Association of frailty in the elderly in primary care with morbidity and mortality

Asociación de fragilidad en ancianos en atención primaria con morbimortalidad

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Abstract

Introduction: The elderly population are the largest users of hospital care. However, they are not a homogeneous population and some are frail.
Objective: To assess the value of using predictive frailty measures in the elderly.
Methods: A cohort study was conducted with 380 community-dwelling elderly receiving primary care at home.
Results: The following variables were associated with mortality: CFS (HR) 5.9 (95 % CI 3.1 to 11.2); EQ-5D - HR 6.3 (95 % CI 2.1 to 18.6); EQ-VAS - HR 7.0 (95 % CI 2.3 to 20.9).
Conclusions: simple measures of physical health, mental health and general frailty are strong predictors of mortality, hospitalization and AAR.
Keywords: elderly, primary care, frailty, mortality, hospitalization Source :DeCS
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Resumen
Introducción:La población anciana son los mayores usuarios de la atención hospitalaria. Sin embargo, no son una población homogénea y algunos son frágiles.
Objetivo: Evaluar el valor del uso de medidas de fragilidad predictoras en ancianos.
Método: Se realizó un estudio de cohorte con 380 personas mayores que vivían en la comunidad y recibían atención primaria en el hogar.
Resultados:Las siguientes variables se asociaron con mortalidad: CFS (CR) 5,9 (IC del 95 %: 3,1 a 11,2); EQ-5D - CR 6,3 (IC del 95 %: 2,1 a 18,6); EQ-VAS - CR 7,0 (IC del 95 %: 2,3 a 20,9.
Conclusiones:las medidas simples de salud física, salud mental y fragilidad general son predictores fuertes de mortalidad, hospitalización y TAA.
Palabras clave: ancianos, atención primaria, fragilidad, mortalidad, hospitalización Fuente :DeCS

Introduction

The elderly population is the largest hospital and nursing home care users for all adult age groups. However, they are not a homogeneous population and some are frail[1]. Two main models of frailty have been described. The frailty phenotype model has been characterized by unintentional weight loss, reduced muscle mass and strength, reduced gait speed, fatigue, and low energy expenditure. The second model of frailty is the cumulative deficit model,which characterizes frailty as an accumulation of deficits caused by disease, injury, and aging[2].

Both models describe a frailty syndrome characterized by loss of homeostatic reserve and increased vulnerability to adverse outcomes following seemingly minor illness, injury or medication changes. The frail elderly group has the highest risk of death as well as a variety of conditions that can compromise their quality of life, lead to hospitalization (H), loss of independence and transfer to a nursing home (TAA)[3]. The prevalence of frailty is estimated to be 14 % for ages >65, 30 % for ages 80 to 90 and 50 % for ages >90. Despite the increasing burden of frailty in aging populations, there have been difficulties in targeting this group in primary care. It can be challenging to objectively distinguish the frail group from healthy older people and quantify their level of risk[4]. Despite several well-validated tools, few frailty measures are used in routine medical care. In addition, health risks in this population are generally poorly estimated from the presence and severity of chronic medical diagnoses alone[2].

The present study was initiated to improve health care for the elderly by introducing valid, reliable, and responsive measures of health status and frailty into routine primary care. The measures selected would be (1) easy to administer, (2) clinically useful for individual patient care, and (3) helpful in evaluating program-level interventions. A battery of physical, mental, and quality-of-life measures selected from the literaturewas tested,finding that (1) the assessment could be completed in less than 60 minutes by a trained nurse, and (3) the test was acceptable to older people with 89% reporting that it was relevant to their health and that they would be prepared to repeat it[5].

In May 2019, researchers began administering the assessment to all individuals in the primary care geriatric practice. This study reports predictors of death, AAR, and hospitalization after the first 18 months of follow-up.

Method

A cohort study included all 380 community-dwelling older persons receiving home-based primary care from an interdisciplinary geriatric medical practice in Ambato between May 1, 2019, and October 30, 2020. Eligibility criteria for entry into this practice included (1) age > 70 years, (2) difficulty accessing office-based care, (3) presence of a frailty syndrome (e.g., dementia, falls, and chronic pain), and (4) multiple comorbidities and need for complex interdisciplinary medical care. This study was approved by the Universidad Regional Autónoma de Los Andes (UNIANDES).

Demographic data, medications, laboratory values, and medical diagnoses were extracted from the electronic medical record (EHR). In addition, medical diagnoses were manually audited and extracted from a medical history text box that is part of the EHR.

