



## ORIGINAL ARTICLE

## Functional recovery unit national map. FUN-RUN Map Project

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## ABSTRACT

**Introduction:** Functional recovery units (FRUs) provide bed-based functional reablement for adults affected by morbidity-related or healthcare system-induced functional decline. Despite strong evidence supporting their efficacy, FRU development has been uneven within national territory. This project aims to identify territorial accessibility to FRUs in Spain in 2024. The project's objectives included describing structure–process–outcome indicators and collecting staff opinions on some of these metrics.

**Methods:** A cross-sectional study was designed using a piloted questionnaire in an encrypted online platform, comprising sociodemographics, center-characteristics, unit-characteristics, and staff opinions. Inclusion criteria included publicly funded hospital units focused on geriatric rehabilitation, managed by physicians with MIR specialty. One hundred IC-Hospitals (ICH) were identified as potentially eligible within the National Catalogue of Hospitals, 55 centers meeting inclusion criteria where clinical referees were identified.

**Results:** Thirty-two questionnaires completed (response rate 58%) by geriatricians (81.25%), with an average of 13.4 years of FRU-experience. Geographic representation included 11 provinces and eight autonomous communities. 87.5% of FRUs are located in ICH and have an average experience of 22.69 years. 0.52 beds per 1000 inhabitants >65 years and 1.7 beds per 1000 >80 years were described in the provinces represented, and a national ratio of 0.2 beds/1000 >65 years and 0.7 beds/1000 >80 years. Staff ratios of 15.94 and 14.91 beds/doctor and beds/nurse slightly differ from the opinion of referees ideal of 14.3 beds/doctor and 11.7 beds/nurse. Structure, process and outcomes indicators are exhaustively described.

**Conclusions:** A national consensus is needed, integrating general recommendations/processes, Quality-standards stratification to optimize effectiveness and efficiency of these units and patients' opinions to improve care quality and standards.

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## Mapa nacional de unidades de recuperación funcional. FUN-RUN-Map

## RESUMEN

**Introducción:** A pesar de la evidencia sobre la efectividad de las Unidades de Recuperación Funcional (URF), se han desarrollado heterogéneamente. Este proyecto pretende identificar la accesibilidad territorial a las URF en España en 2024, describir indicadores de estructura-proceso-resultado y opiniones del personal sobre algunos de estos indicadores.

**Métodos:** Estudio transversal mediante cuestionario previamente pilotado en una plataforma encriptada, incluyendo datos sociodemográficos, características del centro y de la unidad, y opiniones del personal. Criterios de inclusión: unidades hospitalarias públicas/concertadas centradas en recuperación funcional de adultos mayores, lideradas por especialistas MIR. Se identificaron 100 hospitales elegibles del Catálogo Nacional de Hospitales, y 55 centros con criterios de inclusión y referentes clínicos.

## Palabras clave:

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**Resultados:** Se cumplimentaron 32 cuestionarios (tasa de respuesta del 58%), mayoritariamente por geriatras (81,25%), con 13,4 años de experiencia en URF. Representación geográfica: 11 provincias y 8 comunidades autónomas. El 87,5% de las URF están en hospitales de atención intermedia con experiencia media de 22,69 años. Se calcularon 0,52 camas/1.000 habitantes >65 años y 1,79 camas/1.000 >80 años en las provincias representadas, y ratio nacional 0,21 camas/1.000 >65 años y 0,71 camas/1.000 >80 años, asumiendo ausencia de camas en las no representadas. Las ratios de personal de 15,94 y 14,91 camas/médico y camas/enfermería difieren ligeramente de la opinión sobre una ratio ideal de 14,3 camas/médico y 11,7 camas/enfermería. Se describen exhaustivamente indicadores de estructura, proceso y resultados.

**Conclusiones:** Es necesario un consenso nacional integrando recomendaciones de estructura/procesos/resultados, estratificación de estándares de calidad para optimizar efectividad y eficiencia, y opinión de los pacientes para mejorar la calidad asistencial y los estándares.

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## Introduction

Increased ageing population poses significant challenges for Healthcare Systems, emphasizing the importance of preventing dependency and ensuring access to high-quality, efficient healthcare resources. Public policies to prevent dependency and guarantee accessibility are crucial, especially in the context of ongoing economic challenges affecting most vulnerable populations. Prevalence of frailty in older population will grow exponentially<sup>1</sup> doubling every 14 years, leading to greater susceptibility to functional impact and the need for interventions such as admission to functional recovery units (FRUs).

FRUs<sup>2–5</sup> established in Spain 50 years ago,<sup>6,7</sup> have developed unevenly across the autonomous communities (CCAA), despite strong evidence supporting their effectiveness and efficacy.<sup>8–12</sup> As part of intermediate care (IC), these units provide bed-based functional enablement for adults affected by morbidity-related functional decline or healthcare system-induced iatrogenesis.<sup>13</sup>

FRUs can be categorized as process-specific (focusing on medical convalescence, orthogeriatric, or stroke-rehabilitation) or non-Specific, which manage a wide range of high-impact functional conditions. Patients are typically characterized by acute functional decline, reversibility of the condition, and individual vulnerability to further functional impairments.<sup>13</sup>

Hip fracture enablement is the most common process handled by FRUs, followed by stroke and other cases of functional loss. Despite evidence supporting their effectiveness, factors like management conditions, service provision, accessibility, and funding have led to significant disparities in their development.

