

THE LANCET

Healthy Longevity

Supplementary appendix

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

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Supplemental table 1 Analysis comparing patients with and without a CFS

	CFS Sample	Non-CFS sample	
	Total (n=2434)	Total (n=3102)	p-value
Age (years)	67 [55-77]	69 [58-78]	<0.0001
<65 years	1096 (45%)	1222 (39%)	<0.0001
65-75 years	589 (24%)	774 (25%)	
>75 years	749 (31%)	1106 (36%)	
Male gender	1480 (61%)	1947 (63%)	0.13
Concomitant drugs			
<i>Blood pressure-lowering drugs</i>	1136 (47%)	1665 (54%)	<0.0001
<i>Antiplatelet drugs</i>	405 (17%)	699 (23%)	<0.0001
<i>Oral anticoagulants</i>	272 (11%)	373 (12%)	0.33
<i>Glucose-lowering drugs</i>	437 (18%)	636 (21%)	0.018
<i>Antipsychotics and cholinesterase inhibitors</i>	143 (6%)	136 (4%)	0.013
Number of drug classes	3 [1-7]	5 [2-9]	<0.0001
Clinical outcome			
<i>Hospital mortality</i>	456 (19%)	653 (21%)	0.032
<i>ICU admission</i>	616 (25%)	700 (23%)	0.13

Displayed values are median [interquartile range] and n (%), p-values are estimated using Mann Whitney U test and chi-square test for continuous and categorical variables where necessary.

Supplemental Table 2 Baseline characteristics of the total sample for patients <65 and ≥65 years, separately

	<65 years Total (n=1096)	≥65 years Total (n=1338)	p-value
Age (years)	53 [45-60]	76 [71-83]	NA
< 65 years	1096		NA
65-75 years		589	
>75 years		749	
Male gender	700 (64%)	780 (58%)	0.0050
Concomitant drugs			
Blood pressure-lowering drugs	285 (26%)	851 (64%)	<0.0001
Antiplatelet drugs	81 (7%)	324 (24%)	<0.0001
Oral anticoagulants	32 (3%)	240 (18%)	<0.0001
Glucose-lowering drugs	130 (12%)	307 (23%)	<0.0001
Antipsychotics and cholinesterase inhibitors	25 (2%)	118 (9%)	<0.0001
Number of drug classes	1 [1-4]	5 [2-9]	<0.0001
Clinical Frailty Score			
			<0.0001
1 Very fit	184 (17%)	69 (5%)	
2 Well	419 (38%)	258 (19%)	
3 Managing well	189 (17%)	258 (19%)	
4 Vulnerable	125 (11%)	241 (18%)	
5 Mildly frail	54 (5%)	144 (11%)	
6 Moderately frail	37 (3%)	145 (11%)	
7 Severely frail	47 (4%)	147 (11%)	
8 Very severely frail	37 (3%)	62 (5%)	
9 Terminally ill	4 (1%)	14 (1%)	
Clinical outcome			
Hospital mortality	53 (5%)	403 (30%)	<0.0001
ICU admission	290 (26%)	326 (24%)	0.26

Displayed values are median [interquartile range] and n (%). P-values are based on Mann-Whitney U test for continuous variables, and Fisher's exact test for categorical variables. NA are p-values that are non-informative and are therefore omitted from the table.

Supplemental Table 3 Baseline characteristics of the total sample for each CFS category, separately

Clinical Frailty Scale	<i>Fit [CFS 1-3]</i> (n=1377)	<i>Mildly frail [CFS 4-5]</i> (n=564)	<i>Frail [CFS 6-9]</i> (n=493)	p-value
Age (years)	62 [51-72]	73 [60-81]	75 [65-84]	<0.0001
<65 years	792 (57%)	179 (32%)	125 (25%)	<0.0001
65-75 years	330 (24%)	136 (24%)	123 (25%)	
>75 years	255 (18%)	249 (44%)	245 (50%)	
Male gender	853 (62%)	329 (58%)	298 (60%)	0.33
Concomitant drugs				
<i>Blood pressure-lowering drugs</i>	537 (39%)	304 (54%)	295 (60%)	<0.0001
<i>Antiplatelet drugs</i>	179 (13%)	122 (22%)	104 (21%)	<0.0001
<i>Oral anticoagulants</i>	116 (8%)	72 (13%)	84 (17%)	<0.0001
<i>Glucose-lowering drugs</i>	198 (14%)	131 (23%)	108 (22%)	<0.0001
<i>Antipsychotics and cholinesterase inhibitors</i>	37 (2%)	37 (7%)	69 (14%)	<0.0001
Number of drug classes	2 [1-6]	5 [1-8]	5 [2-9]	<0.0001
Clinical outcome				
<i>Hospital mortality</i>	142 (10%)	132 (23%)	182 (37%)	<0.0001
<i>ICU admission</i>	353 (26%)	104 (18%)	159 (32%)	<0.0001