General frailty was measured with the Clinical Frailty Scale (CFS)[6] using the following level criteria: Level < 3 - well +/- asymptomatic chronic disease, Level 4 - chronic or slowed symptoms, Level 5 - dependent in any instrumental activity of daily living (IADL), Level 6 - dependent in at least one basic activity of daily living (BADL) or requiring assistance with stairs and Level 7 - complete dependence in IADL and BADL. The EuroQol EQ-5D-5L summary index (EQ-5D), administered by interview, was used to measure health-related quality of life (HRQoL)[7]. The EQ-5D uses a time trade-off method to establish population norms for how people rate their health. Scores range from negative 0.148 (health status worse than death) to 0.949 (their best possible health status). The EuroQol 100-point vertical visual analog scale (EQ-VAS) was used to measure self-reported health. It is scored from 0 - 'The worst health you can imagine' to 100 - 'the best health you can imagine' [8].

Depression was assessed with the 5-item Geriatric Depression Scale (GDS)[9]. The Mini-Nutritional Assessment Short Form (MNA-SF),[10] was used to assess nutritional risk. Due to the high prevalence of edema, only body mass index and not calf circumference were used for the MNA-SF. The 3-m walking speed (gait speed) was performed with the subjects' usual walking aid and they were asked to walk at a comfortable pace. Walking speed was measured from the average of the second and third tests and reported in meters/second (m/s). Grip strength (Grip force) in kg was measured with a dynamometer using the dominant or stronger hand with the patient seated with feet on the floor. An average of three trials was used. The 3-ounce water swallow test (PDA) was used to assess dysphagia and risk of aspiration. Failure was the inability to drink it all without stopping, coughing while drinking, or having a wet voice when finished. Blood pressure (BP) was measured sitting and standing with a sphygmomanometer, and the difference was recorded. All questionnaires were conducted by interview.

All charts were audited by electronic EHR query for practice discharge, death, and AAR dates. The nurses who performed the assessment were not involved in collecting outcome data.

The database and statistical processing of the data were performed and analyzed in the SPSS 26 statistical program (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used for the results collection, presentation, and interpretation, and the significance level was set at 0.05 to consider a result significant. Bilateral t-tests were used for continuous data and X-tests^2 with Yates correction for categorical data. Fisher's exact test was used if there were fewer than six observations in a cell. Cox proportional hazards stepwise regression was used for multivariate analysis.

Results

All 380 individuals in practice between May 1, 2019, and October 31, 2020, were included in the analysis. The average test administration rate was 85.9% (80% to 100%) for the nine main health status measures. The population's mean (SD) age was 88.4 (6.5), 72.4% were female, and 41.2% lived in supportive housing. The mean CFS score was 5.6 (0.8), with 60.5% at levels 6 to 7. The mean gait speed was less than 0.8 m/s, at 0.59 (0.3), indicating that this population was at increased risk for falls and death. Mean MNA-SF was 11.8 (2.1), with 5.2 % scoring in the malnutrition range (<8) and 31.8 % in the high-risk range (9 to 11). Multiple comorbidities were found in 85.3% of individuals and a mean of 6.0 (3.2) drugs were prescribed.

Follow-up data for all 380 individuals was completed. The total observation period was 18 months, with a mean of 10.0 (5.5) months. There were 39 (10.3 %) deaths, 48 (12.6 %) HAART and 93 (24.5 %) persons admitted to the hospital during the 18 months of follow-up.

The following variables were significantly associated with death: CFS - hazard ratio (HR) 5.9 (95 % CI 3.1 to 11.2); EQ-5D - HR 6.3 (95 % CI 2.1 to 18.6); EQ-VAS - HR 7.0 (95 % CI 2.3 to 20.9); Gait speed: HR 5.9 (95 % CI 1.8 to 19.3); Grip strength: HR 10.5 (95 % CI: 3.7 to 30.3); MNA-SF - HR 8.4 (95 % CI: 1.9 to 37.8); Hemoglobin (Hgb) - HR 8.3 (95 % CI: 3.1 to 22.3); Estimated Glomerular Filtration Rate (eGFR) - HR 5.7 (95 % CI: 2.3 to 13.9); Heart Disease - HR 3.7 (95 % CI: 1.9 to 7.1) and Cancer - HR 2.7 (95 % CI: 1.0 to 7.1).