A comprehensive analysis of FRUs in Spain conducted in 2000 by Baztán-Cortés et al.<sup>14,15</sup> highlighted impact of patient selection and care coordination on outcomes. This study also led to quality standards and care accessibility analysis.<sup>7</sup> Since then, the Spanish Society of Geriatrics and Gerontology (SEGG) has established quality benchmarks,<sup>16,17</sup> including key indicators like staff-to-patient ratios, average length-of-stay (LOS), institutionalization and mortality rates. In 2023, Catalonia introduced updated standards emphasizing staff specialization and training, alongside process-specific indicators for orthogeriatric and neuro-rehabilitation.<sup>18</sup>

The SEGG's Intermediate Care Group (ICG) launched the FUN-RUN Mapping Project (functional recovery units national map) to identify territorial accessibility to FRUs in Spain in 2024. The project's objectives included describing structure–process–outcome indicators and collecting staff opinions on some of these metrics.

## Material and methods

### Study design

A cross-sectional study was conducted using an online questionnaire developed by five members of the ICG. The questionnaire underwent partial testing through a pilot study among ICG members in 2023 and a full pilot testing by four members during 2024. Initial attempts to establish a registry-based questionnaire and a Delphi model for staff feedback were unsuccessful, leading to the adoption of a Likert-type questionnaire tested for user-friendliness by four ICG members.

The final questionnaire comprised four sections:

1. Sociodemographic characteristics.
2. Center characteristics.
3. Unit characteristics.
4. Staff opinions.

The questionnaire was designed to maximize ease of response and reduce completion time, thus improving response rates. Ten meetings were held to finalize variables, with complex items removed.

### Ethics committee

Since no patient data were involved, ethics committee approval was deemed unnecessary. Approval was requested from the SEGG Board of Directors. Consent was requested from the manager responsible for the care of the service and/or center for participation in the study.

### Inclusion and exclusion criteria

Inclusion criteria included publicly financed hospital units focused on geriatric rehabilitation within public or private hospitals with dedicated beds. Units had to be managed by a physician with a recognized specialty (MIR system). Units in nursing homes or led by non-MIR professionals were excluded.

### Identification, participation, and data privacy

A total of 120 intermediate and long-term care hospitals were identified within the National Catalogue of Hospitals, with 100 deemed potentially eligible. AMGEN is a private pharmacological company founding the methodological support for this study and has a national delegate network visiting hospitals and doctors who

**Table 1**  
Characteristics of the URFs, centres and referents participating in the FUN-RUN Map Project.

A. Characteristic of centers, units and referees (N = 32)		N	%	
Type of center	Tertiary Hospital	4	12.5	
	Intermediate Care Hospital	28	87.5	
Specialty of referees	Geriatric Medicine	26	81.25	
	Internal Medicine	3	9.38	
	Primary Care Medicine	2	9.25	
Specialization of unit	General non-process specific	17	53.13	
	General but management is process-specific	6	18.75	
	Structurally process-specific	9	28.13	
B. Characteristics of centers, units and referees		Average	SD	N
Years of operation of the centre		38.59	31.42	32
Years of operation of the unit		22.69	11.23	32
Years of experience in FRU of referee		13.41	9.83	32
Number of patients 2023		495.78	400.64	32
C. Process of admission (referrall)		Average	SD	N
Admission	Internal 50%			13
Referrall	External but can reject 31.25%			10
Process	Mixed 18.75%			6
	% patients admitted if mixed	Internal	63	29.68
		External	37	29.68

A–C shows characteristics of centers, units and referees, referred to structure during 2024, as well as years of experience, number of patients attended during 2023 and referrall process during 2023.

Percentage of data loss 0% from 32 centers.

potentially would work in post-acute units. Therefore, the scientific committee thought this network could help identify hospitals or non-geriatrician-led FRUs. AMGEN delegates identified 55 FRUs meeting inclusion criteria with clinical referees, who were invited to participate. Project promotion included infographics distributed by AMGEN delegates and an online session with clinical training on osteoporosis. Also, inviting web-mail-letters and study promotion were made throughout SEGG membership and FRU leaders known by the SEGG-AI-Working-group.

Data collection was conducted via an encrypted platform, ensuring anonymity. Each participant received a personal password for questionnaire access, and no personal or identifiable data were collected. Participants were provided with SEGG research collaboration certificates.

### Data collection

Questionnaires were distributed on April 24, 2024, and responses were collected until October 1, 2024. Email and phone reminders were sent at two- and four-month intervals.

### Analysis

Descriptive analysis was performed using Excel. Frequencies and percentages were calculated for qualitative variables, while centrality and dispersion measures (mean  $\pm$  SD, or median with interquartile ranges) were used for quantitative data. Staff opinions from the Likert-type questionnaire are reported similarly. Pearson's coefficient of variation was also described for the opinion questionnaire.

## Results

### Response rate and participation

At the end of the collection period, 36 responses were obtained from 55 potential centers. Of these, 32 questionnaires were fully completed, yielding a response rate of 58%. From the initial 36, 2

did not meet fully inclusion criteria and 2 were incomplete, thus were not analyzed.

### Sociodemographic results

Responses were primarily from geriatricians (81.25%), with an average of 13.4 years of FRU experience (Table 1). Geographic representation included 11 provinces and eight autonomous communities, representing 2.108 beds and 14,865 patients attended during 2023.

The total sum of beds has been calculated and related to the total population of participating provinces (INE-register 1st-April-2024),<sup>19</sup> obtaining 0.52 beds per 1000 inhabitants >65 years and 1.7 beds per 1000 >80 years in the represented provinces. If we assume no beds in the non-participating provinces data for the national territory would be 0.2 beds/1000 >65 years and 0.7 beds/1000 >80 years. Islas Canarias (0.88 beds/1000 over 65 y) and Islas Baleares (0.82 beds/1000 over 65 y) are the communities with the highest rates of beds/older adults, followed by Catalonia (0.61 beds/1000 over 65 y), Madrid (0.48 beds/1000 over 65 y) and Asturias (0.32 beds/1000 >65) (Table 2 and Fig. 1A and B). Provinces with higher rates were las Palmas (0.88 beds/1000 >65 and 3.6 beds/1000 >80) and Baleares, with 0.83 beds/1000 >65 and 3.1 beds/1000 >80 (Table 2 and Fig. 1A and B).

