



IV Jornada d'Atenció a la Gent Gran. La fragilitat

electronic-Screening Index of Frailty (e-SIF)

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- Les Guies de pràctica clínica internacionals recomanen cribratge de la fragilitat en poblacions d'edat avançada, especialment en l'àmbit de l'atenció primària.
- La càrrega de treball de metges i infermeres d'AP i la manca d'eines de cribratge acceptables són els principals obstacles per aquest cribratge.
- Les eines electròniques han generat gran interès, però encara presenten algunes limitacions (validació, criteris utilitzats, població destinatària, ...)

- Desenvolupar i validar una nova eina electrònica (e-SIF) que, utilitzant dades de salut electròniques que es recullen de forma rutinària i que estan disponibles, permeti identificar de forma automàtica i massiva l'estat de fragilitat en la població general de ≥ 65 anys.

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RESEARCH PAPER

Development and validation of the electronic screening index of frailty

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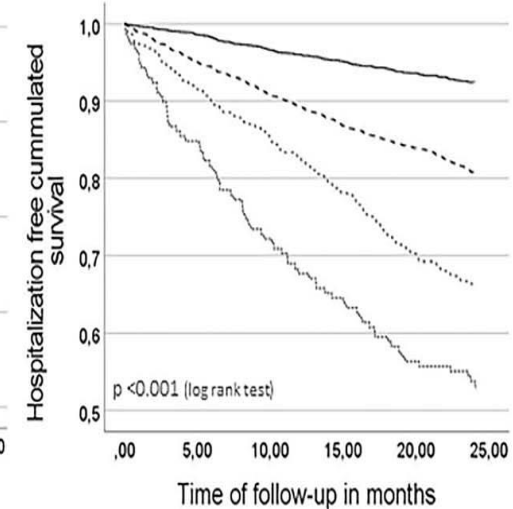
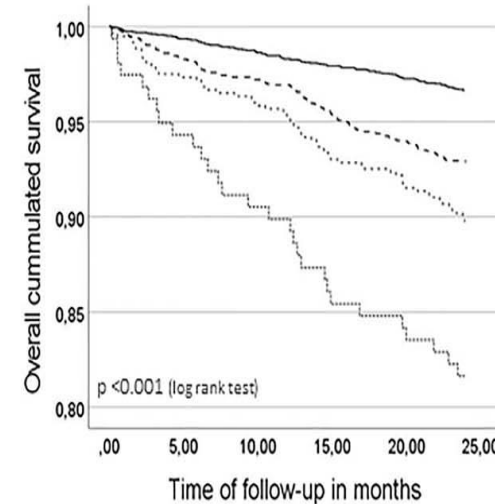
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- Model acumulació condicions clíniques
- Selecció de les condicions clíniques després d'una revisió de les eines i l'evidència existents. (42 condicions clíniques)
- Establiment de codis (CIM-10 i ATC), criteris i algoritmes per definir cada condició clínica.
- Creació de l'eina electrònica amb:
 - Identificació de les fonts d'informació
 - extracció automàtica de dades de les diverses fonts
 - transformació de dades (neteja i control de qualitat, pseudoanonimització)
 - càlcul de la puntuació e-SIF en un moment donat

Primera validació de l'e-SIF

- Estudi de cohorts (31/12/2017 a 31/12/2019)
- Recollida retrospectiva de dades a partir de les històries clíniques informatitzades (AP i Hospital) i altres bases de dades.
- N=9.315 habitants (persones ≥ 65 anys de les 3 ABS del CSdM).
- Variables d'estudi van incloure:
 - e-SIF (a 31/12/2017),
 - característiques sociodemogràfiques
 - Mortalitat
 - Hospitalització, institucionalització, i consum de recursos sanitaris durant el període d'estudi



Aplicació (I): tendències en l'epidemiologia de la fragilitat a Catalunya

Public Health 237 (2024) 14–21



Original Research

Frailty trends in Catalonia 2017–2021: An epidemiological study with 1.5 million people aged ≥ 65 years