AAR was significantly associated with: CFS - HR 6.0 (95 % CI 3.4 to 10.7); EQ-5D - HR 3.2 (95 % CI 1.3 to 7.8); EQ-VAS - 3.4 (95 % CI 1.2 to 9.4); Gait speed - HR 8.5 (95 % CI 3.2 to 22.8); Grip strength - HR 10.6 (95 % CI: 3.6 to 31.5); MNA-SF - HR 12.5 (CI could not be calculated because there were no events in the Q5 group); Failed PDA - HR 2.7 (95% CI: 1.0 to 7.4); MDC - HR 4.6 (95% CI: 1.8 to 11.5) and AE - HR 3.2 (95% CI: 1.6

to 6.7). None of the medical diagnoses or laboratory values besides Dementia - HR 5.7 (95% CI 3.2 to 10.4) or Mood Disorder - HR 2.3 (95% CI 1.3 to 4.0) were associated with an increased risk of AAD.

Hospitalization was significantly associated with: CFS - HR 2.9 (95 % CI: 1.9 to 4.4); EQ-5D - HR 2.9 (95 % CI: 1.5 to 5.9); EQ-VAS - HR 6.7 (95 % CI: 3.2 to 14.0); AE - HR 2.5 (95 % CI: 1.2 to 5.1); Gait velocity - HR 11.1 (95 % CI: 5.5 to 22.4); Hgb - HR 2.3 (95 % CI: 1.1 to 4.5); eGFR - HR 2.5 (95 % CI: 1.3 to 4.7); Heart disease: HR 2.5 (95 % CI: 1.6 to 3.8); Arthrosis/Chronic pain: HR 1.6 (95 % CI 1.1 to 2.4), Multiple comorbidities: HR 4.0 (95 % CI 2.3 to 7.0) and Number of drugs: HR 6.1 (95 % CI 2.9 to 12.7).

Multivariate analysis using the Cox proportional hazards model was used to calculate the adjusted hazard ratio (aHR) (Table 1). Death was independently associated with: CFS (aCR 2.88, 95 % CI 1.23 to 6.68); EQ-VAS (aCR 0.96, 95 % CI 0.93 to 0.98); eGFR (aCR 0.97, 95 % CI 0.95 to 1.00) and Hgb (aCR 0.97, 95 % CI 0.94 to 0.99). The p-value for the model was <0.001. NHT was independently associated with: gait speed (aCR 0.13, 95% CI 0.03 to 0.57); AD (aCR 1.39, 95% CI 1.07 to 1.82) and Dementia (aCR 4.61, 95% CI 1.86 to 11.44). CFS was not statistically significant in this model when gait speed was added. The p-value for the overall model was <0.001. Hospitalization was associated with CFS (aCR 1.75, 95% CI 1.21 to 2.51); EQ-VAS (aCR 0.98, 95% CI 0.96 to 0.99). The p-value for the overall model was <0.001.

Table 1. Multivariate analysis: Cox proportional hazards model.

Variable	Unadjusted Hazard Ratio (95 % CI)	Valueof p	Adjusted Hazard Ratio * (95 % CI)	Valueof p
Clinicalfrailtyscale	3,50 (2,15 a 5,71)	<0.001	2,88 (1,23 a 6,68)	0.014
EuroQol-EVA	0,96 (0,95 a 0,98)	<0.001	0,96 (0,93 a 0,98)	<0.001
Hemoglobin	0,97 (0,95 a 0,99)	<0.001	0,97 (0,94 a 0,99)	0.02
Years	1,07 (1,01 a 1,12)	<0.01	1,10 (1,02 a 1,18)	0.02
Walkingspeed	0,10 (0,03 a 0,31)	<0.001	0,13 (0,03 a 0,57)	0.01
GeriatricDepressionScale	1,55 (1,25 a 1,91)	<0.001	1,39 (1,07 a 1,82)	0.01
Diagnosis ofdementia	5,75 (2,99 a 11,06)	<0.001	4,61 (1,86 a 11,44)	0.001
Clinicalfrailtyscale	2,04 (1,54 a 2,71)	<0.001	1,75 (1,21 a 2,51) CR	0.003

Source: statistical analysis *Adjusted for age, sex, multiple comorbidities, number of drugs and variables in the final model.