### Characteristics of FRUs

Intermediate Care Hospitals (ICH) ubicate 87.5% of FRUs, with an average experience of 22.69 years. Each FRU gives support to 4.88 referral hospitals. Other geriatric care units, such as palliative care (87.50%), outpatient clinics (78.13%), subacute care units and day hospital (59.38%), continuing care units (50%) and acute geriatric units (AGU) (46.88%) were present in most centers.

### Structure indicators

FRUs reported an average of 65.88 ( $\pm$ 58.87 SD) beds, with 10% single rooms and 24/7-h medical coverage. All FRUs have rehabilitation gyms, 81.25% living-rooms for families and patients, and 75% have occupational therapy (OT) rooms.

**Table 2**  
FRU beds/1000 inhabitants.

Region	Province	Number of beds	65 years or older	Beds/1000 inhab. ( $\geq 65$ yr.)	80 years or older	Beds/1000 inhab. ( $\geq 80$ yr.)
		Reported by referees, April 2024	INE statistics, 1st April 2024		INE statistics, 1st April 2024	
Andalucía		14	1.621.857	0.009	438.527	0.032
	Cádiz	14	236.460	0.059	59.545	0.235
Aragón		15	303.528	0.049	97.533	0.154
	Teruel	15	33.239	0.451	11.604	1.293
Asturias		92	283.336	0.325	85.111	1.081
	Asturias	92	283.336	0.325	85.111	1.081
Baleares		171	206.735	0.827	55.327	3.091
	Baleares	171	206.735	0.827	55.327	3.091
Cataluña		961	1.572.347	0.611	467.243	2.057
	Barcelona	687	1.153.446	0.596	347.398	1.978
	Gerona	120	155.963	0.769	43.237	2.775
	Lerida	24	90.391	0.266	27.950	0.859
	Tarragona	130	172.547	0.753	48.658	2.672
Islas Canarias		176	403.026	0.437	103.837	1.695
	Las Palmas	176	199.118	0.884	48.534	3.626
Madrid		638	1.313.426	0.486	396.500	1.609
	Madrid	638	1.313.426	0.486	396.500	1.609
País Vasco		41	533.097	0.077	163.747	0.250
	Guipuzcoa	41	173.423	0.236	52.570	0.780
Total Selec. CCAA		2108	6.237.352	0.338	1.807.825	1.166
	Total Selec. Prov.	2108	4.018.084	0.525	1.176.434	1.792
Total Spain		2108	9.978.738	0.211	2.965.883	0.711

These data relate with Fig. 1A and B.

Number of functional recovery units beds referred by the participants and related to over 65 and over 80 years old population recorded by National Statistical Institute (INE) dated 1st April, 2024.

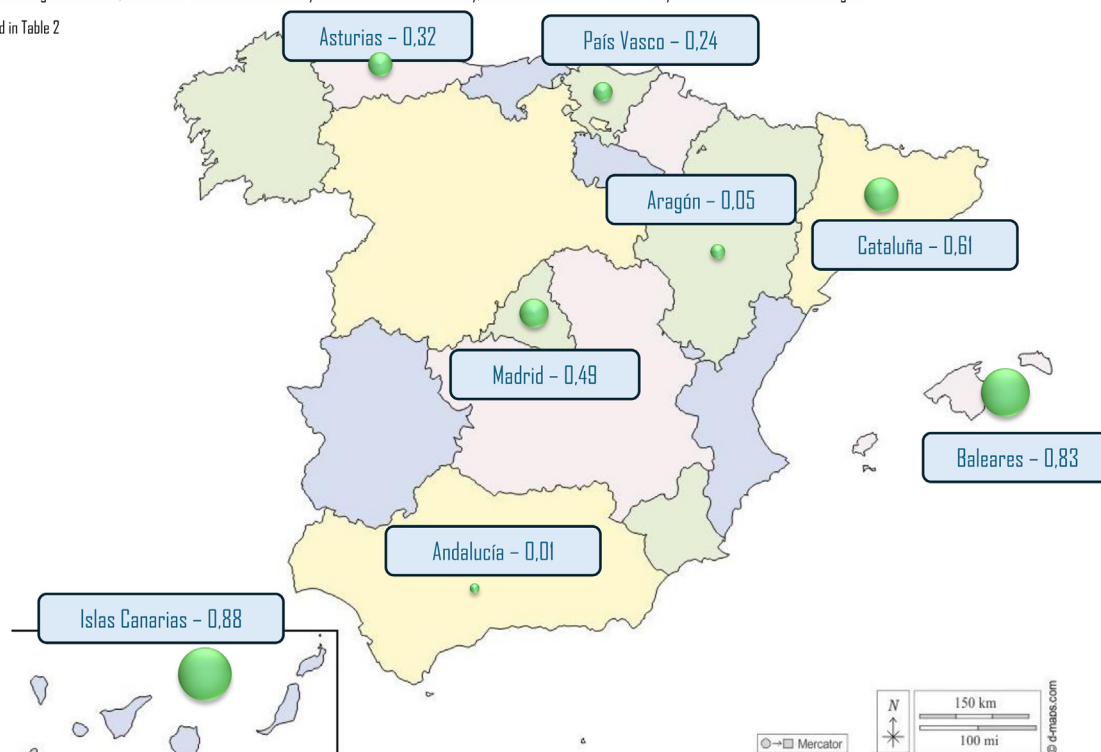
Each FRU employs an average of 5.72 ( $\pm 6.43$  SD) doctors with MIR specialties, most of them geriatricians (90.63%) with a median of two specialists per center and specialty. The average bed-to-doctor ratio was 15.94 ( $\pm 3.74$  SD) and the to-rehabilitation-

specialist ratio was 22.71 ( $\pm 17.19$  SD). Other staff-to-patient ratios are shown in Table 3. Regarding supporting services, 90.62 units have a pharmacist, 65.63% have clinical psychologists and nutritionists. 71.88% have at least one geriatric-nurse-specialist.