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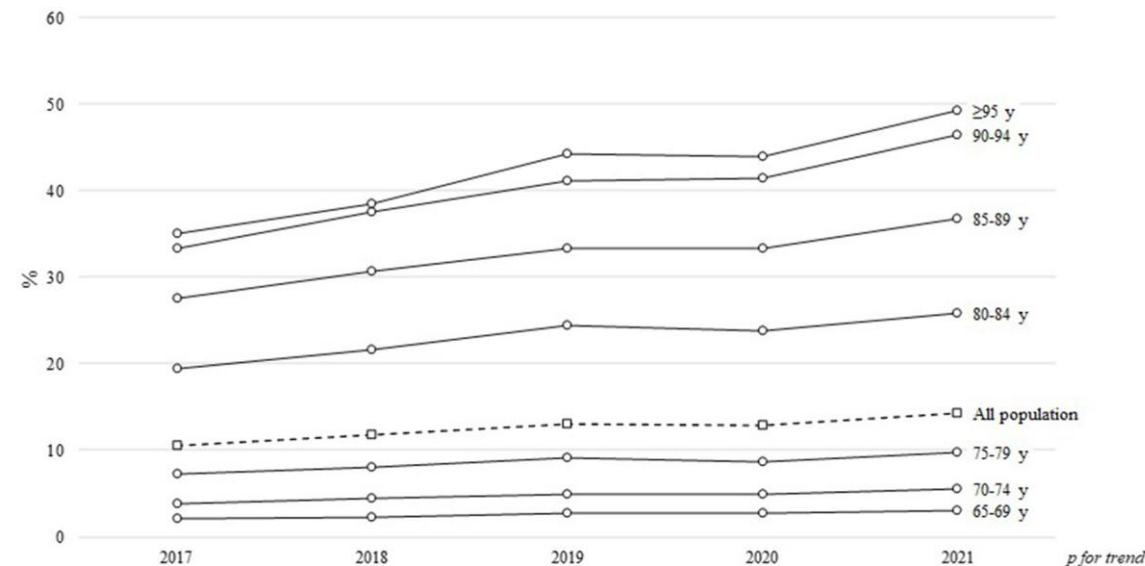
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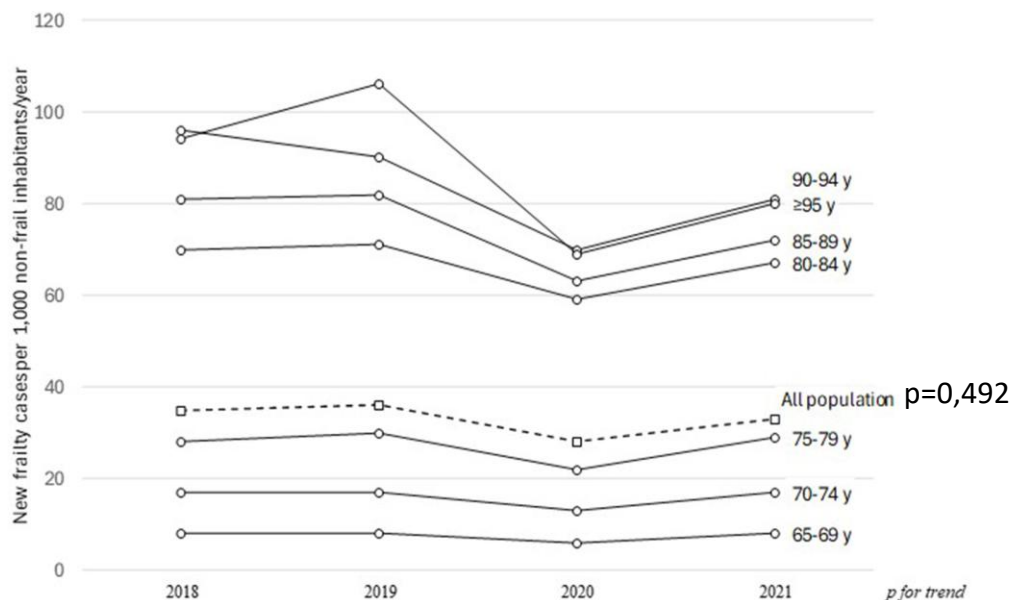
Estudi de cohorts (2017-2021)
Recollida retrospectiva de dades (PADRIS)
N= 1,41 milions de persones ≥ 65 anys