Displayed values are median [interquartile range] and n (%). P-values are based on one-way ANOVA for continuous variables and Fisher's exact test for categorical variables.

Supplemental Table 4 Binary logistic regression presenting all the estimates (Odds Ratios) and 95% Confidence intervals with hospital mortality as the outcome

Hospital mortality	Model IV	Model IV	Model IV
	Total sample	<65 years	≥65 Years
Mildly frail [CFS4-5]; ref is Fit[CFS1-3]	1·54 (1·16-2·06)	1·08 (0·48-2·39)	1·64 (1·20-2·25)
Frail [CFS6-9]; ref is Fit[CFS1-3]	2·71 (2·04-3·60)	2·22 (1·08-4·57)	2·90 (2·12-3·97)
Male	2·04 (1·59-2·63)	2·01 (1·00-4·04)	2·04 (1·56-2·67)
Age	2·00 (1·80-2·24)	1·85 (1·24-2·75)	1·74 (1·46-2·08)
Polypharmacy	1·05 (1·01-1·09)	1·15 (1·06-1·26)	1·02 (0·98-1·06)
Blood pressure-lowering drugs	1·14 (0·86-1·51)	0·54 (0·25-1·17)	1·26 (0·92-1·71)
Antiplatelet drugs	1·02 (0·75-1·39)	0·67 (0·24-1·91)	1·13 (0·81-1·56)
Oral anticoagulants	1·04 (0·74-1·39)	1·59 (0·50-5·96)	1·05 (0·74-1·49)
Glucose-lowering drugs	0·99 (0·74-1·34)	1·32 (0·60-2·90)	0·90 (0·66-1·24)
Cholinesterase inhibitors	1·44 (0·96-2·16)	2·72 (0·86-8·57)	1·30 (0·85-2·00)
N	2367	1069	1298
Nagelkerke R-square	0·3	0·15	0·16
-2 Loglikelihood	-1837·85	-367·68	-1449·07
Chi-square (df, p-value)	482·00 (10, <0·001)	54·09 (10, <0·001)	159·11 (10, <0·001)

Note: Bold values are significant at 5% alpha level.

Supplemental Table 5 Binary logistic regression presenting all the estimates (Odds Ratios) and 95% Confidence intervals with ICU admission as the outcome

ICU admission	Model IV	Model IV	Model IV
	Total sample	<65 years	≥65 Years
Mildly frail [CFS4-5]; ref is Fit[CFS1-3]	0.71 (0.55-0.92)	0.93 (0.63-1.38)	0.66 (0.47-0.93)
Frail [CFS6-9]; ref is Fit[CFS1-3]	1.54 (1.21-1.97)	2.96 (1.98-4.43)	1.27 (0.92-1.75)
Male; ref is female	2.03 (1.65-2.48)	2.06 (1.50-2.83)	1.75 (1.33-2.31)
Age	1.00 (0.94-1.08)	1.47 (1.25-1.72)	0.56 (0.46-0.68)
Polypharmacy	0.98 (0.95-1.01)	1.00 (0.94-1.06)	0.97 (0.93-1.01)
Blood pressure-lowering drugs	1.35 (1.06-1.71)	0.95 (0.64-1.40)	1.50 (1.10-2.06)
Antiplatelet drugs	0.72 (0.54-0.97)	0.87 (0.50-1.53)	0.69 (0.48-0.99)
Oral anticoagulants	0.60 (0.42-0.86)	0.56 (0.23-1.36)	0.70 (0.47-1.04)
Glucose-lowering drugs	1.02 (0.78-1.34)	1.07 (0.67-1.72)	0.86 (0.61-1.20)
Cholinesterase inhibitors	0.63 (0.39-1.00)	0.92 (0.34-2.46)	0.70 (0.40-1.22)
N	2418	1091	1327
Nagelkerke R-square	0.06	0.11	0.11
-2 Loglikelihood	-12646.23	-1175.15	-1381.33
Chi-square (df, p-value)	98.20 (10, <0.001)	88.34 (10, <0.001)	98.34 (10, <0.001)

Note: Bold values are significant at 5% alpha level.

