Title	Predicting 1#year mortality in older hospitalized patients: external validation of the HOMR Model
Authors	Curtin, Denis;Dahly, Darren L.;van Smeden, Maarten;O'Donnell, Desmond P.;Doyle, David;Gallagher, Paul F.;O'Mahony, Denis
Publication date	2019-05-03
Original Citation	Curtin, D., Dahly, D. L., van Smeden, M., O'Donnell, D. P., Doyle, D., Gallagher, P. and O'Mahony, D. (2019) 'Predicting 1#year mortality in older hospitalized patients: external validation of the HOMR Model', Journal of the American Geriatrics Society. doi:10.1111/jgs.15958
Type of publication	Article (peer-reviewed)
Link to publisher's version	10.1111/jgs.15958
Rights	© 2019, the American Geriatrics Society. This is the peer reviewed version of the following article: Curtin, D., Dahly, D. L., van Smeden, M., O'Donnell, D. P., Doyle, D., Gallagher, P. and O'Mahony, D. (2019) 'Predicting 1#year mortality in older hospitalized patients: external validation of the HOMR Model', Journal of the American Geriatrics Society. doi:10.1111/jgs.15958, which has been published in final form at https://doi.org/10.1111/jgs.15958. This article may be used for non-commercial purposes in accordance with Wiley Terms and Conditions for Use of Self-Archived Versions.
Download date	2024-04-28 18:01:01
Item downloaded from	https://hdl.handle.net/10468/8108

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Sex	Points
Female	0
Male	1

ED visits	Points
Female	0
Male	1

Home O_2	Points
No	0
Yes	1

Admission directly to ICU	Points
No	0
Yes	1

Admissions by ambulance	Points
0	0
1	3
2	4
≥3	5

Sex	Points
No	0
Yes	1

Diagnostic Risk Score
See Appendix

Charlson Comorbidity Index score

Diagnosis	Points	Diagnosis	Points
Myocardial infarction	1	Diabetes with chronic complications	2
Heart failure	2	Hemi- or paraplegia	1
Peripheral vascular disease	1	Renal disease	3
Cerebrovascular disease	1	Nonmetastatic cancer	2
Dementia	3	Moderate to severe liver disease	4
Chronic respiratory disease	2	Metastatic cancer	6
Mild liver disease	2	HIV infection	4
Diabetes without complications	1	**Total comorbidity score**	

Charlson Comorbidity Index score: Age x comorbidity

Age, yr	0	1	2	3	4	5	≥6
20-24.9	0	3	5	7	8	9	10
25-29.9	2	5	7	9	10	11	11
30-34.9	4	7	9	11	12	12	13
35-39.9	7	9	11	12	13	14	15
40-44.9	8	11	13	14	15	15	16
45-49.9	10	13	14	15	16	17	17
50-54.9	12	14	16	17	17	18	18
55-59.9	14	16	17	18	19	19	17
60-64.9	15	17	18	19	20	20	18
65-69.9	17	19	20	21	21	22	20
70-74.9	18	20	21	22	22	23	21
75-79.9	20	21	22	23	23	24	22
80-84.9	21	23	23	24	24	25	25
85-89.9	23	24	25	25	25	26	26
90-94.9	24	25	26	26	26	27	27
≥95	25	26	27	27	27	28	28

Living status/ admission urgency x admissions by ambulance

	No. of admissions by ambulance			
	0	**1**	**2**	**≥3**
Living status				
Home, independent	0	0	0	0
Rehabilitation facility	3	3	2	2
Home with home care	4	3	3	3
Nursing home	4	4	4	3
Chronic care hospital	8	6	5	5
Admission urgency				
Elective	0	0	0	0
ED, no ambulance	3	1	0	0
ED, ambulance	5	2	1	0

Admitting service	Points
Medicine	
General medicine	10
Cardiology	8
Gastroenterology/ nephrology/ neurology	9
Palliative care	28
Heamatology/ oncology	14
Gynecology	7
Surgery	
General surgery	8
Cardiovascular surgery	9
Neurosurgery	10
Orthopedic/ plastic surgery	7
Thoracic/ transplant surgery	7
Trauma	8
Urology	6

Covariate	Total points
Sex	
ED visits	
Home O_2	
Diagnostic Risk Score	
Admission to ICU	
Admissions by ambulance	
Urgent readmission	
Admitting service	
Age x comorbidity	
Living status x admissions by ambulance	
Admission urgency x admissions by ambulance	
Total HOMR score	_____

Supplementary appendix S1: The original HOMR model. Covariates used to calculate a patient's Hospital-patient One-year Mortality Risk (HOMR) score. ED = emergency department. ICU = intensive care department.