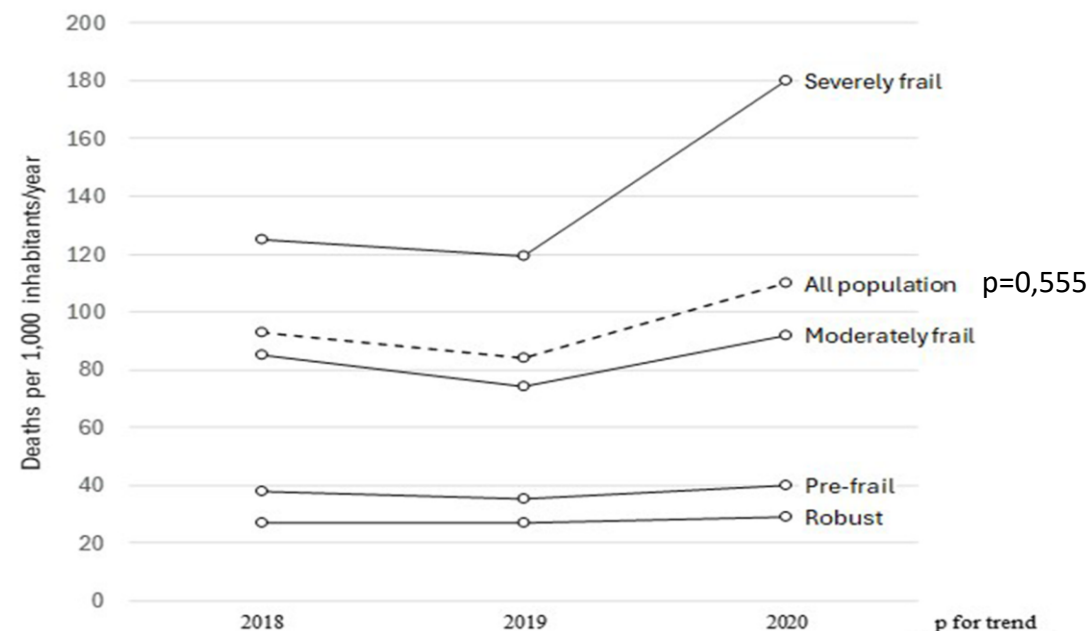
Sex	2017	2018	2019	2020	2021	<i>p</i> for trend
Female	12,4 [12,2-12,5]	13,8 [13,7-14,0]	15,3 [15,2-15,5]	15,2 [15,1-15,4]	16,6 [16,5-16,8]	0,001
Male	8,0 [7,9-8,2]	9,1 [9,0-9,2]	10,1 [10,0-10,2]	9,9 [9,8-10,1]	11,3 [11,1-11,4]	0,008
Age groups						
65-69 y	2,1 [2,0-2,2]	2,3 [2,2-2,4]	2,7 [2,6-2,8]	2,7 [2,6-2,8]	3,0 [3,1-3,2]	0,005
70-74 y	3,8 [3,7-3,9]	4,4 [4,3-4,5]	4,9 [4,8-5,1]	4,9 [4,7-5,0]	5,6 [5,8-6,0]	0,006
75-79 y	7,2 [7,0-7,4]	8,1 [7,9-8,3]	9,1 [8,9-9,3]	8,7 [8,4-8,9]	9,8 [10,8-11,1]	0,023
80-84 y	19,5 [19,1-19,8]	21,7 [21,3-22,0]	24,4 [24,0-24,8]	23,8 [23,4-24,2]	25,8 [27,5-28,0]	0,017
85-89 y	27,6 [27,2-28,1]	30,7 [30,2-31,2]	33,3 [32,8-33,8]	33,4 [32,9-33,9]	36,7 [39,0-39,6]	0,005
90-94 y	33,4 [32,6-34,2]	37,6 [36,8-38,4]	41,1 [40,2-41,9]	41,4 [40,6-42,3]	46,4 [48,2-49,2]	0,005
≥ 95 y	35,0 [33,5-36,5]	38,5 [37,0-40,1]	44,2 [42,6-45,9]	43,9 [42,3-45,5]	49,2 [51,0-52,7]	0,006
All population	10,5 [10,4-10,6]	11,8 [11,7-11,9]	13,1 [13,0-13,2]	12,9 [12,8-13,0]	14,3 [16,0-16,2]	0,010