Supplemental Table 6 Binary regression analysis using CFS as a continuous variable

<i>Study endpoint</i>		<i>No. of events</i>	<i>Clinical frailty score</i>	
			<i>OR (95%CI)</i> <i>Per 1 increase</i> <i>Clinical Frailty Score</i> <i>(n=2434)</i>	<i>p-value</i>
Hospital mortality	I	456	1.44 (1.37 - 1.52)	<0.0001
	II		1.30 (1.22 - 1.37)	<0.0001
	III		1.28 (1.21 - 1.36)	<0.0001
	IV		1.27 (1.20 - 1.35)	<0.0001
Intensive care admission	I	616	1.08 (1.04 - 1.13)	<0.0001
	II		1.11 (1.05 - 1.16)	<0.0001
	III		1.12 (1.06 - 1.17)	<0.0001
	IV		1.12 (1.07 - 1.18)	<0.0001

Model

I: Crude

II: Adjusted for sex, age

III: II + additional adjustment for number of drugs

IV: III + additional adjustment for blood pressure-lowering drugs, antiplatelet drugs, oral anticoagulants, glucose-lowering drugs, antipsychotics, and cholinesterase inhibitors

**Estimates are Odds Ratios (OR) and their respective 95% Confidence Intervals (95% CI)*

Supplemental Table 7 Binary logistic regression analysis when including BMI as an additional covariate in the extended model IV

Outcome	Hospital mortality			ICU admission		
	Total	<65 years	≥65 Years	Total	<65 years	≥65 Years
Sample	IV	IV	IV	IV	IV	IV
Mildly frail [CFS4-5]; ref is Fit [CFS1-3]	1·56 (1·13-2·15)	1·13 (0·84-2·65)	1·69 (1·19-2·42)	0·65 (0·50-0·86)	0·80 (0·52-1·22)	0·63 (0·43-0·92)
Frail [CFS6-9]; ref is Fit [CFS1-3]	2·43-1·74-3·38)	2·13 (0·92-4·92)	2·62 (1·82-3·79)	1·66 (1·26-2·19)	2·92 (1·80-4·73)	1·45 (1·01-2·08)
Male; ref is female	2·97 (1·64-2·94)	1·86 (0·87-3·98)	2·24 (1·64-3·06)	2·09 (1·67-2·62)	2·14 (1·51-3·04)	1·81 (1·32-2·47)
Age	1·87 (1·65-2·13)	1·85 (1·19-2·87)	1·52 (1·23-1·88)	1·00 (0·92-1·08)	1·48 (1·25-1·76)	0·51 (0·40-0·64)
Pre-obesity; ref is normal	1·66 (1·20-2·28)	2·00 (0·89-4·47)	1·54 (1·08-2·19)	1·70 (1·32-2·18)	1·92 (1·21-2·81)	1·25 (0·89-1·77)
Obesity; ref is normal	1·57 (1·13-2·19)	1·51 (0·64-3·55)	1·54 (1·07-2·22)	1·51 (1·17-1·96)	1·98 (1·34-2·92)	0·98 (0·68-1·43)
Polypharmacy	1·06 (1·02-1·10)	1·17 (1·06-1·29)	1·03 (0·99-1·08)	0·98 (0·95-1·03)	1·00 (0·94-1·07)	0·98 (0·94-1·03)
Blood pressure-lowering drugs	1·06 (0·77-1·46)	0·49 (0·21-1·16)	1·19 (0·93-1·69)	1·24 (0·95-1·62)	0·84 (0·55-1·28)	1·51 (1·06-2·16)
Antiplatelet drugs	0·99 (0·70-1·40)	0·57 (0·18-1·82)	1·14 (0·79-1·65)	0·73 (0·53-1·01)	0·74 (0·41-1·37)	0·74 (0·50-1·10)
Oral anticoagulants	1·07 (0·74-1·56)	1·81 (0·54-6·06)	1·09 (0·73-1·62)	0·56 (0·38-0·82)	0·44 (0·17-1·15)	0·70 (0·54-1·16)
Glucose-lowering drugs	1·00 (0·72-1·39)	1·55 (0·67-3·61)	0·84 (0·58-1·21)	0·92 (0·69-1·24)	0·94 (0·57-1·57)	0·79 (0·54-1·16)
Cholinesterase inhibitors	1·49 (0·93-2·38)	2·87 (0·81-10·18)	1·30 (0·79-2·15)	0·69 (0·41-1·16)	1·11 (0·39-3·18)	0·70 (0·37-1·30)
N	1882	858	1024	1929	877	1052
Nagelkerke R-square	0·26	0·19	0·14	0·08	0·14	0·13
-2 Loglikelihood	-1445·38	-301·94	-1117·76	-2161·41	-976·18	-1108·73
Chi-square (df, p-value)	317·49 (12, <0·001)	56·74 (12, <0·001)	100·89 (12, <0·001)	110·69 (12, <0·001)	88·23 (12, <0·001)	95·89 (12, <0·001)