	Dependent variable:
	1 year post-hospitalization mortality
DRS	0.11 (0.07, 0.15)
sqrt(Age)	1.45 (0.60, 2.30)
Male (vs Female)	0.44 (0.12, 0.77)
Rehab	0.82 (-1.75, 3.38)
Homecare	1.16 (-0.24, 2.56)
Nursing Home	1.56 (0.13, 2.99)
log(CCI)	2.78 (-2.76, 8.33)
sqrt(Ed visits in the previous year + 1)	0.16 (-1.23, 1.55)
1/(Admissions by ambulance in previous year +1)	-2.03 (-4.75, 0.70)
Other (vs General Medicine)	-0.68 (-1.58, 0.22)
ED w/o Ambulance	-0.83 (-3.16, 1.49)
ED w/Ambulance	-1.21 (-3.41, 0.98)
Urgent readmission	0.60 (0.07, 1.12)
Sqrt(Age) log(CCI)	-0.23 (-0.84, 0.38)
Rehab 1/(Admissions by ambulance in previous year +1)	-0.15 (-3.66, 3.36)
Homecare 1/(Admissions by ambulance in previous year +1)	0.31 (-1.23, 1.85)
Nursing Home 1/(Admissions by ambulance in previous year +1)	-0.20 (-1.91, 1.52)
ED w/o Ambulance 1/(Admissions by ambulance in previous year +1)	1.04 (-1.73, 3.81)
ED w/Ambulance 1/(Admissions by ambulance in previous year +1)	1.91 (-0.71, 4.53)
Intercept	-14.79 (-22.86, -6.72)
Observations	1,409
Log Likelihood	-523.28
Akaike Inf. Crit.	1,086.55
Note: **Admiting service recoded to General Medicine vs Other, due to small call sizes. ICU admission from the model was omitted as there were only 3 cases of this happening. Home O2 was omitted from the model since no patients in our sample were using it.**	

Supplementary Appendix S2: Re-estimated HOMR model with regression coefficients. CCI = Charlson Comorbity Index; ED = emergency department; ICU = Intensive care unit.

Model	Description	C-Statistic: Derivation	Validation	Independent validation
HELP, 2000[28]	Patients ≥80 years, emergency admissions	C= 0.73 (N=1266)	C=0.74 (N=150)	-
Walter et al, 2001[29]	Patients ≥70 years, discharged from general medicine service	C=0.75 (N=1495)	C=0.79 (N=1427)	C=0.72[25] (N=100; patients ≥75; 1 year mortality prediction)
BISEP, 2003[30]	Patients ≥70 years, admitted under general medicine service	C=0.83 (N=525)	C=0.77 (N=1246)	C=0.72[25] (N=100; patients ≥75; 1 year mortality prediction)
CARING, 2006[31]	Adult patients admitted under general medicine service	C=0.82 (N=435)	C=0.79 (N=1064)	C=0.63[25] (N=100; patients ≥75; 1 year mortality prediction)
Levine et al, 2007[32]	Patients ≥65 years discharged from general medicine service	C=0.67 (N=2739)	C=0.65 (N=3643)	C=0.64[25] (N=100; patients ≥75; 1 year mortality prediction)
MPI, 2008[33]	Patients ≥65 years admitted to geriatric unit	C=0.75	C=0.75[34]	-
SAFES, 2008[35]	Patients ≥75 admitted through the emergency department	C=0.72 (N=870)	C=0.71 (N=436)	-
Silver Code, 2010[36]	Patients ≥75 admitted through the emergency department	C=0.66 (N=5457)	C=0.64 (N=5456)	0.51[25] (N=100; patients ≥75; 1 year mortality prediction)
HOMR, 2014[5]	Adult patients of all ages admitted under non-psychiatric hospital services	C=0.92 (N=319 531)	C=0.89 - 0.92[6] (N= 2 862 996)	C=0.78 (N=1409; patients ≥65 years discharged from geriatric service; model re-calibrated for validation sample)

Supplementary Appendix S3: Summary of prognostic models used to predict mortality in hospitalized older patients.

Legend: BISEP = Burden of Illness Score for Elderly Persons; CARING = cancer, ≥2 admissions, residence in a nursing home, intensive care unit admission with multiorgan failure, ≥2 noncancer hospice guidelines; HELP = Hospitalized Elderly Longitudinal Project; HOMR = Hospital patient One year Mortality Risk; MPI = Multidimensional Prognostic Index; SAFES = Sujet Agé Fragile—Evaluation et Suivi (Frail Elderly Subject – Assessment Follow-up).