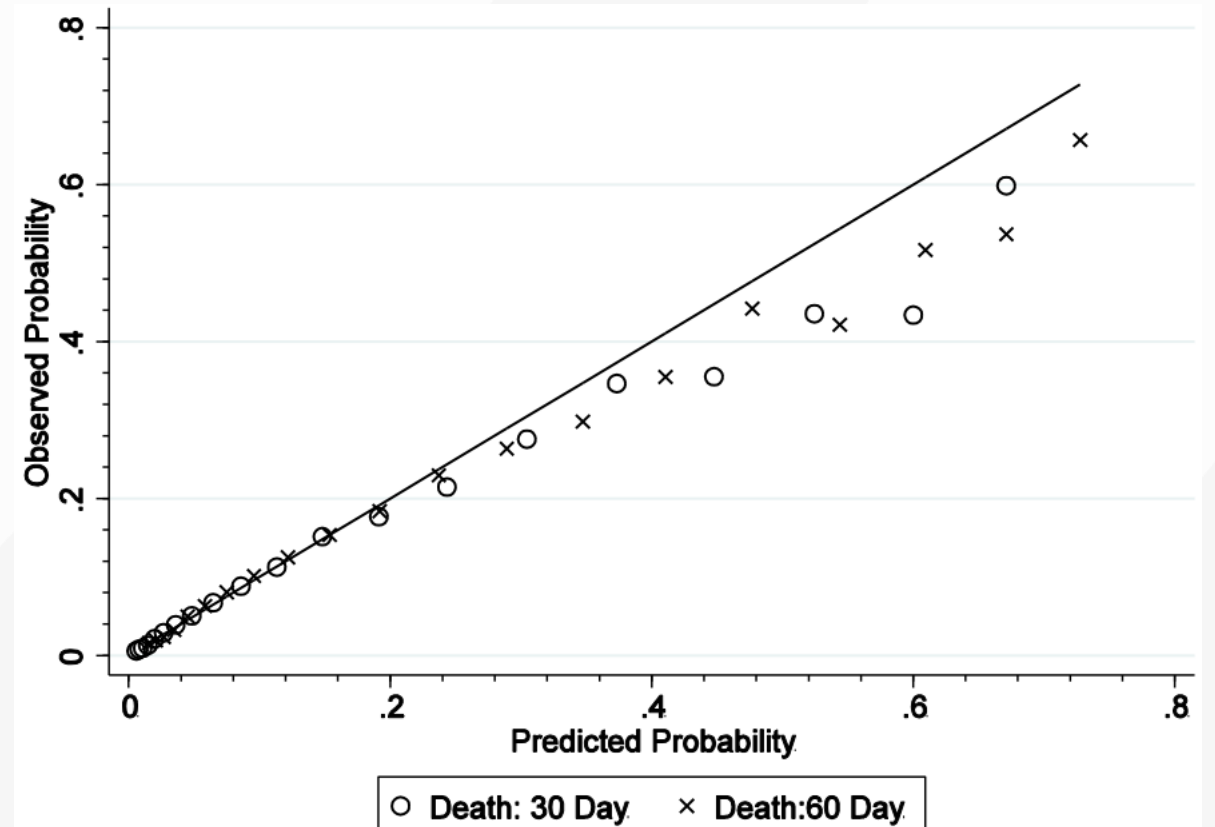
Item	Weight
Age	1 - 5
Severe physical impairment	3
Acute change in mental status	3
Shortness of breath, any	3
Dehydrated	3
Severe cognitive impairment	3
Internal bleeding	2
Swallowing disorder, any	2
Vomiting	2
Fever	2
Unplanned weight loss	2
Heart Failure	2
Worst pressure ulcer, slough, or necrotic	2
Pneumonia	1
Any falls since admission or prior assessment	1
Viral hepatitis	1
Hyponatremia	1
At least one stage 3, 4, or unstageable pressure ulcer	1

Severe physical impairment = 1 if ADL score \geq 23
Severe cognitive impairment = 1 if CFS = 4

Background on Scale Development

- Summary of Analyses of psychometric properties
 - External validation
 - Discrimination (odds ratio – concordance C statistic measuring Receiver Operating Characteristic, ROC, ideal 0.5 - 1)
 - Calibration
 - Cutoff point (8 or higher)- Youden Index (J)
 - 30-day mortality – 5.4 times
 - 60-day mortality – 4.2 times
 - Sensitivity Analysis –