### I.A. Number of beds per 1000 Inhabitants > 65years, per region.

The green spheres represent, according to their size, the number of Functional Recovery Units beds found in this study, related to the number of over 65 years old in habitants in each region.

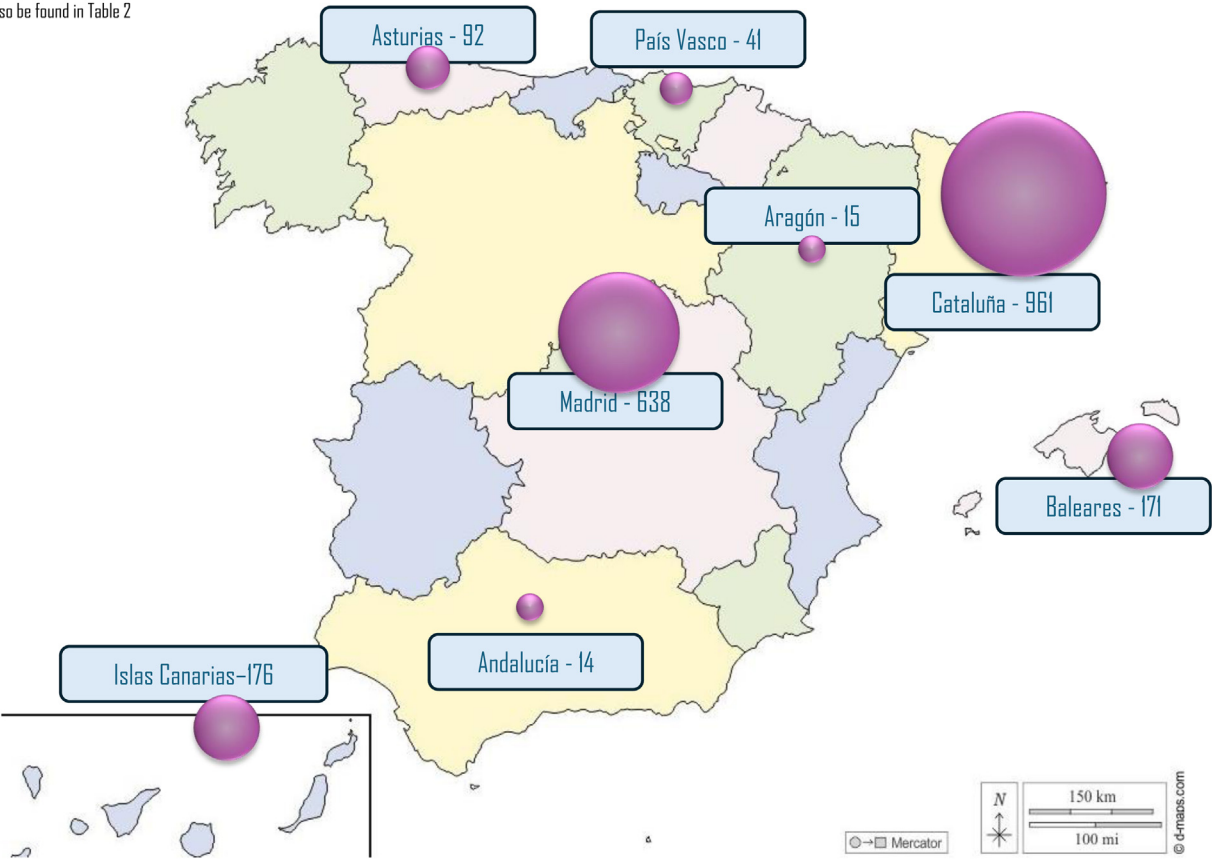
These figures can also be found in Table 2



**Fig. 1.** Map with beds per province and beds/1000 inhabitants over 65 years, in the FUN-RUN Map Project.

I.B. Number of beds per Region, raw

The purple spheres represent, according to their size, the number of Functional Recovery Units beds found in this study, in each region.  
These figures can also be found in Table 2



CCAA	Nº de Camas		Camas/1.000 hab. (>65a.)	
Andalucía - 14	14	14	0,01	Andalucía - 0,01
Andalucía	14			
Aragón - 15	15	15	0,05	Aragón - 0,05
Aragón	15			
Asturias - 92	92	92	0,32	Asturias - 0,32
Asturias	92			
Baleares - 171	171	171	0,83	Baleares - 0,83
Baleares	171			
Cataluña - 961	961	961	0,61	Cataluña - 0,61
Cataluña	961			
Islas Canarias-176	176	176	0,88	Islas Canarias - 0,88
Canarias	176			
Madrid - 638	638	638	0,49	Madrid - 0,49
Madrid	638			
País Vasco - 41	41	41	0,24	País Vasco - 0,24
País Vasco	41			
Total Selec. CCAA	2108		0,34	
Total España	2108		0,21	

Fig. 1. (Continued)

Medical support resources and interconsultations

Regarding medical support resources that prevent patient transfers, all FRUs can provide scheduled-general laboratory tests, while

61.63% offer urgent tests and 53.12% have their own laboratories. 78.12% have portable ultrasound equipment. 81.25% FRU have in-house pharmacy services, all have oxygen supplies and 53.12% are equipped with non-invasive mechanical ventilation systems.

