

Supplemental tables S1A-C showing codes and weights for Charlson Comorbidity Index, Elixhauser index, and the RxRisk index

Title: Current trends in comorbidities measured with Charlson comorbidity, Elixhauser, and RxRisk indices and associated mortality - a population-based cohort of 31,443 hip fracture patient

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Table S1A: ICD-10 codes and weights for Charlson Comorbidity Index

| Diseases | ICD-10 ¹⁰ | Weights original CCI ³ |
|------------------------------------|--|-----------------------------------|
| Myocardial infarction | I21;I22;I23 | 1 |
| Congestive heart failure | I50; I11.0; I13.0; I13.2 | 1 |
| Peripheral vascular disease | I70; I71; I72; I73; I74; I77 | 1 |
| Cerebrovascular disease | I60-I69; G45; G46 | 1 |
| Dementia | F00-F03; F05.1; G30 | 1 |
| Chronic pulmonary disease | J40-J47; J60-J67; J68.4; J70.1; J70.3; J84.1; J92.0; J96.1; J98.2; J98.3 | 1 |
| Rheumatic disease | M05; M06; M08; M09;M30;M31; M32; M33; M34; M35; M36; D86 | 1 |
| Peptic ulcer disease | K22.1; K25-K28 | 1 |
| Mild liver disease | B18; K70.0-K70.3; K70.9; K71; K73; K74; K76.0 | 1 |
| Diabetes Type 1 &2 | E10.0, E10.1; E10.9, E11.0; E11.1; E11.9 | 1 |
| Diabetes with chronic complication | E10.2-E10.8 E11.2-E11.8 | 2 |
| Hemiplegia or paraplegia | G81; G82 | 2 |
| Renal disease | I12, I13, N00-N05, N07, N11; N14; N17-N19; Q61 | 2 |
| Any tumor | C00-C75 | 2 |
| Leukemia | C91-C95 | 2 |
| Lymphoma | C81-C85; C88; C90; C96 | 2 |
| Moderate or severe liver disease | B15.0, B16.0, B16.2, B19.0; K70.4; K72; K76.6; I85 | 3 |
| Metastatic solid tumor | C76-C80 | 6 |
| AIDS/HIV | B21-B24 | 6 |

A few diseases appear in two different groups of different severity. When calculating the total index, only the most severe of these counts for each disease ({Diabetes Type 1 &2, Diabetes with chronic complication}, {Mild liver disease, Moderate or severe liver disease}, {Any tumor, Metastatic solid tumor}).”