Aplicació (I): tendències en l'epidemiologia de la fragilitat a Catalunya

Incidència de fragilitat

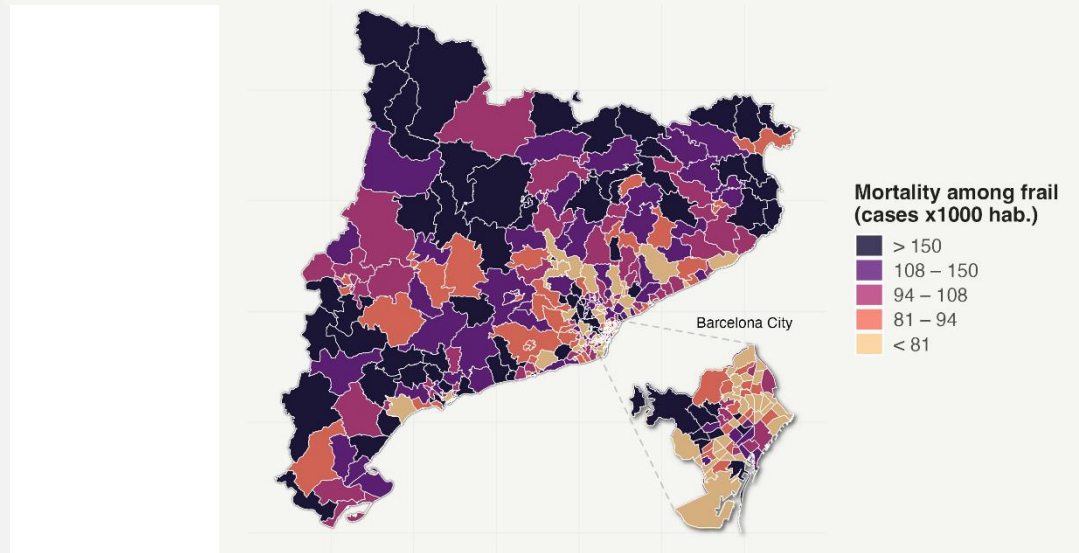
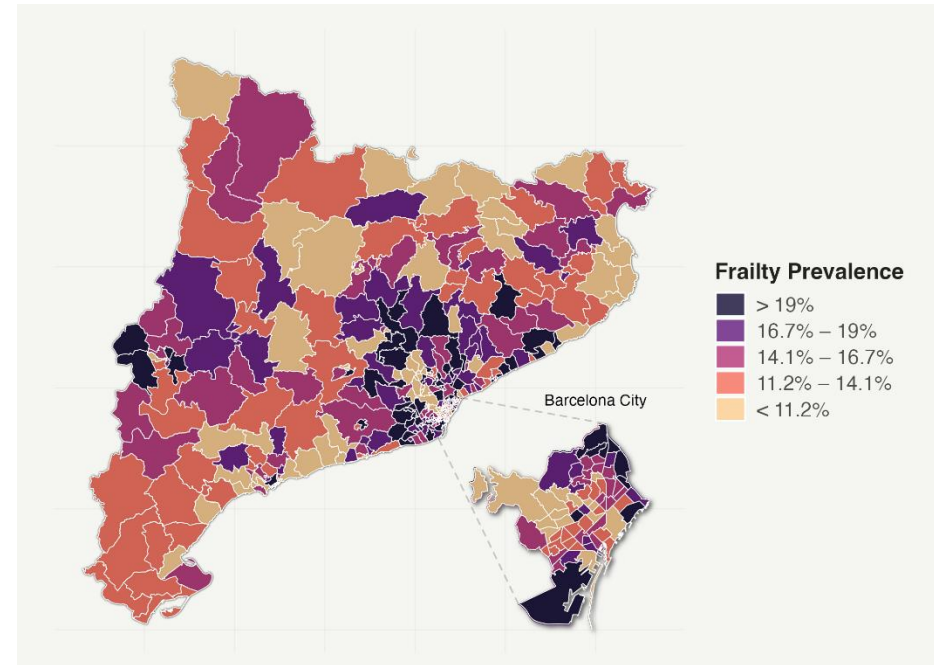
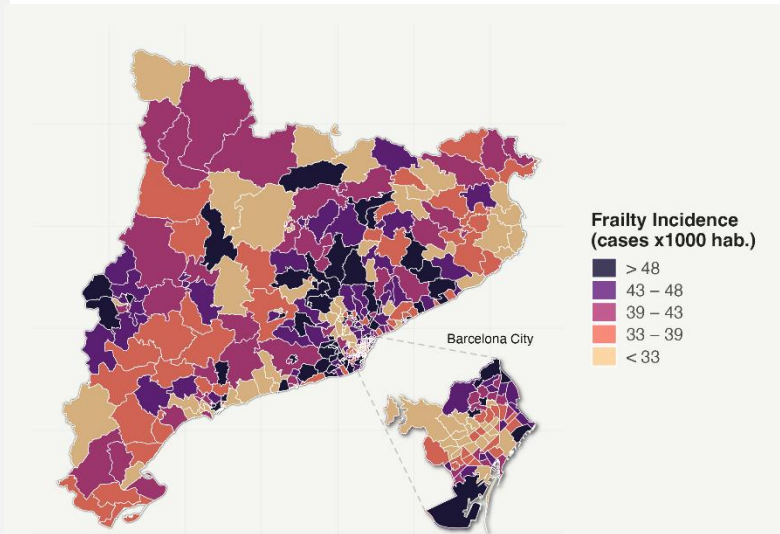