Note: Bold values are significant at 5% alpha level.

Supplemental Table 8 Binary logistic regression for the association between CFS and hospital mortality stratified for whether the patient was admitted at the ICU during the COVID-19 hospitalisation

Outcome Stratification Model	Hospital mortality	
	ICU admission	No ICU admission
	IV	IV
Mildly frail [CFS4-5]; ref is Fit [CFS1-3]	1.33 (0.78-2.27)	1.90 (1.31-2.75)
Frail [CFS6-9]; ref is Fit [CFS1-3]	1.81 (1.14-2.87)	3.23 (2.22-4.72)
Male	1.84 (1.14-2.96)	1.86 (1.37-2.54)
Age	1.80 (1.49-2.17)	2.47 (2.11-2.90)
Polypharmacy	1.05 (0.99-1.12)	1.05 (1.00-1.10)
Blood pressure-lowering drugs	0.85 (0.53-1.37)	1.28 (0.88-1.86)
Antiplatelet drugs	0.97 (0.54-1.75)	1.13 (0.78-1.65)
Oral anticoagulants	1.19 (0.62-2.30)	1.03 (0.68-1.55)
Glucose-lowering drugs	1.15 (0.68-1.95)	0.95 (0.65-1.38)
Cholinesterase inhibitors	1.94 (0.72-5.22)	1.45 (0.91-2.29)
N	570	1781
Nagelkerke R-square	0.19	0.38
-2 Loglikelihood	-603.77	-1127.63
Chi-square (df, p-value)	80.34 (10, <0.001)	448.52 (10, <0.001)

Note: Bold values are significant at 5% alpha level.

Supplemental file 1 List of authors COMET research team

The following list entails all the authors of the COMET research team. They are ordered by country, hospital, and each participant belonging to a hospital.

Aruba

Dr Horacio E Oduber hospitaal, Oranjestad: Jacomien Aleman (PharmD).

Austria

Vienna General Hospital - Medical University Campus, Vienna: Fiona Nagele (MPharm), Gunar Stermer (MPharm).

Klinik Favoriten, Vienna: Doris Haider (PharmD), Katharina Heitzeneder (MPharm), Nikolaus Lindner (MPharm), Andrea Lubich (PhD), Monika Schwap (MPharm).

Klinik Penzing, Vienna: Christine Müller (MPharm), Konstanze Duchek-Mann (MPharm), Marietta Huebler (MPharm).

Klinik Donaustadt, Vienna: Rosalinda Cabuk (MPharm), Theresa Forsthuber (MPharm), Karin Nemeč (PharmD).

Belgium

University Hospitals Leuven, Leuven: Jos Tournoy (MD), Lorenz Van der Linden (PharmD).

Curacao

Curaçao MC, Willemstad: Zohreh Safipour (PharmD).

Denmark

Hvidovre Hospital, Copenhagen: Anne Kathrine Benggaard (PharmD).

Copenhagen University Hospital Amager and Hvidovre, Hvidovre: Morten Baltzer Houlinde (PharmD).

France

Bichat-Claude-Bernard, Paris: Grégoire Callens (BSc), Jennifer Le Grand (PharmD), Michaël Kemogni (pharmacy student), Marc Veyrier (PharmD).

Hôpital Beaujon, Clichy: Guillaume Cohet (PharmD), Gaëlle OKA (PharmD), Nathalie Pons-Kerjean (PharmD).