Table S1B: ICD-10 codes and weights for Elixhauser Index

| Disease | ICD-10 | Weights in points |
|---|---|-------------------|
| Congestive heart failure | I09.9, I11.0, I13.0, I13.2, I25.5, I42.0, I42.5 - I42.9, I43.x, I50.x, P29.0 | 7 |
| Cardiac arrhythmias | I44.1 - I44.3, I45.6, I45.9, I47.x - I49.x, R00.0, R00.1, R00.8, T82.1, Z45.0, Z95.0 | 5 |
| Valvular disease | A52.0, I05.x - I08.x, I09.1, I09.8, I34.x - I39.x, Q23.0 - Q23.3, Z95.2 - Z95.4 | -1 |
| Pulmonary circulation disorders | I26.x, I27.x, I28.0, I28.8, I28.9 | 4 |
| Peripheral vascular disorders | I70.x, I71.x, I73.1, I73.8, I73.9, I77.1, I79.0, I79.2, K55.1, K55.8, K55.9, Z95.8, Z95.9 | 2 |
| Hypertension | I10.x, I11.x - I13.x, I15.x | 0 |
| Paralysis | G04.1, G11.4, G80.1, G80.2, G81.x, G82.x, G83.0 - G83.4, G83.9 | 7 |
| Other neurological disorders | G10.x - G13.x, G20.x - G22.x, G25.4, G25.5, G31.2, G31.8, G31.9, G32.x, G35.x - G37.x, G40.x, G41.x, G93.1, G93.4, R47.0, R56.x | 6 |
| Chronic pulmonary disease | I27.8, I27.9, J40.x - J47.x, J60.x - J67.x, J68.4, J70.1, J70.3 | 3 |
| Diabetes, uncomplicated | E10.0, E10.1, E10.9, E11.0, E11.1, E11.9, E12.0, E12.1, E12.9, E13.0, E13.1, E13.9, E14.0, E14.1, E14.9 | 0 |
| Diabetes, complicated | E10.2 - E10.8, E11.2 - E11.8, E12.2 - E12.8, E13.2 - E13.8, E14.2 - E14.8 | 0 |
| Hypothyroidism | E00.x - E03.x, E89.0 | 0 |
| Renal failure | I12.0, I13.1, N18.x, N19.x, N25.0, Z49.0 - Z49.2, Z94.0, Z99.2 | 5 |
| Liver disease | B18.x, I85.x, I86.4, I98.2, K70.x, K71.1, K71.3 - K71.5, K71.7, K72.x - K74.x, K76.0, K76.2 - K76.9, Z94.4 | 11 |
| Peptic ulcer disease, no bleeding | K25.7, K25.9, K26.7, K26.9, K27.7, K27.9, K28.7, K28.9 | 0 |
| AIDS/HIV | B20.x - B22.x, B24.x | 0 |
| Lymphoma | C81.x - C85.x, C88.x, C96.x, C90.0, C90.2 | 9 |
| Metastatic cancer | C77.x - C80.x | 12 |
| Solid tumor without metastasis | C00.x - C26.x, C30.x - C34.x, C37.x - C41.x, C43.x, C45.x - C58.x, C60.x - C76.x, C97.x | 4 |
| Rheumatoid arthritis/collagen vascular diseases | L94.0, L94.1, L94.3, M05.x, M06.x, M08.x, M12.0, M12.3, M30.x, M31.0 - M31.3, M32.x - M35.x, M45.x, M46.1, M46.8, M46.9 | 0 |
| Coagulopathy | D65 - D68.x, D69.1, D69.3 - D69.6 | 3 |
| Obesity | E66.x | -4 |
| Weight loss | E40.x - E46.x, R63.4, R64 | 6 |
| Fluid and electrolyte disorders | E22.2, E86.x, E87.x | 5 |
| Blood loss anemia | D50.0 | -2 |
| Deficiency anemia | D50.8, D50.9, D51.x - D53.x | -2 |
| Alcohol abuse | F10, E52, G62.1, I42.6, K29.2, K70.0, K70.3, K70.9, T51.x, Z50.2, Z71.4, Z72.1 | 0 |
| Drug abuse | F11.x - F16.x, F18.x, F19.x, Z71.5, Z72.2 | -7 |
| Psychosis | F20.x, F22.x - F25.x, F28.x, F29.x, F30.2, F31.2, F31.5 | 0 |
| Depression | F20.4, F31.3 - F31.5, F32.x, F33.x, F34.1, F41.2, F43.2 | -3 |