Mortalitat segons estat de fragilitat



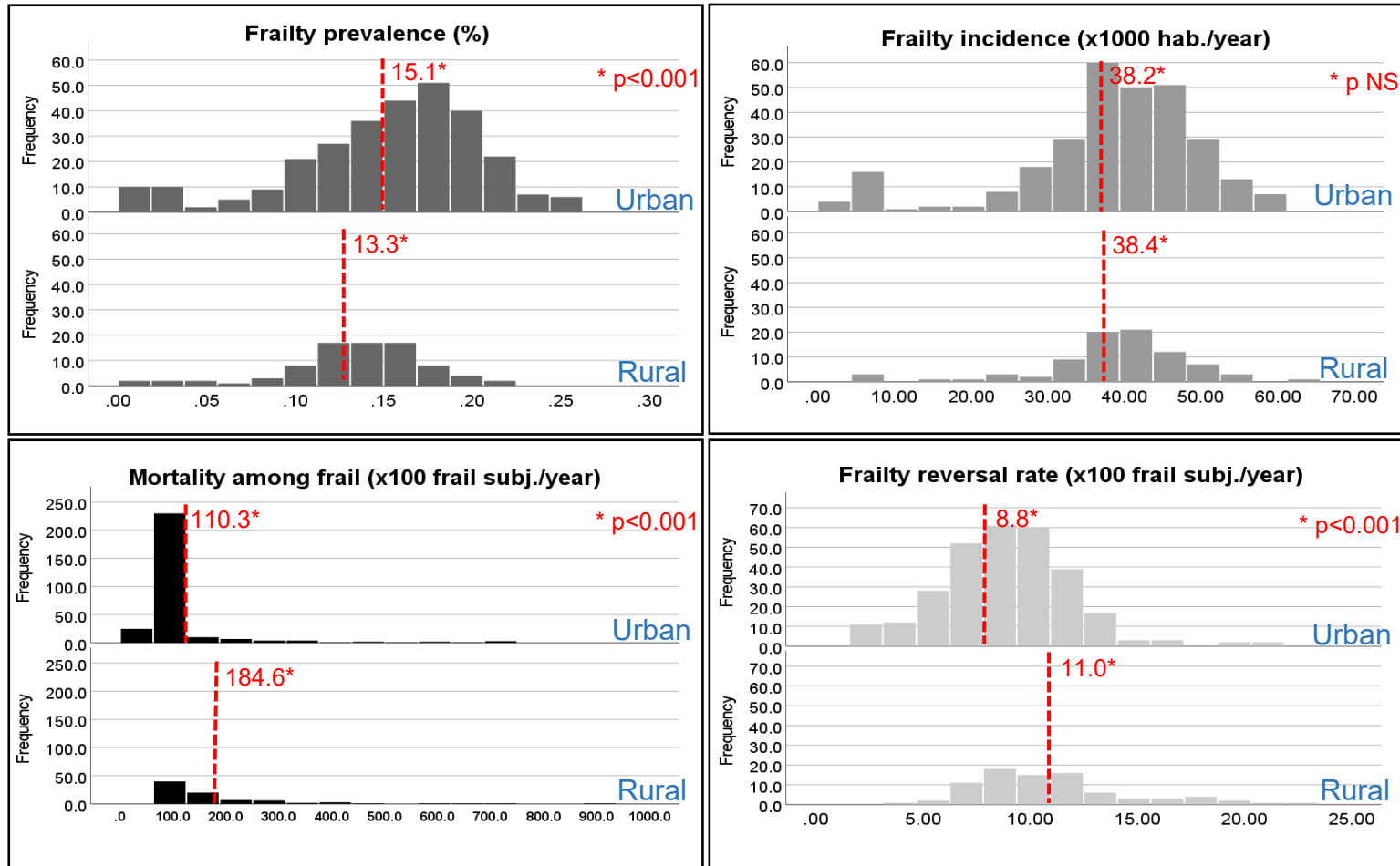
Prevalença de fragilitat severa (dependència) en ≥65 anys: 2,5% (2017) – 4.4% (2021)

Es dobla en 6-7 anys



Prevalença més baixa en les ABS rurals (vs urbanes)
Mortalitat més alta en les ABS rurals (vs urbanes)

Aplicació (II): Desigualtats territorials a Catalunya: ABS rurals vs ABS urbanes



- Taxa reversibilitat de fragilitat: 7 casos/100 fràgils/any
- Taxa reversibilitat de pre-fragilitat: 4 casos/100 pre-fràgils/any
- Taxes superiors en homes que en dones
- Taxes disminueixen amb l'edat
- Reversibilitat molt improbable en persones amb: multi-comorbiditat, polifarmàcia i/o fragilitat severa
- Components de la fragilitat (e-SIF) amb major efecte o impacte sobre la taxa de reversibilitat:
 - Hospitalitzacions urgents o no programades
 - Polifarmàcia
 - Caigudes accidentals, hipotensió ortostàtica, síncope, alteracions visuals, mareig, alteracions equilibri, anèmia, fatiga, dispnea, pèrdua pes, malnutrició, alcoholisme

Open access

Original research

Family Medicine and Community Health

Frailty reversal and its main determinants: a population-based observational and longitudinal study

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ABSTRACT

Background Clinical guidelines recommend frailty screening for the aged population, given that frailty is frequently reversible. However, little is known about frailty and prefrailty reversal rates in the general population if no specific interventions have been implemented.

Aim To assess real-world frailty and prefrailty reversal rates in the general population aged >65 years, the main contributing clinical conditions and the main risk factors for reversing frailty and prefrailty.

Methods Observational longitudinal 12-month study (2019) of all 1.5 million persons aged >65 years in Catalonia. Data were retrospectively collected from various health databases through the Catalan Public Data Analysis for Health Research and Innovation (PADRIS) V2022 programme. Frailty status according to the electronic Screening Index for Frailty (e-SIF) was determined for 31 December 2018 and for 31 December 2019.

Results The study included 1 465 312 Catalan inhabitants (mean age 75.8 years, 57.0% women). The annual frailty and pre-frailty reversal rates were 7.1% and 4.6%, respectively. Both rates were higher in men and decreased with age. The e-SIF components with the greatest impact on frailty reversal were non-planned hospitalisations, polypharmacy, orthostatic hypotension or syncope, anaemia and visual impairment. Female sex, age, dependency, >2 comorbidities and polypharmacy had an independent protective effect on 12-month frailty and pre-frailty reversals.