81.25% FRUs conduct face-to-face interconsultations with other specialties, and 71.87% teleconsultations.

### Teaching and research activities

Involvement in teaching activities was reported in 93.75% FRUs with nursing undergraduates being the most frequent group (84.38%). Additionally, 50% FRU provide training to undergraduate medical students, while 62.50% offer postgraduate education in fields such as physiotherapy, occupational therapy, nursing assistants, speech therapy, or other disciplines. Postgraduate training in geriatrics for residents (MIR) is reported in 46.87% centers, 53.12% centers hosting residents from other specialties and external MIR rotations. Furthermore, 62.5% FRUs provide postgraduate training for nursing residents (EIR). 71.83% report conducting research projects, most of which are unfunded. Six units have projects supported by public funding, five by private funding, and nine FRUs do not report any research activities.

### Process indicators

General FRU combining older medical processes orthogeriatric and stroke rehabilitation make up 53.13%, while 18.75% of units have non-structural but management differentiation. 28.13% FRU have a structural differentiation by processes. 50% FRU have an internal process for clients' selection, 31.25% external selection and 18.75% a mixed process (within these, 63% of users are selected internally and 37% externally). On admission, there is not a comprehensive geriatric assessment (CGA) in 3.12% FRU, 6.25% complete CGA within 3–5d, the rest under 48 h (17 < 24 h) of admission.

In 84.37% FRU weekly interdisciplinary meetings are held. In 43.75% of FRU, patients are reassessed by the rehabilitation specialist before starting rehabilitation. In 37.5% there is a differentiation between high and low intensity therapy stratified in process management. In 65.63% therapy is complemented with guided activities taught to family/caregivers, and in 43.75% with activities directed by assistant nursing technician (ANT). There is no therapy on Saturday/Sunday in any unit. In 40.62% FRU there are in-service therapists who continue therapy outside of rehabilitation schedules, and 37.5% use grooming/ADL as therapy hours.

### Quality indicators

Prevention and management protocols for falls and pressure ulcers are reported by 93.70% FRU, 75% for delirium, 68.75% for malnutrition, 62.5% for incontinence and 28.13% for depression. 16 (50%) FRUs report a protocol to detect prior frailty, 10 (31%) a strength/resistance training program, 6FRU a protocol on sarcopenia, and 5 an adapted exercise protocol for clients with dementia. Follow-up on discharge is carried out by Primary Care Teams in 81.25% units and 28.12% make phone follow-ups.

### Outcome indicators

During 2023 an average of 495.78 (SD 400.64,  $p50 = 339$ ) clients were admitted to each FRU, with an average LOS of 34.22 ( $\pm 15.90$  SD) days. In process-specific units ( $N = 16$ ), LOS (orthogeriatric) was 31.99 (12.97 SD) days, LOS (Stroke-rehab-Units) 44.55 (18.23 SD) days. LOS reported for medical convalescence ( $N = 12$ ) was 43.11 (27.62 SD,  $p50 = 35.14$ ) days.

Measures of functional change were reported to be Barthel-Index (BI) on admission and discharge in 93.75% cases and in 28.12% FRU efficiency of the functional gain.

Within clients admitted during 2023, mortality ratio reported was 5.73% ( $\pm 4.99$  SD).

New institutionalization rate within 2023 users was 13.59 (SD 8.4).

Emergency level transfers were reported to be 8.54% ( $\pm 8.56$  SD), and acute readmissions 6.99% (SD 5.98).

In 8 FRU there was no reported audit, whereas the rest reported an internal audit ( $N = 8$ ), external ( $N = 4$ ) or both ( $N = 12$ ).

### Opinion questionnaires

Most respondents (90.63%) considered that FRUs should be located near a Tertiary Hospital. In a Likert-type questionnaire,<sup>1–10</sup> referents considered important the clinical director or management leader to be a geriatrician 9.31 ( $\pm 1.91$  SD). The most important (>8/10) identified issues were adjusting LOS specifically for processes of care (orthogeriatric-stroke-medical) 8.84 (SD 1.17), the presence of at least one specialist-geriatric-nurse (9.38, SD 1.1), protocols for prevention/management of geriatric syndromes (pressure ulcers, delirium, falls, malnutrition, depression, incontinence, polypharmacy, frailty and sarcopenia), and also to protocolize exercise/resistance training, and adapting exercise programs for clients with dementia, also providing early access to FRU within 48 h of indication (Table 3).

Regarding staff ratios, responders considered optimal ratios: 14.34 (4.00 SD) clients/doctor, 11.75 (4.03 SD) clients/NG, 7.38 (1.72 SD) clients/ANT, 11.84 (5.51 SD) clients/physiotherapist, and 25.94 (12.74 SD) clients/social worker (SW).

Among the limitations and barriers identified for research activities responders highlighted lack of time 8.97 (1.33 SD), financing 8.22 (2.11 SD) and difficulty in accessing projects 7.81 (3.57 SD).

Potential barriers to achieve care results include clients admitted with unresolved social issues in acute care 8.84 (1.27 SD), inadequate use of FRU to shorten hospital acute stays 8.84 (1.27 SD), insufficient staff resources 8.84 (1.27 SD), and inappropriate admissions 7.19 (2.99 SD).