	30-Day Mortality	60-Day Mortality
MRS3	0.744 (0.741, 0.747)	0.709 (0.706, 0.711)
Charlson Comorbidity Index	0.611 (0.607, 0.615)	0.608 (0.605, 0.610)
6-Month Prognosis	0.543 (0.542, 0.545)	0.528 (0.527, 0.529)



MDS Items (note: may be Not Applicable)

MDS 2.0 items	MDS 3.0 items	Notes:
	<p>J1800_Fall_Last_Asmt_Cd Falls since admission or prior assessment- No injury (J1900A_Fall_No_Injury_Cd) Falls since admission or prior assessment- Injury, except major (J1900B_Fall_Injury_Cd) Falls since admission or prior assessment- Major injury (J1900C_Fall_Maj_Injury_Cd) Shortness of breath or trouble breathing with exertion (J1100A_SOB_Exrtn_Cd) Shortness of breath or trouble breathing when sitting at rest (J1100B_SOB_Sitg_Cd) Shortness of breath or trouble breathing when lying flat (J1100C_SOB_Lyg_Cd) None of the above-Shortness of breath (J1100Z_No_SOB_Cd) Dehydration (J1550C_Dhydrtn_Cd) Internal Bleeding (J1550D_Intrnl_Bledg_Cd) Vomiting (J1550B_Vmtg_Cd) Fever (J1550A_Fvr_Cd) Unplanned wight loss 5% last month, 10% in 6months (K0300_Wt_Loss_Cd)</p>	<p>Falls since admission or prior assessment (OBRA, PPS or Discharge), whichever is recent</p> <p>Shortness of breath. any</p> <p>Dehydrated Internal Bleeding Vomiting Fever Unplanned weight loss</p>

MDS Items (note: may be Not Applicable)

MDS 2.0 items	MDS 3.0 items	Notes:
	<p>Heart Failure (I0600_Hrt_Failr_Cd) Pneumonia (I2000_Pneumo_Cd) Loss of liquids/solids-Swallowing disorder (K0100A_Loss_Mouth_Eatg_Cd) Holding food in mouth-Swallowing disorder (K0100B_Hld_Food_Mouth_Cd) Coughing or choking during meals or when swallowing meds-Swallowing disorder (K0100C_Chok_Drng_Meal_Cd) Complaints of difficulty or pain with swallowing-Swallowing disorder (K0100D_Cmplnt_Swlwg_Cd) None of the above-Swallowing disorder (K0100Z_No_Swlwg_Cd) One or more unhealed pressure ulcers at stage 1 or higher (M0210_Stg_1_Hghr_Ulcr_Cd) Number of stage 3 pressure ulcers (M0300C1_Stg_3_Ulcr_Num) Number of stage 4 pressure ulcers (M0300D1_Stg_4_Ulcr_Num)</p>	<p>Heart Failure Pneumonia Swallowing disorder, any</p> <p>At least one stage 3, 4, or unstageable pressure ulcer</p>

MDS Items (note: may be Not Applicable)

MDS 2.0 items	MDS 3.0 items	Notes:
	<p>Number of unstageable-non-removable dressing pressure ulcers (M0300E1_Unstgbl_Ulcr_Drsng_Num)</p> <p>Number of unstageable-slough and/or eschar pressure ulcers (M0300F1_Unstgbl_Ulcr_Esc_Num)</p> <p>Number of unstageable-deep tissue pressure ulcers (M0300G1_Unstgbl_Ulcr_Deep_Num)</p> <p>Most severe type of any pressure ulcer (M0700_Ulcr_Tissue_Type_Cd)</p> <p>Viral Hepatitis (I2400_Vrl_Hpt_Cd)</p> <p>Hyponatremia (I3100_Hyponatremia_Cd)</p>	<p>Worst pressure ulcer, Slough or Necrotic</p> <p>Viral Hepatitis</p> <p>Hyponatremia</p>

Technical Notes

- If missing on any of the 17 items, then the scale is set to missing
- From 2016 onwards the item C1600_Chg_Mentl_Stus_Cd was renamed to C1310A_Mentl_Stus_Chg_Cd but the codes are the same