Conclusions Prefrailty and frailty are reversible, but reversal is unlikely in cases of multimorbidity, polypharmacy and functional dependency in older and severely frail individuals. Interventions that mainly target the avoidance of non-planned hospitalisations, polypharmacy and falls would have the greatest impact on reversing frailty and pre-frailty.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Frailty screening is recommended based on the notion that frailty is a reversible state, especially in its initial stages.

WHAT THIS STUDY ADDS

⇒ In the general elderly population, 7% of frail revert their frailty annually.

⇒ Frailty reversal can be mainly achieved by preventing non-planned hospitalisations, reviewing polypharmacy, correcting orthostatic hypotension, anaemia, dyspnoea, fatigue, dizziness or impaired balance and avoiding falls.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Interventions to prevent or revert frailty should specifically target late-middle-aged adults without high burden of comorbidities, disability or severe frailty.

leads to a two-and-a-half- to threefold increase in health resource use and costs.^{6,7} For all these reasons, frailty is considered to be a major public health problem requiring priority attention in developed countries.⁸ Clinical guidelines and recommendations issued by international institutions and scientific societies recommend launching frailty screening programmes for the aged general population, to operate especially from the primary care setting.⁹⁻¹¹ Those recommendations are based on the notion that frailty is reversible, especially in its initial stages, and that effective interventions exist for this clinical condition.

There is limited but growing evidence regarding the efficacy and effectiveness of multimodal interventions to prevent or reverse frailty in the aged population.^{10,12-15} Such interventions focus on addressing nutrition, physical exercise, chronic disease management, medication use and social issues. However, little is known about frailty and prefrailty reversal rates and their main determinants in the general population, especially

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Estudi de cohorts
(2017-2021)

Recollida
retrospectiva de
dades (PADRIS)

N= 1,41 milions de
persones ≥65 anys

N (%) or Mean (SD)	Robust	Pre-frail	Moderately frail	Severely frail	P for trend
Mortality rate	28,695 (3.7%)	38,233 (8.0%)	26,847 (21.6%)	16,350 (36.5%)	<0.001
Hospitalization rate	99,929 (13.0%)	115,516 (24.3%)	47,343 (38.1%)	21,154 (47.3%)	<0.001
Urgent	71,067 (9.2%)	89,791 (18.9%)	42,007 (33.8%)	19,748 (44.1%)	<0.001
Scheduled	42,639 (5.5%)	42,650 (9.0%)	12,188 (9.8%)	4,447 (9.9%)	<0.001
Mean hospitalisations	0.20 (0.6)	0.39 (0.9)	0.69 (1.2)	0.95 (1.5)	<0.001
Urgent	0.13 (0.5)	0.28 (0.7)	0.56 (1.0)	0.81 (1.3)	<0.001
Scheduled	0.07 (0.3)	0.11 (0.4)	0.13 (0.5)	0.14 (0.5)	<0.001
Primary care visits rate	628,606 (81.6%)	467,905 (98.3%)	121,832 (98.1%)	43,723 (97.7%)	<0.001
Mean primary care visits	17.2 (18.1)	36.1 (28.0)	48.9 (39.1)	54.2 (48.5)	<0.001
Institutionalization in social healthcare center rate	20,339 (2.6%)	33,720 (7.1%)	20,136 (16.2%)	10,655 (23.8%)	<0.001
Mean Institutionalization in social healthcare center	0.04 (0.2)	0.10 (0.4)	0.24 (0.7)	0.37 (0.8)	<0.001
Emergency visit rate	342,354 (44.4%)	306,091 (64.3%)	96,329 (77.5%)	37,008 (82.7%)	<0.001
Mean emergency visits	1.37 (2.7)	2.65 (4.1)	4.43 (5.8)	5.66 (7.2)	<0.001
Medication dispensed rate	483,643 (62.8%)	424,905 (89.3%)	113,621 (91.5%)	41,539 (92.9%)	<0.001
Mean amount of medication dispensed (€)	416 (900)	1424 (1698)	2279 (2193)	2792 (2475)	<0.001
Day hospital sessions rate	17,286 (2.2%)	20,432 (4.3%)	6,711 (5.4%)	2,709 (6.1%)	<0.001
Mean day hospital sessions ¹	0.09 (1.2)	0.17 (1.62)	0.22 (1.8)	0.28 (2.0)	<0.001

translator - Buscar con Google x TESI SERGIO MARIN PDF.pdf x Calculadora de fragilitat x