The 53 respondents (13.9 %) who did not respond were significantly more frail (mean CFS 6.0 ± 0.8 vs. 5.5 ± 0.8) and were more likely to have a diagnosis of dementia compared to responders (n = 31 (58.5 %) vs. 109 (33.3 %). All three outcomes were the most common in non-respondents.

Discussion

This study demonstrates that for an elderly population, simple tests of general frailty (PSFG), physical health (Gaitspeed and MNA-SF) and self-reported HRQoL/general health (EQ-5D and EQ-VAS) strongly predicted the risk of death, OAD and hospitalization. In addition, measures of cognitive impairment (MDC), mood (EA) and dysphagia (PDA) predicted the risk of HAART. Polypharmacy (number of drugs) and multiple comorbidities, considered markers of geriatric risk, predicted hospitalization but not death or HAT.

Frailty measures appeared to be stronger predictors of death than chronic disease diagnoses. These findings are consistent with other studies examining the relationship between functional impairment, chronic disease, health outcomes, and mortality[11]. For traditional medical diagnosis categories, heart disease and cancer were more weakly associated with death than frailty measures. Dementia and mood disorder predicted TAA. Heart disease and osteoarthritis/chronic pain weakly predicted hospitalization. Low eGFR and hemoglobin were exceptions, strongly predicted death and less strongly predicted hospitalization.

The high-risk and low-risk groups were separated early and the HRs were clinically and statistically significant within 12 months. For example, the median survival for CFS level 7 was 13 months, similar to stage 4 lung cancer and significantly lower than for people with metastatic breast cancer or prostate cancer(12). Therefore, prognostic information from these tests can be extremely valuable for patients and their families to decide on the intensity of medical interventions they desire and the need for community and institutional support. These findings also show that frailty is not an "all or nothing" risk phenomenon but exists along a continuum.

There is overlap in what these tests measure, which includes: function and symptoms (CFS/EQ-5D); physical problems (EQ-5D, MNA-SF); and mental health problems (EQ-5D, EA and MNA-SF). It is tempting to rely on a measure such as the CFS that ranks frailty and strongly predicts adverse outcomes. However, it does not inform us about an individual's mood, cognitive function, strength, gait and balance, health-related quality of life (HRQoL), chronic symptoms, swallowing problems, or nutritional risk. In addition to measuring unique dimensions of health status, these tests can change over time and be modifiable risk markers. For example, while it is unusual for people with chronic frailty to improve to a better CFS level, there is evidence that these tests EQ-5D, EQ-VAS, Gaitspeed, Gripstrength, MNA-SF responds to changes in health and minimally important clinical differences have been established(13,14). Therefore, repeat testing of these tests may help evaluate interventions (e.g., a medication change or rehabilitation treatment) for individual patients and for evaluating aggregate changes for a program. These data will be used to evaluate the next interdisciplinary team's interventions for individuals and to aggregate before and after data to evaluate the program.

Reduced HRQoL at baseline, as measured by the EQ-5D, was a strong risk factor for adverse outcomes. These findings are consistent with other studies for general and elderly populations(15). Arguably, HRQoL is not only a risk factor but one of the most important outcome measures and goals of care for the elderly. The EQ-5D is the only test that can be complex to use and interpret. It requires using population norms and conversion to a summary index that can be freely interpreted to assess how people rate their current health status(16,17). The EQ-VAS, which uses a 100-point vertical visual analog scale for general health, was an elementary test and a strong predictor for all outcomes. Our study's EQ-VAS and EQ-5D scores were remarkably similar, with a correlation coefficient of 0.48 $p<0.001$. Thus, it may be possible to use the EQ-VAS as a surrogate measure of HRQoL when software or population norms for the EQ-5D are not readily available. The population was compared to demonstrate that when HRQoL measured by EQ-5D and EQ-VAS falls below 0.7/70 (quintile 1), the risk of death, AAR and hospitalization increase significantly(18).

A trained nurse administered these tests, but all or part of the assessment could easily be administered by any trained team member. The cost of administering the entire assessment was 1 hour of nursing time. This is less expensive than a typical battery of blood tests or scans performed for a geriatric assessment. Administration of most individual tests took less than 5 to 10 minutes.

The bivariate analyses show that not all older people need a complete evaluation. Furthermore, the mean test values were mainly in the normal range for CFS <5. Therefore, older people may be screened initially with the CFS and if the level is >5, more comprehensive testing could be performed.