Table S1C: ACT codes and weights for RxRisk index

| Disease | ATC-codes | Weights |
|--------------------------------------|--|---------|
| Alcohol dependency | N07BB01-N07BB99 | 6 |
| Allergies | R01AC01-R01AD60,R06AD02-R06AX27, R06AB04 | -1 |
| Anticoagulants | B01AA03-B01AB06, B01AE07, B01AF01, B01AF02, B01AX05 | 1 |
| Antplatelets | B01AC04-B01AC30 | 2 |
| Anxiety | N05BA01-N05BA12, N05BE01 | 1 |
| Arrhythmia | C01AA05, C01BA01-C01BD01, C07AA07 | 2 |
| Benign prostatic hyperplasia | G04CA01-G04CA99, G04CB01, G04CB02* | 0 |
| Bipolar disorder | N05AN01 | -1 |
| Chronic airways disease | R03AC02-R03DC03, R03DX05 | 2 |
| Congestive heart failure | C03DA02-C03DA99, C07AB07, C07AG02, C07AB12 (C03CA01-C03CC01 and C09AA01-C09AX99, C09CA01-C09CX99)† | 2 |
| Dementia | N06DA02-N06DA04, N06DX01 | 2 |
| Depression | N06AA01-N06AG02, N06AX03-N06AX11, N06AX13-N06AX18, N06AX21-N06AX26 | 2 |
| Diabetes | A10AA01-A10BX99 | 2 |
| Epilepsy | N03AA01-N03AX99 | 0 |
| Glaucoma | S01EA01-S01EB03, S01EC03-S01EX99 | 0 |
| Gastroesophageal reflux disease | A02BA01-A02BX05 | 0 |
| Gout | M04AA01-M04AC01 | 1 |
| Hepatitis B | J05AF08, J05AF10, J05AF11 | NA |
| Hepatitis C | J05AB54, L03AB10, L03AB11, L03AB60, L03AB61, J05AE14, J05AE11-J05AE12, J05AX14, J05AX15, J05AX65, J05AB04 | NA |
| HIV | J05AE01-J05AE10, J05AF12-J05AG05, J05AR01-J05AR99, J05AX07-J05AX09, J05AX12, J05AF01-J05AF07, J05AF09 | 0 |
| Hyperkalaemia | V03AE01 | 4 |
| Hyperlipidaemia | A10BH03‡, C10AA01-C10BX09 | -1 |
| Hypertension | C03AA01-C03BA11, C03DB01, C03DB99, C03EA01, C09BA02-C09BA09, C09DA02-C09DA08, C02AB01-C02AC05, C02DB02- C02DB99 (C03CA01-C03CC01 or C09CA01- C09CX99)§ | -1 |
| Hyperthyroidism | H03BA02, H03BB01 | 2 |
| Hypothyroidism | H03AA01-H03AA02 | 0 |
| Irritable bowel syndrome | A07EC01-A07EC04, A07EA01-A07EA02, A07EA06, L04AA33 | 0 |
| Ischaemic heart disease angina | C01DA02-C01DA14, C01DX16, C08EX02 | 2 |
| Ischaemic heart disease hypertension | C07AA01-C07AA06, C07AA08-C07AB01, C07AB02, C07AG01, C08CA01-C08DB01, C09DB01-C09DB04, C09DX01, C09BB02-C09BB10, C07AB03, C09DX03, C10BX03** | -1 |
| Incontinence | G04BD01-G04BD99 | 0 |
| Inflammation/pain | M01AB01-M01AH06 | -1 |
| Liver failure | A06AD11, A07AA11 | 3 |
| Malignancies | L01AA01-L01XX41 | 2 |
| Malnutrition | B05BA01-B05BA10 | 0 |
| Migraine | N02CA01-N02CX01 | -1 |
| Osteoporosis/pagets | M05BA01-M05BB05, M05BX03, M05BX04, G03XC01, H05AA02 | -1 |
| Pain | N02AA01-N02AX02, N02AX06, N02AX52, N02BE51 | 3 |
| Pancreatic insufficiency | A09AA02 | 0 |
| Parkinson's disease | N04AA01-N04BX02 | 3 |
| Psoriasis | D05AA01-D05AA99, D05BB01 D05BB02, D05AX02, D05AC01-D05AC51, D05AX52 | 0 |
| Psychotic illness | N05AA01-N05AB02, N05AB06-N05AL07, N05AX07-N05AX13 | 6 |
| Pulmonary hypertension | C02KX01-C02KX05 | 6 |
| Renal disease | B03XA01-B03XA03, A11CC01-A11CC04, V03AE02, V03AE03, V03AE05 | 6 |
| Smoking cessation | N07BA01-N07BA03, N06AX12 | 6 |
| Steroid-responsive disease | H02AB01-H02AB10 | 2 |
| Transplant | L04AA06, L04AA10, L04AA18, L04AD01, L04AD02 | 0 |
| Tuberculosis | J04AC01-J04AC51, J04AM01-J04AM99 | NA |

*Benign prostatic hyperplasia medicines are tested for sex —must be male. Females suffering from bladder obstructions can be prescribed medicines used to treat benign prostatic hyperplasia.