https://fragilitat.shinyapps.io/Fragilitat/

Patient age (years): Sex: ☐ Man ☒ Woman

☐ 1. Limitation of physical activity	☐ 15. Orthostatic hypotension or syncope	☐ 29. Weight loss, anorexia or malnutrition
☒ 2. Anemia	☐ 16. Coronary artery disease	☐ 30. Inflammatory bowel disease or malabsorption
☒ 3. Arthritis/arthrosis	☐ 17. Dementia	☐ 31. Chronic liver disease
☐ 4. Atrial fibrillation	☐ 18. Osteoporosis or fragility fractures	☐ 32. Obesity
☐ 5. Cerebrovascular disease	☐ 19. Parkinson or neurodegenerative diseases	☒ 33. Chronic pain
☒ 6. Chronic renal disease	☐ 20. Functional dependence. Transfer problems	☐ 34. Depression
☒ 7. Diabetes	☐ 21. Dyspepsia or gastroesophageal reflux	☐ 35. Sarcopenia, cachexia and muscular weakness
☐ 8. Chronic dizziness or altered balance	☐ 22. Peripheral atherosclerotic disease	☐ 36. Active cancer (malignant neoplasms)
☐ 9. Dyspnea or fatigue	☒ 23. Polypharmacy (≥5 chronic medications)	☐ 37. Psychosis
☒ 10. Falls last year	☐ 24. Chronic respiratory disease	☐ 38. HIV infection
☐ 11. Visual alterations	☐ 25. Cutaneous ulcer	☒ 39. Age >80
☒ 12. Heart failure	☒ 26. Sleep disorders	☐ 40. Dysphagia
☐ 13. Home confinement or institutionalization	☐ 27. Social vulnerability	☐ 41. Urgent admission during the last year with stay ≥ 2 days
☐ 14. Arterial hypertension	☐ 28. Urinary or faecal incontinence	☐ 42. Alcohol abuse or dependence

The m-SIF CALCULATOR is designed to be used by healthcare professionals, together with patients, to assist in clinical decision making.

You have obtained a score of **10** in the frailty screening index (which ranges between 0 and 42). According to this score you belong to the group: **Moderate fragility.**

Windows taskbar: 12:38 11/02/2025

☒ 6. Chronic renal failure
☒ 7. Diabetes
☐ 8. Chronic dizziness or altered balance
☐ 9. Dyspnea or fatigue
☒ 10. Falls last year
☐ 11. Visual alterations
☒ 12. Heart failure
☐ 13. Home confinement or institutionalization
☐ 14. Systolic hypertension
☐ 20. Functional dependence. Transfer problems
☐ 21. Dyspepsia or gastroesophageal reflux
☐ 22. Peripheral arteriovascular disease
☒ 23. Polypharmacy (5 or chronic medications)
☐ 24. Chronic respiratory disease
☐ 25. Collapsed liver
☒ 26. Sleep disorders
☐ 27. Social vulnerability
☐ 28. Urinary or fecal incontinence
☐ 34. Depression
☐ 35. Sarcopenia, cachexia and muscular weakness
☐ 36. Active cancer (malignant neoplasms)
☐ 37. Phytosanitary
☐ 38. HIV infection
☒ 39. Age > 65
☐ 40. Dysphagia
☐ 41. Urgent admission during the last year with stay > 2 days
☐ 42. Alcohol abuse or dependence

The SIF CALCULATOR is designed to be used by healthcare professionals, together with patients, to assist in clinical decision making.

You have obtained a score of **10** in the frailty screening index (which ranges between 0 and 42). According to this score you belong to the group: **Moderate fragility**.

According to your profile

The probability of dying at one year is **5,63%** and at two years is **13,89%**.

1-year probability of death
 Average of CATALUNYA (all-year-old women): 4,34%
 SUBJECT

2-year probability of death
 Average of CATALUNYA (all-year-old women): 11,64%
 SUBJECT

The probability of urgent hospitalization in one year is **19,63%** and in two years is **34,44%**.