The strengths of this study are the inclusion of a large number of very elderly and frail individuals, the high rates of test administration, and the thorough follow-up of results. The pragmatic nature of this "usual care" study with assessments performed by practice nurses adds to its generalizability. The tests used have been well studied and be valid, reliable, and responsive across populations, for different diseases, and in different clinical settings[19,20]. The unique aspect of this study is to use these health status tests to measure multiple health domains, including HRQoL, in a primary care setting and aggregate the results to predict adverse outcomes. There was a relatively low nonresponse rate to frailty testing, confirming that this assessment is well tolerated and acceptable to most frail older people in a practice setting.

Limitations of this study are that the results, including absolute risks and time to event, may not be generalizable to groups of "younger elderly" or non-elderly populations with disabilities.

Conclusions

For an elderly population, simple measures of physical health, mental health, HRQoL, and general frailty, administered as part of routine medical care, are stronger predictors of mortality, hospitalization, and AAR than traditional medical diagnoses. Therefore, the incorporation of these measures into routine medical care should be considered.

References

1. Song X, Mitnitski A, Rockwood K. Prevalence and 10-year outcomes of frailty in older adults in relation to deficit accumulation. J Am GeriatrSoc [Internet]. abril de 2010;58(4):681-7. Disponible en: https://pubmed.ncbi.nlm.nih.gov/20345864/
2. Kojima G. Frailty as a predictor of disabilities among community-dwelling older people: a systematic review and meta-analysis. DisabilRehabil [Internet]. septiembre de 2017 [citado 8 de julio de 2022];39(19):1897-908. Disponible en: https://pubmed.ncbi.nlm.nih.gov/27558741/
3. Reeves D, Pye S, Ashcroft DM, Clegg A, Kontopantelis E, Blakeman T, et al. The challenge of ageing populations and patient frailty: can primary care adapt? BMJ [Internet]. 28 de agosto de 2018 [citado 8 de julio de 2022];362:k3349. Disponible en: https://pubmed.ncbi.nlm.nih.gov/30154082/
4. Gale CR, Cooper C, Sayer AA. Prevalence of frailty and disability: findings from the English Longitudinal Study of Ageing. Age Ageing [Internet]. enero de 2015 [citado 6 de julio de 2022];44(1):162-5. Disponible en: https://pubmed.ncbi.nlm.nih.gov/25313241/
5. Cheung A, Haas B, Ringer TJ, McFarlan A, Wong CL. Canadian Study of Health and Aging Clinical Frailty Scale: Does It Predict Adverse Outcomes among Geriatric Trauma Patients? J Am Coll Surg [Internet]. noviembre de 2017 [citado 8 de julio de 2022];225(5):658-665.e3. Disponible en: https://pubmed.ncbi.nlm.nih.gov/28888692/
6. Rockwood K, Song X, MacKnight C, Bergman H, Hogan DB, McDowell I, et al. A global clinical measure of fitness and frailty in elderly people. CMAJ [Internet]. 30 de agosto de 2005 [citado 9 de julio de 2022];173(5):489-95. Disponible en: https://pubmed.ncbi.nlm.nih.gov/16129869/
7. Xie F, Pullenayegum E, Gaebel K, Bansback N, Bryan S, Ohinmaa A, et al. A Time Trade-off-derived Value Set of the EQ-5D-5L for Canada. Med Care [Internet]. enero de 2016 [citado 7 de julio de 2022];54(1):98-105. Disponible en: https://pubmed.ncbi.nlm.nih.gov/26492214/
8. Kim S, Won CW, Kim BS, Kim S, Yoo J, Byun S, et al. EuroQol Visual Analogue Scale (EQ-VAS) as a Predicting Tool for Frailty in Older Korean Adults: The Korean Frailty an Aging Cohort Study (KFACS). J NutrHealthAging [Internet].

2018 [citado 6 de julio de 2022];22(10):1275-80. Disponible en: https://pubmed.ncbi.nlm.nih.gov/30498837/