SEGG quality standards suggest LOS = 18–35 days, and 75% of participants support the continuity of this standard. Those who disagree (28.12%) propose longer general LOS = 42.22 (7.95 SD), Orthogeriatric-LOS = 36.67 (10.31 SD) days and stroke-rehab-LOS = 46.89 (6.89 SD) days (Table 3).

## Discussion

### Response rate

The response rate of 32 FRU out of 100 potential hospitals (32%) and 55 with referees (58%) can be considered low<sup>10</sup> although in line with other online questionnaires and the Second National IC Audit in UK which has reported encompassing 107 of the 211 Clinical Commissioning Groups (50.7%).<sup>20</sup> A similar study in the Netherlands<sup>21</sup> obtained similar response rates.

The existence of a call effect on each autonomous community and within SEGG members is likely to have occurred, despite the attempts to promote the study through several channels and including non-geriatrician-led-FRUs. The fact that promotion and invitation to participation was done through an external company, although in the name of SEGG, may have downsized participation, related to professional and personal trust. Also, the participation was volunteer and not funded or supported by the Ministry of Health which might have enhanced participation and variability of centers and specialties.

Mostly answered by geriatricians, this demographic concentration might introduce bias, as our perspectives could differ from those of other professionals involved in FRU operations, potentially influencing the study's findings and their generalizability. The answers reflect heterogeneous geographical implantation among

**Table 3**

Comparison between guidelines, data reported and referees opinions.

		A. SEGG Guidelines 2006 (Delphi model, consensus, N= 91)	B. Reported/Observed data 2024 Questionnaire, reported data by referee (N=32)	C. Referees' opinion 2024 (N=32)
Guidelines		Average (Av)/standard deviation (SD)	Av (SD)	Av (SD) (CV = coefficient of variation)
Structure	Beds/>65 years	4.6 (2.7)	0.2–0.5 beds/1000 inhabs >65 years 0.7–1.8 <sup>a</sup> beds/1000 inhabs >80 years	
	Ratio beds/doctor	19.3 (3.3)	15.9 (3.74)	14.34 (4)
	Ratio beds/nursing graduate	13.5 (2.7)	14.91 (5.6)	11.75 (4.03)
	Ratio beds/auxiliar staff		8.38 (1.81)	7.38 (1.72)
	Ratio beds/occupational T		13.15 (5.97)	11.84 (.51)
	Ratio beds/physiotherapist		15.26 (10.04)	
	Ratio beds/SpeechLanguageT		7.52 (5.03)	
	Ratio beds/psychologist			
	Ratio beds/social worker		32.06 (13.36)	25.94 (12.74)
Process	Primary aim of admission functional reablement	8.8		7.47 (2.18)
	Prompt access to specialists if needed	8.8	Face to face consultation 26 (81.25%) Teleconsultation 23 (71.88%)	
	Boosting research	8.3	26 (81.25%) research, non funded  23 (71.88%) research, funded  9 (28.13%) no research	Barriers to research    Lack time 8.97 (SD 1.33) CV 0.14 Financing 8.22 (SD 2.11) CV 0.25 Difficulty accessing project 7.81 (SD 3.57) CV 0.45
	Time from admission to comprehensive geriatric assessment (CGA)		<24 h N 17 (53.13%) 24–48 h N 12 (37.5%) 3–5d N 2 (6.25%) No CGA accomplished N 1 (3.13%)	
Length of stay (LOS)	General LOS	18.6 (3.5)–34.8 (7.8)	34.22 (15.9)	Maintain SEGG Guidelines LOS N 24 (75%) Change Guidelines N 9 (10.8%) Change General LOS (if change N 9) 42.22 (SD 7.95) CV 0.19
	Immobility syndrome LOS		43.11 (27.62)	Change LOS Orthogeriatrics (if change N 9) 36.57 (SD 10.31) CV 0.28
	Orthogeriatric LOS		31.99 (12.97)	Change LOS stroke rehabilitation (if change N 9) 46.89 (SD 6.86) CV 0.15
	Stroke/Neuroirrehab LOS		44.55 (18.23)	

**Table 3**  
(Continued)

		A. SEGG Guidelines 2006 (Delphi model, consensus, N=91)	B. Reported/Observed data 2024 Questionnaire, reported data by referee (N=32)	C. Referees' opinion 2024 (N=32)
Quality	Multidisciplinary meetings frequency	1.1 (0.5) meetings/week	84.38% weekly 9.38 biweekly 6.26 other	
	Functional gain monitoring	8.8	Barthel discharge/admission 93.75% Absolute functional gain 43.75% Relative functional gain 18.75 Efficiency of functional gain 28.13%	
	Geriatric Syndromes Monitoring & management protocols	General monitoring 8.5		Likert-type questionnaire (1–10) Avge (SD)
		Pressure ulcers	N 30	% 93.75% 9.63 (0.61)
		Delirium	24	75.00% 9.66 (0.55)
		Falls	30	93.75% 9.69 (0.54)
		Malnutrition	22	68.75% 9.56 (0.67)
		Depression/mood	9	28.13% 9 (1.02)
		Dementia exercise protocol	5	15.63% 9 (1.02)
		Incontinence	20	62.50% 9.31 (0.86)
		Polipharmacy	13	40.63% 9.66 (0.6)
		Frailty	16	50.00% 9.53 (0.76)
		Sarcopenia	6	18.75% 9.03 (0.97)
		Strength Exercise	10	31.25% 9.41 (0.84)
	No protocols	1	3.13%	Barriers to functional/other outcomes:
Outcomes	Maximum institutionalization rates	17.4 (4.3)	13.59 (8.43)	External or inadequate selection 7.19 (2.99) CV 0.41
	Maximum rates of readmission to acute care	9.7 (3.3)	8.54 (8.56)	Social problems that difficult acute care discharge and are transferred to IC 8.84 (1.27) (CV 0.14)
	Mortality rates	6.8 (2.8)	6.99 (5.98) 5.73 (4.99)	Use of IC to fulfill acute care, shortening acute care LOS 8.09 (2.16) CV 0.26 Insufficient assistential resources 8.09 (3.73) CV 0.46 Low specialization 6.16 (3.73) CV 0.6 Other 5.47 (3.63) CV 0.66