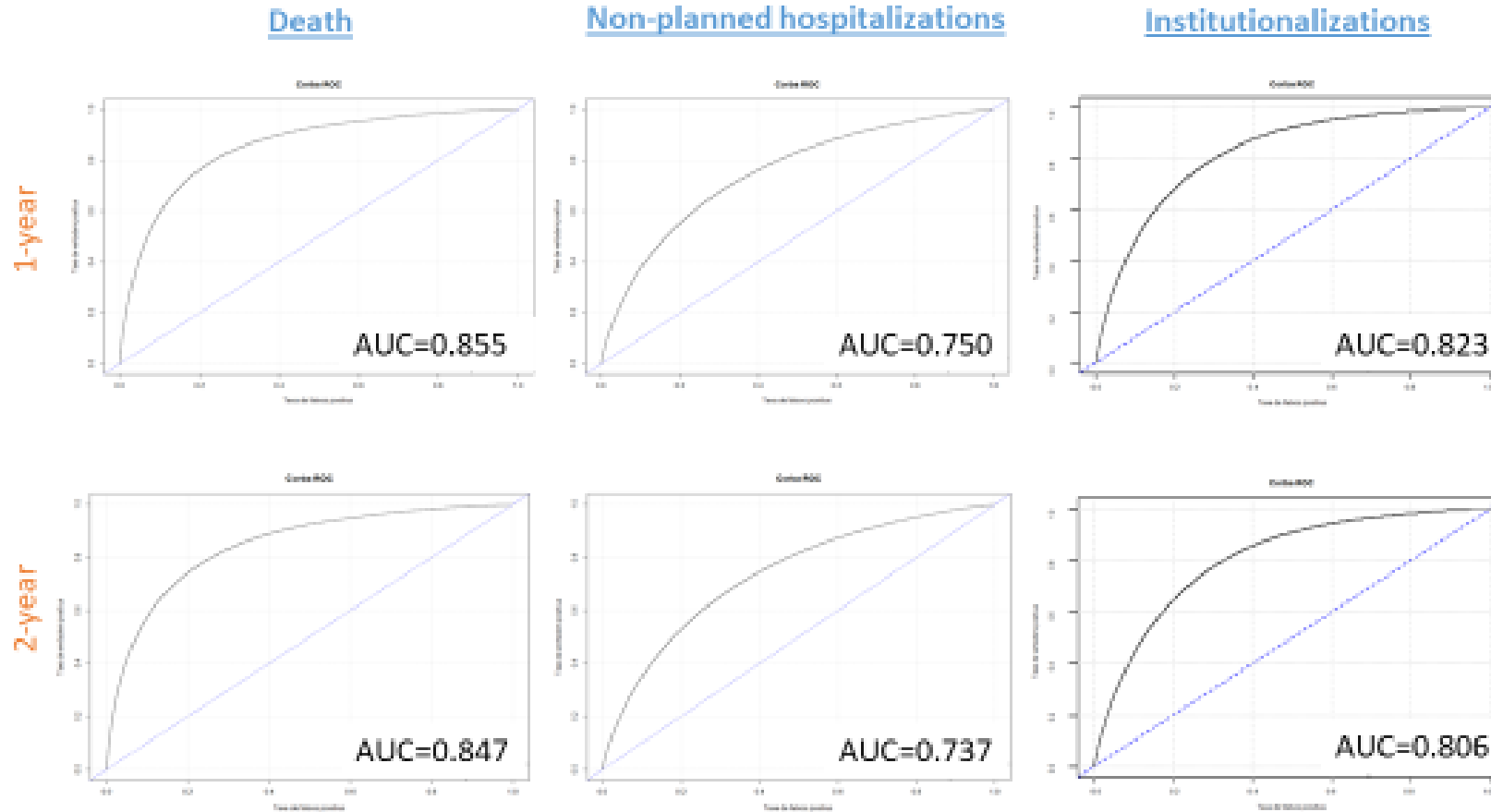
Probability of emergency hospitalization at 1 year
 Average of CATALUNYA (all-year-old women): 11,30%
 SUBJECT

Probability of emergency hospitalization at 2 years
 Average of CATALUNYA (all-year-old women): 19,74%
 SUBJECT

The probability of hospitalization in socio-sanitary in one year is **7,82%** and in two years is **14,87%**.

Probability of hospitalization in socio-sanitary in 1 year
 Average of CATALUNYA (all-year-old women): 6,75%
 SUBJECT

Probability of hospitalization in socio-sanitary in 2 years
 Average of CATALUNYA (all-year-old women): 12,38%
 SUBJECT



- Depèn de la qualitat dels registres i la codificació
- Instrument de cribratge que no substitueix la valoració geriàtrica integral
- No s'ha comparat amb altres instruments de mesura de fragilitat (per manca d'un Gold Standard o criteri de referència)
- Construït amb l'evidència científica actual (2022), que pot canviar en el futur

Avantatges de l'e-SIF

- Validat (n=9.315)
- Població general ≥ 65 anys
- Permet cribratge automàtic, massiu i en qualsevol moment
- Validació externa en una mostra independent (n=1.450.000)
- Sensible als canvis
- Utilitza codis CIM-10 i ATC en algoritmes oberts: Reproduïble arreu
- Disposa d'una calculadora manual
- Models predictius de mortalitat, hospitalització i institucionalització amb $AUC > 0,75$
- Útil per estudis clínics i epidemiològics

- L'e-SIF és una eina automàtica, vàlida, fiable i sensible als canvis que permet classificar l'estat de fragilitat de la població general de 65 anys o més en qualsevol moment en el temps.
- L'aplicació d'aquesta eina al conjunt de la població catalana ha mostrat ser útil en la monitorització de la prevalença i les taxes d'incidència, reversibilitat i mortalitat de la fragilitat, així com en l'avaluació de les desigualtats territorials de la fragilitat i la seva relació amb el consum de recursos sanitaris i socio-sanitaris.
- Disposa d'una calculadora manual que també ha mostrat una molt bona validesa.

Moltes gràcies per la seva atenció