†Must have at least two medicines prescribed with one of those medicines having an ATC code from C03CA01-C03CC01 and the other having an ATC code from either C09AA01-C09AX99 or C09CA01-C09CX99.

‡Combination product for hyperlipidemia and diabetes.

§Can have medicine dispensed with an ATC code C03CA01-C03CC01 or C09AA01-C09AX99, but not both, as this would indicate chronic heart failure

**Combination product for hyperlipidemia and ischaemic heart disease: hypertension.

N/A, not applicable

Supplemental Table S2 showing baseline characteristics for patients with hip fracture overall and according to comorbidity level measured with Charlson Comorbidity, Elixhauser, and RxRisk indices

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Table S2: Baseline characteristics for patients with hip fracture overall and according to comorbidity level measured with Charlson Comorbidity, Elixhauser, and RxRisk indices

| | Overall % | (n) | Charlson Comorbidity Index | | | | Elixhauser Index | | | | RxRisk Index | | | | | | | | |
|----------------------------------|-----------|----------|----------------------------|----------------------|--------------------|-------------------------|------------------|----------------------|--------------------|-------------------------|----------------|----------------------|--------------------|-------------------------|--|--|--|--|--|
| | | | No comorbidity | Moderate comorbidity | Severe comorbidity | Very severe comorbidity | No comorbidity | Moderate comorbidity | Severe comorbidity | Very severe comorbidity | No comorbidity | Moderate comorbidity | Severe comorbidity | Very severe comorbidity | | | | | |
| | | | 0 points | 1 point | 2 points | ≥3 points | ≤0 points | 1-5 points | 6-13 points | ≥14 points | ≤0 points | 1-3 points | 4-6 points | ≥7 points | | | | | |
| | | | 37.7% N=11,862 | 23.2% N=7,301 | 18.0% N=5,653 | 21.1% N=6,627 | 44.0% N=13,951 | 24.7% N=7,761 | 21.6% N=6,800 | 9.3% N=2,931 | 28.1% N=8,833 | 31.0% N=9,753 | 21.5% N=6,775 | 19.3% N=6,082 | | | | | |
| Age, % (n) | | | | | | | | | | | | | | | | | | | |
| 65-74 years | 21.4 | (6,715) | 23.2 (2,750) | 19.1 (1,398) | 20.0 (1,129) | 21.7 (1,438) | 23.0 (3,204) | 18.4 (1,426) | 20.6 (1,398) | 23.4 (687) | 25.2 (2,223) | 19.8 (1,930) | 18.9 (1,283) | 21.0 (1,279) | | | | | |
| 75-84 years | 36.3 | (11,426) | 33.6 (3,980) | 36.5 (2,667) | 37.3 (2,107) | 40.3 (2,672) | 34.9 (4,868) | 35.7 (2,772) | 38.1 (2,593) | 40.7 (1,193) | 35.8 (3,166) | 34.5 (3,369) | 36.9 (2,497) | 39.4 (2,394) | | | | | |