Germany

Universitätsklinikum Düsseldorf, Düsseldorf: Anneke Maiworm (PharmD).

Italy

Ospedale Bufalini di Cesena -AUSL della Romagna, Cesena: Francesca Caruso (PharmD), Carito Zenico (PharmD). *Morgagni Forlì, Forlì:* Fabio Pieraccini (PharmD).

Carlo Urbani Hospital, Jesi (AN): Katia Bini (PharmD), Marco Candela (MD), Anna Maria Schimizzi (MD), Marco Di Carlo (MD), Roberto Grinta (PharmD), Fausto Salaffi (MD), Marika Tardella (MD), Federica Verri (PhD).

Istituto Scientifico Romagnolo per lo Studio e per la Cura dei Tumori I.R.S.T. IRCCS, Ospedale Sacro Cuore Don Calabria, Verona: Carla Masini (PharmD), Gloria Boni (PharmD), Zeno Bisoffi (MD), Roberto Tessari (PharmD), Francesca Marchesini (PharmD), Teresa Zuppini (Hospital Pharmacy Director).

San Francesco Hospital, Nuoro: Paola Chessa (PharmD).

Pederzoli Hospital, Peschiera del Garda, VR: Marco Gambera (PharmD), Isabella Martignoni (PharmD).

Santa Maria delle Croci, Ravenna: Giovanna Rametta (PharmD).

"Infermi" Hospital, Rimini: Laura Fantini (PharmD), Francesco Pappalardo (PharmD), Elisa Maria Platania (PharmD), Lucia Rossi (PharmD).

Azienda ospedaliero-universitaria Sant'Andrea, Rome: Giorgia Gambarelli (PharmD), Silvia Berlinghini (PharmD), Simone Pagliarino (PharmD), Martina Canonici (PharmD), Eleonora Capone (PharmD), Caterina Maesano (PharmD), Gabriella Martini (PharmD), Elena Loche (PharmD).

Azienda Ulss 5 Veneto, Rovigo: Laura Agnoletto (PharmD).

Hospital Pharmacy - Hospital Santa Maria della Misericordia di Urbino, Urbino: Silvia Andreassi (MD), Michela Maragna (MD), Manola Peverini (PharmD), Celestino Bufarini (PharmD).

the Netherlands

Noordwest Ziekenhuisgroep, Alkmaar: Ingrid van Haelst (PhD).
Meander MC, Amersfoort: Louise Andrews (PharmD), Eefje Jong (MD).
Amsterdam UMC, AMC, Amsterdam: Marleen Kemper (PharmD), Ferdi Sombogaard (PharmD), Roland van den Berg (PharmD), Elise Slob (PharmD).
Farmadam Apotheek, Amsterdam: Firdaouss Boutkourt (PharmD).
Gelre ziekenhuizen, Apeldoorn/Zutphen: Annemiek Otten-Helmers (BSc), Erik van Kan (PharmD PhD).
Rijnstate, Arnhem: Margreet Filius (PharmD), Wietske Hemminga (PharmD).
Rode Kruis Ziekenhuis, Beverwijk: Caroline Ghazarian (PharmD), Doranne Hilarius (PharmD).
Amphia ziekenhuis, Breda: Ronald Van Etten (MD), Hein van Onzenoort (PharmD), Mariette Kappers (MD), Peter van Wijngaarden (MD), Jose Verstijnen (BSc).
Reinier de Graaf Ziekenhuis, Delft: Ilse Cornelissen-Wesseling (Msc), Jeroen Diepstraten (PharmD), Jacobien Ellerbroek (MD).
Haaglanden MC, Den Haag: Eveline Roelofsen (MSc), Edmé Roobol-Meuwese (MSc).
Gelderse Vallei Hospital, Ede: Peter Wierenga (PharmD).
Admiraal de Ruyter Ziekenhuis (ADRZ), Goes: Rosanne Kranenburg (MD).
Treant Zorggroep, Emmen: Rosalie Moorlag (PharmD), Anja Vos (MD).
Beatrixziekenhuis, Gorinchem: Ingrid Hoogendoorn-de Graaf (PharmD), Judith Verdonk (BSc).
St Jansdal, Harderwijk: Marieke Ebbens (PharmD).
Tergooi hospital, Hilversum: Linda Hendriksen (PharmD), Paul van der Linden (PharmD).
MUMC+, Maastricht: Jos Schols (MD).
Canisius Wilhelmina Hospital, Nijmegen: Hugo de Wit (PharmD), Stefan Russel (MSc).
Dijklander ziekenhuis, Amsterdam/Purmerend/Hoorn: Kaylen Guda (PharmD), Kristel Crommentuijn (PharmD).
Erasmus MC, Rotterdam: Betul Dilek (BSc), Freija Hogenhuis (PharmD).
Franciscus Gasthuis & Vlietland, Rotterdam: Suzanne van Dijk (MD).
Maasstad Hospital, Rotterdam: Tessa Bosch (PharmD), Lisanne Krens (PharmD), Kajie Liang (PharmD), Langeza Saleh (MD), Milou van Heuckelum (MSc).
Ommelander Hospital Groningen, Scheemda: Monique Slijfer (PharmD).
Zuyderland MC, Sittard-Geleen: Debbie Deben (PharmD), Kim Hurkens (MD), Dennis Wong (PharmD), Marion Vromen (MD).
Haga Ziekenhuis, Den Haag: Marieke Ezinga (PharmD), Kees van Nieuwkoop (MD), Loes Visser (PharmD), Liesbeth Bosma (PharmD).
Elisabeth TweeSteden ziekenhuis, Tilburg: Ebbie Boemaars (CPhT), Zahira Getrouw (PharmD), Barbara Maat (PharmD).
Máxima MC, Veldhoven: Luc Derijks (PharmD).
VieCuri Medical Centre, Venlo: Paddy Janssen (PharmD).
Streekziekenhuis Koningin Beatrix, Winterswijk: Arjan Bulsink (PharmD).
Isala, Zwolle: Peter ter Horst (PharmD).