In this table we compare the guidelines given by SEGG's consensus of experts, 2006 (SEGG, 2006 Quality Standards in Geriatrics [Internet]. Available at: <https://www.segg.es/estandares.asp>) (column A) and the findings in our study, both by data reported by referees on the reality of their working environment during 2024 (ratios) and 2023 (institutionalization, mortality, acute care readmission) (column B) and their opinions (column C). The areas represented in light grey are empty either because the question did not apply or was not made. Pearson's variation coefficient (CV) was calculated dividing standard deviation (SD) between average (Av) when applicable.

<sup>a</sup> In represented provinces.

CCAA and even between provinces of the same community. This variability reflects the decentralization with 17 health systems coexisting with budgetary and local priorities, which could be mitigated by auditable national guidelines or National audits such as The UK National IC Audit.<sup>22</sup>

Outside Baleares, Canary Islands, Catalonia, Madrid, Asturias, Basque Country the representation is scarce. This lack represents an ageist discrimination towards older adults and a lack of public policies and responsibility towards the health care needs of older adults of the Health Authorities but as there is a lack of national capacity of effective guidance, audit and obligation and also a lack of planification in the number of annually high quality certified geriatricians. Longer lasting and consolidated IC networks such as Asturias, Catalonia and Madrid stand out for their greater number of FRU beds and specialization, but also communities where the historic presence of geriatric medicine is younger such as Baleares stand with high bed coverage and communities with younger population such as Canary Islands show also high bed coverage. Therefore, many other factors need to be considered in the interpretation of these rates, such as the limitations of this study that might have not been able to find units in other Communities or the fact that many specialists are certified in docent-units lacking these FRU, or the lack of AGU that are a priority in clinical bed planification.<sup>23</sup> In Spain there is a lack of registration of FRUs and some terminological confusion regarding IC/FRU, like bed-based geriatric rehabilitation and IC Services in the UK.<sup>20</sup> Process specificity is also not widespread. Therefore, it is difficult to know exactly how many beds and per-process-admissions occur. Also, there are autonomous communities with a lack of Geriatric Medicine in the public system that may have been disguised as chronic diseases management or other terms making them difficult to identify or enroll in this study.

Last record date from 2016 within the "Map of IC resources and proposals for the future"<sup>24</sup> where an analysis of sociosanitary and institutional nursing-home resources was carried out by regions observing 15,122 medium/long stay beds and 1.76 beds per 1000 inhabitants over 65 years (9206 places in Catalonia with 6.03 places/1000 >65 years, 1332 places in Madrid with 1.23 places/1000 >65 and 915 places in the Valencian Community with 1.00 places/1,000 >65). However, nursing-home IC-admissions have not been audited in our country for quality or efficiency standards,<sup>25</sup> and in other countries have shown to be improvable as IC-option<sup>26</sup> and should also be mandatory audited in their quality indicators and outcomes.<sup>25</sup> Our study identifies publicly-financed hospital-resources obtaining 0.52 beds/1000 >65 years and 1.7 beds/1000 >80 years, or 0.2 beds/1000 >65 years and 0.7 beds/1000 >80 years figures well below the standards recommended by SEGG (4.6/1000 >65a)<sup>16</sup> or Spanish Society of Geriatric Medicine (SEMEG-Sociedad Española de Medicina Geriátrica) (1.32 beds/>65a).<sup>27</sup> In the Second National IC Audit in UK were identified 0.02–1.2 beds per 1000 eligible patients<sup>20</sup> and in the EUGMS survey 0–70/100,000 inhabitants.<sup>28</sup> On the other hand, the quality of responses was high in the study with 100% completion.

In the National Registry of Hip Fracture (RNFC), within 52,000 processes registered in participating hospitals, 18% were referred to FRU with a variable distribution among communities observing higher percentages in Catalonia (49%), Aragon (33%), Madrid (20%) and Basque Country (19%), and without records in communities such as Andalusia, Cantabria and Extremadura (0%).<sup>29</sup>

#### *Characteristics of the participating center*

Most FRU are based in ICH, with others care levels enhancing synergy and patient allocation. There are different models of care from functional enablement in tertiary hospitals to Nursing-Homes with reduced medical input, but this type of Intermediate

care model in ICH might give a balanced answer between complexity, precision of care and costs.<sup>23,30</sup> Also, in some communities the lack of FRU means that older adults are discharged home with decapacitating clinical events and a lack of specific interventions.

#### *Patient selection*

Early access and proper selection are essential to achieve functional and care objectives, and the lack of these is identified as a potential barrier towards care outcomes with 7.19/10 and 8.03–8.8/10 points respectively.<sup>31,32</sup>

Patient selection is key to meet functional outcomes or clinical achievements and clients safety.<sup>31</sup> In Madrid, there is an IC-Coordination-Unit of the Madrid Health Service (SERMAS),<sup>33</sup> which has modified the management, accessibility and provision of resources.<sup>31</sup> In Catalonia, the evolution of the interdisciplinary functional social-health unit (UFISS) to the hospital support team as a resource within acute hospitals has been advocated.<sup>34</sup> In this study high differences between centers and specificity of care has been shown, regarding quality indicators and standards of care. In UK, where such differences also exist, higher functioning centers are modelled and followed as benchmarking opportunities, but in Spain transparency and publicly published quality standards difficult management by health dispensers. However, as Geriatricians, we can discuss the need of higher standards of care in a few scarce centers, or the generalization of care with sufficient standards, guaranteeing prompt access to FRU, which should be clearly a quality indicator as it is in UK.<sup>35</sup> While we make a united national improvement effort, a benchmarking strategy with comparable quality indicators may be sought, led by ICW groups, scientific societies, patients' aggrupation's, the Ministry of Health and local/Community Health Authorities. A 48 h response FRU-access was deemed relevant by staff, similar to UK-IC standards<sup>36</sup> although not measured in our study due to lack of recorded data. Considering per-population beds ratios, it is highly unlikely to meet these standards.