| ≥85 years | 42.3 | (13,302) | 43.3 (5,132) | 44.3 (3,236) | 42.8 (2,417) | 38.0 (2,517) | 42.1 (5,879) | 45.9 (3,563) | 41.3 (2,809) | 35.9 (1,051) | 39.0 (3,444) | 45.7 (4,454) | 44.2 (2,995) | 39.6 (2,409) | | | | | |
| Sex, % (n) | | | | | | | | | | | | | | | | | | | |
| Male | 30.6 | (9,630) | 24.8 (2,940) | 29.2 (2,130) | 33.3 (1,881) | 40.4 (2,679) | 25.0 (3,490) | 30.7 (2,384) | 36.7 (2,494) | 43.1 (1,262) | 28.6 (2,525) | 30.5 (2,979) | 31.8 (2,152) | 32.5 (1,974) | | | | | |
| Female | 69.4 | (21,813) | 75.2 (8,922) | 70.8 (5,171) | 66.7 (3,772) | 59.6 (3,948) | 75.0 (10,461) | 69.3 (5,377) | 63.3 (4,306) | 56.9 (1,669) | 71.4 (6,308) | 69.5 (6,774) | 68.2 (4,623) | 67.5 (4,108) | | | | | |
| Fracture type | | | | | | | | | | | | | | | | | | | |
| Medial fracture | 54.4 | (17,094) | 54.8 (26,083) | 54.0 (28,087) | 54.6 (28,877) | 53.7 (28,376) | 55.6 (25,246) | 53.7 (27,846) | 53.2 (28,262) | 53.1 (30,069) | 55.7 (27,526) | 53.0 (26,859) | 54.3 (28,344) | 54.8 (28,694) | | | | | |
| Lateral fracture | 45.6 | (14,349) | 45.2 (5360) | 46.0 (3,356) | 45.4 (2,566) | 46.3 (3,067) | 44.4 (6,197) | 46.3 (3,597) | 46.8 (3,181) | 46.9 (1,374) | 44.3 (3,917) | 47.0 (4,584) | 45.7 (3,099) | 45.2 (2,749) | | | | | |
| Cohabitant status, % (n) | | | | | | | | | | | | | | | | | | | |
| Living alone | 61.7 | (19,386) | 61.4 (7,283) | 64.9 (4,737) | 62.7 (3,547) | 57.6 (3,819) | 61.3 (8,548) | 64.0 (4,967) | 60.8 (4,134) | 59.3 (1,737) | 57.7 (5,100) | 62.0 (6,043) | 63.4 (4,298) | 64.9 (3,945) | | | | | |
| Living together | 38.3 | (12,057) | 38.6 (4,579) | 35.1 (2,564) | 37.3 (2,106) | 42.4 (2,808) | 38.7 (5,403) | 36.0 (2,794) | 39.2 (2,666) | 40.7 (1,194) | 42.3 (3,733) | 38.0 (3,710) | 36.6 (2,477) | 35.1 (2,137) | | | | | |
| Level of education, % (n) | | | | | | | | | | | | | | | | | | | |
| Elementary school (7 years) | 51.0 | (16,027) | 50.7 (6,016) | 51.9 (3,786) | 50.6 (2,858) | 50.8 (3,367) | 50.7 (7,080) | 52.0 (4,033) | 50.8 (3,454) | 49.8 (1,460) | 47.6 (4,203) | 50.3 (4,904) | 52.6 (3,561) | 55.2 (3,359) | | | | | |
| More than elementary school | 30.9 | (9,723) | 29.6 (3,516) | 30.3 (2,213) | 32.1 (1,812) | 32.9 (2,182) | 30.6 (4,272) | 30.0 (2,331) | 31.6 (2,149) | 33.1 (971) | 32.5 (2,873) | 30.7 (2,999) | 30.4 (2,060) | 29.4 (1,791) | | | | | |
| University degree | 11.6 | (3,637) | 12.2 (1,443) | 11.1 (813) | 11.1 (630) | 11.3 (751) | 11.9 (1,663) | 11.0 (856) | 11.3 (771) | 11.8 (347) | 13.6 (1,205) | 11.8 (1,148) | 10.4 (703) | 9.6 (581) | | | | | |
| Unknown | 6.5 | (2,056) | 7.5 (887) | 6.7 (489) | 6.2 (353) | 4.9 (327) | 6.7 (936) | 7.0 (541) | 6.3 (426) | 5.2 (153) | 6.2 (552) | 7.2 (702) | 6.7 (451) | 5.8 (351) | | | | | |