Portugal

Egas Moniz Hospital, Lisboa: Margarida Falcao (PharmD), Helena Farinha (PharmD), Dina Mendes (PharmD), Joao Rijo (PharmD).
Hospital São Francisco Xavier, Lisboa: Joana Soares (PharmD), Fatima Falcao (PharmD), Mariana Solano (PharmD), Erica Viegas (PharmD).

Spain

Vall d'Hebron Hospital, Barcelona: Marta Miarons (PharmD), Maria Queralt Gorgas (PharmD).
University Hospital Infanta Sofía, San Sebastián de los Reyes: Cristina García Yubero (PharmD), Laura Portillo Horcajada (PharmD).

Switzerland

FHP Kantonsspital Aarau, Aarau: Kim Blum (Clinical Pharmacist).
Cantonal Hospital of Lucerne, Lucerne: Kim Keijzers (PharmD), Silke Lim (PharmD).

United Kingdom

Antrim Area Hospital, Antrim: Linden Ashfield (MSc), Helen Bell (PharmD), Naomi Fitzhugh (MPharm), Glenda Fleming (PhD), Nicola Goodfellow (MPharm), Joanne Hanley (BSc), Michael Scott (PhD).
Cleveland Clinic London, London: Francine de Stoppelaar (PharmD).
Norfolk and Norwich University NHS Foundation Trust, Norwich: Martyn Patel (PhD), Roisin Mc Menamin (MPharm).

Clinical Frailty Scale*



1 Very Fit – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.



2 Well – People who have **no active disease symptoms** but are less fit than category 1. Often, they exercise or are very **active occasionally**, e.g. seasonally.



3 Managing Well – People whose **medical problems are well controlled**, but are **not regularly active** beyond routine walking.



4 Vulnerable – While **not dependent** on others for daily help, often **symptoms limit activities**. A common complaint is being “slowed up”, and/or being tired during the day.



5 Mildly Frail – These people often have **more evident slowing**, and need help in **high order IADLs** (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.



6 Moderately Frail – People need help with **all outside activities** and with **keeping house**. Inside, they often have problems with stairs and need **help with bathing** and might need minimal assistance (cuing, standby) with dressing.



7 Severely Frail – **Completely dependent for personal care**, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).



8 Very Severely Frail – Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.



9. Terminally Ill - Approaching the end of life. This category applies to people with a **life expectancy <6 months**, who are **not otherwise evidently frail**.

Scoring frailty in people with dementia

The degree of frailty corresponds to the degree of dementia. Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderate dementia**, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In **severe dementia**, they cannot do personal care without help.

* 1. Canadian Study on Health & Aging, Revised 2008.
2. K. Rockwood et al. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005;173:489-495.

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