9. Hoyl MT, Alessi CA, Harker JO, Josephson KR, Pietruszka FM, Koelfgen M, et al. Development and testing of a five-item version of the Geriatric Depression Scale. J Am GeriatrSoc [Internet]. julio de 1999 [citado 7 de julio de 2022];47(7):873-8. Disponible en: https://pubmed.ncbi.nlm.nih.gov/10404935/
10. Helminen H, Luukkaala T, Saarnio J, Nuotio M. Comparison of the Mini-Nutritional Assessment short and long form and serum albumin as prognostic indicators of hip fracture outcomes. Injury [Internet]. abril de 2017 [citado 7 de julio de 2022];48(4):903-8. Disponible en: https://pubmed.ncbi.nlm.nih.gov/28249678/
11. Formiga F, Ferrer A, Padros G, Montero A, Gimenez-Argente C, Corbella X. Evidence of functional declining and global comorbidity measured at baseline proved to be the strongest predictors for long-term death in elderly community residents aged 85 years: a 5-year follow-up evaluation, the OCTABAIX study. Clin Interv Aging [Internet]. 2016 [citado 7 de julio de 2022];11:437-44. Disponible en: https://pubmed.ncbi.nlm.nih.gov/27143867/
12. Sweeney CJ, Chen YH, Carducci M, Liu G, Jarrard DF, Eisenberger M, et al. Chemohormonal Therapy in Metastatic Hormone-Sensitive Prostate Cancer. N Engl J Med [Internet]. 20 de agosto de 2015 [citado 17 de julio de 2022];373(8):737-46. Disponible en: https://pubmed.ncbi.nlm.nih.gov/26244877/
13. Van Abbema R, De Greef M, Crajé C, Krijnen W, Hobbelen H, Van Der Schans C. What type, or combination of exercise can improve preferred gait speed in older adults? A meta-analysis. BMC Geriatr [Internet]. 1 de julio de 2015 [citado 7 de julio de 2022];15:72. Disponible en: https://pubmed.ncbi.nlm.nih.gov/26126532/
14. Costa AS, Reich A, Fimm B, Ketteler ST, Schulz JB, Reetz K. Evidence of the sensitivity of the MoCA alternate forms in monitoring cognitive change in early Alzheimer's disease. DementGeriatrCognDisord [Internet]. 2014 [citado 8 de julio de 2022];37(1-2):95-103. Disponible en: https://pubmed.ncbi.nlm.nih.gov/24107412/
15. Nikolova S, Hulme C, West R, Pendleton N, Heaven A, Bower P, et al. Normative Estimates and Agreement Between 2 Measures of Health-Related Quality of Life in Older People With Frailty: Findings From the Community Ageing Research 75+ Cohort. ValueHealth [Internet]. agosto de 2020 [citado 1 de julio de 2022];23(8):1056-62. Disponible en: https://pubmed.ncbi.nlm.nih.gov/32828218/
16. Chong E, Ho E, Baldevarona-Llego J, Chan M, Wu L, Tay L, et al. Frailty in Hospitalized Older Adults: Comparing Different Frailty Measures in Predicting Short- and Long-term Patient Outcomes. J Am MedDirAssoc [Internet]. mayo de 2018 [citado 12 de julio de 2022];19(5):450-457.e3. Disponible en: https://pubmed.ncbi.nlm.nih.gov/29153536/
17. Maxwell CJ, Mondor L, Hogan DB, Campitelli MA, Bronskill SE, Seitz DP, et al. Joint impact of dementia and frailty on healthcare utilisation and outcomes: a retrospective cohort study of long-stay home care recipients. BMJ Open [Internet]. 21 de junio de 2019 [citado 9 de julio de 2022];9(6):e029523. Disponible en: https://pubmed.ncbi.nlm.nih.gov/31230032/
18. Maclagan LC, Maxwell CJ, Gandhi S, Guan J, Bell CM, Hogan DB, et al.

Frailty and Potentially Inappropriate Medication Use at Nursing Home Transition. J Am GeriatrSoc [Internet]. octubre de 2017 [citado 17 de julio de 2022];65(10):2205-12. Disponible en: https://pubmed.ncbi.nlm.nih.gov/28752589/

19. Sexton DJ, Lowney AC, O'Seaghdha CM, Murphy M, O'Brien T, Casserly LF, et al. Do patient-reported measures of symptoms and health status predict mortality in hemodialysis? An assessment of POS-S Renal and EQ-5D. Hemodial Int [Internet]. octubre de 2016 [citado 8 de julio de 2022];20(4):618-30. Disponible en: https://pubmed.ncbi.nlm.nih.gov/27198825/
20. Chua XY, Toh S, Wei K, Teo N, Tang T, Wee SL. Evaluation of clinical frailty screening in geriatric acute care. J Eval Clin Pract [Internet]. febrero de 2020 [citado 6 de julio de 2022];26(1):35-41. Disponible en: https://pubmed.ncbi.nlm.nih.gov/30632249/