| Household income, % (n) | | | | | | | | | | | | | | | | | | | |
| Low | 28.3 | (8,884) | 30.1 (3,570) | 28.5 (2,084) | 28.0 (1,581) | 24.9 (1,649) | 29.1 (4,059) | 29.0 (2,248) | 27.3 (1,854) | 24.7 (723) | 27.7 (2,443) | 28.6 (2,788) | 28.1 (1,905) | 28.7 (1,748) | | | | | |
| Medium | 57.5 | (18,088) | 54.7 (6,492) | 58.8 (4,295) | 57.9 (3,272) | 60.8 (4,029) | 56.3 (7,855) | 57.7 (4,478) | 58.4 (3,968) | 61.0 (1,787) | 54.5 (4,811) | 57.3 (5,584) | 59.4 (4,024) | 60.3 (3,669) | | | | | |
| High | 14.2 | (4,471) | 15.2 (1,800) | 12.6 (922) | 14.2 (800) | 14.3 (949) | 14.6 (2,037) | 13.3 (1,035) | 14.4 (978) | 14.4 (421) | 17.9 (1,579) | 14.2 (1,381) | 12.5 (846) | 10.9 (665) | | | | | |
| Body Mass Index, % (n) | | | | | | | | | | | | | | | | | | | |
| 10-19.9 | 13.0 | (4,083) | 12.1 (1,439) | 14.0 (1,019) | 13.7 (775) | 12.8 (850) | 11.4 (1,596) | 13.6 (1,052) | 14.7 (998) | 14.9 (437) | 11.8 (1,039) | 12.7 (1,241) | 13.9 (940) | 14.2 (863) | | | | | |
| 20-24.9 | 39.6 | (12,450) | 41.7 (4,951) | 39.4 (2,876) | 39.0 (2,204) | 36.5 (2,419) | 40.6 (5,662) | 39.1 (3,038) | 39.2 (2,665) | 37.0 (1,085) | 41.4 (3,661) | 40.0 (3,906) | 38.7 (2,619) | 37.2 (2,264) | | | | | |
| 25-29.9 | 21.8 | (6,866) | 22.7 (2,690) | 20.5 (1,496) | 21.5 (1,213) | 22.1 (1,467) | 23.0 (3,211) | 21.3 (1,653) | 20.3 (1,380) | 21.2 (622) | 22.6 (1,992) | 21.9 (2,135) | 21.4 (1,451) | 21.2 (1,288) | | | | | |
| 30-51 | 6.8 | (2,133) | 6.4 (758) | 6.4 (467) | 6.4 (360) | 8.3 (548) | 6.9 (966) | 6.6 (514) | 6.3 (431) | 7.6 (222) | 6.2 (547) | 6.9 (672) | 6.9 (466) | 7.4 (448) | | | | | |
| Missing | 18.8 | (5,911) | 17.1 (2,024) | 19.8 (1,443) | 19.5 (1,101) | 20.3 (1,343) | 18.0 (2,516) | 19.4 (1,504) | 19.5 (1,326) | 19.3 (565) | 18.0 (1,594) | 18.4 (1,799) | 19.2 (1,299) | 20.0 (1,219) | | | | | |
| Residence, % (n) | | | | | | | | | | | | | | | | | | | |
| Own home | 69.5 | (21,864) | 75.3 (8,938) | 65.4 (4,775) | 67.1 (3,791) | 65.8 (4,360) | 72.2 (10,075) | 68.9 (5,351) | 65.9 (4,481) | 66.8 (1,957) | 81.3 (7,183) | 72.7 (7,089) | 64.7 (4,383) | 52.8 (3,209) | | | | | |
| Nursing home | 21.6 | (6,796) | 16.7 (1,979) | 26.0 (1,899) | 23.6 (1,335) | 23.9 (1,585) | 19.6 (2,730) | 22.4 (1,735) | 24.4 (1,660) | 22.9 (671) | 10.3 (909) | 18.3 (1,784) | 26.2 (1,773) | 38.3 (2,330) | | | | | |
| Missing | 8.9 | (2,783) | 8.0 (945) | 8.6 (627) | 9.3 (527) | 10.3 (684) | 8.2 (1,146) | 8.7 (675) | 9.7 (659) | 10.3 (303) | 8.4 (741) | 9.0 (880) | 9.1 (619) | 8.9 (543) | | | | | |