#### *Professional staff*

Regarding SEGG standards, staff ratios of 15.94 and 14.91 beds/doctor and beds/nurse slightly disagree with the opinion of respondents who report the ideal of 14.3 beds/doctor and 11.7 beds/nurse motivated by changes in patients' profiles, with higher medical and social complexity, together with higher standards of desired care. As other IC levels of care are developed, bed based functional-oriented resources may remain for most complexes clinical cases which may need to be described in further studies. In the UK system, patients are classified in four groups combining higher or lower clinical complexity and higher or lower rehabilitation needs. Therefore higher clinical-complexity and higher rehabilitation-need patients are more likely to be admitted to geriatric rehabilitation hospital wards impacting also length of stay or outcome measures. In our system, there is lack of general access to geriatric rehabilitation for many patients and the percentage of the population in need that finally reach or lack these resources has not been, and should be, measured. Although there has been a calculation of beds needed,<sup>27,37–40</sup> there has not been the opposed calculation of those in need who do not access these resources. Also, there is not a clinical or social efficient response for those who lack the capacity of functional or clinical recovery and lack domiciliary support for their care needs and end using inefficiently this clinical resource. Moreover, responders emphasize the need of geriatric medicine specialists presence both in management and clinical leadership. This is important considering clinical, biological and functional complexity of older adults with acute functional impairment. Although in a global perspective, the lack of accessi-

bility to Geriatric Specialist hospital beds is still a reality, and AGU must be a priority, FRUs cannot be avoided or forgot in their development and prioritization, as synergic to other resources. Their naming should also be considered to be functional recovery units for older adults or geriatric functional recovery units, because the specific needs of these patients must be attended with the correct specialization.

### *Comprehensive geriatric assessment and protocols*

The opinion of respondents is that there should be protocols for the prevention of geriatric syndromes with an importance >9/10. The areas of greatest discrepancy between opinion and reality are protocols for malnutrition, depression, incontinence, polypharmacy, frailty-sarcopenia, strength/resistance exercises and their adaptation to people with dementia. These protocols for geriatric syndrome identification and correct management should be mandatory and audited, not only as a process, but also as a result, as they highly impact functional and mortality outcomes.<sup>35</sup>

CGA is carried out in most FRU <48 h of admission and in most cases weekly interdisciplinary team meetings are held. These reflect high standard of quality process indicators being met by FRU facilities and should be clearly implemented in those units who still don't meet these, which should be considered minimum-quality standards. Teams are incorporating professionals such as nutritionists, language-therapists or clinical psychologists who, due to the frequency of dysphagia, depression, and malnutrition, may be included as quality standards, as well as the figure of liaison nursing at discharge and specified its specific role not only as a discharge figure but also facilitating follow up services.

### **Research and teaching**

Over 90% of FRU report teaching, undergraduate and postgraduates, MIR in almost half, EIR in 62%. The interdisciplinary nature of the teams is reflected in the training offered. This represents an added effort to the healthcare activity for the teams, which must be valued and recognized as an investment in the context of a shortage of healthcare staff and salary recognition. The effort in research is striking, in 23 URFs without funding, in 11 with it, identifying barriers to it with a high score (>8/10). This time and effort should also be recognized by Health and local authorities with time and research facilitation. The IC working group in SEGG has offered all the participants in this study to enroll a research-facilitation network.

### *Results*

Although most participants support SEGG LOS-standards there are 9 dissenting opinions suggesting higher LOS, probably reflecting disparity in unit types and clients, clinical complexity, local difficulties or staff shortages.

On the other hand, the Catalanian-Strategic-Plan (PEC-2023) introduces process-LOS-stratifications: LOS-general standards <30 days for ≥50% admissions; LOS-Orthogeriatric <35 days, 30% admissions with LOS <15 days; stroke-rehab-LOS <65 days.<sup>18</sup>

Respondents in this study report assessing functional outcomes using BI alone at admission and discharge; only 43% report using absolute functional gain, recommended by SEGG as a process standard. Twenty eight percent use functional gain efficiency and 19% use relative functional gain, reflecting greater knowledge of indicators.<sup>41,42</sup>

However, functional specific results have not been asked due to difficulty accessing data, highlighting SEGG recommendation of Absolute-Functional-Gain (IB) >20 points, Efficiency (Functional-Gain (IB)/LOS) >1 point. In PEC-2023, quality standards for the

general process include functional improvement in 60–80% and efficiency >0.5 points BI/day in >80% of patients. In orthogeriatric, rehabilitation efficiency >1 is proposed in >80% of admissions.<sup>18</sup> If a benchmarking national-audit strategy is followed, the better half of the interquartile range of these figures should be considered as key indicators.

Mortality, referral to emergency departments, and readmissions to AGU have a moderate variability within the recommended standards, needing further studies and a higher sample size to seek related factors. These have also been set as quality indicators in studies in other countries.<sup>8,43</sup> In some communities, patients may be transferred to temporal nursing homes to complete their convalescence before returning home, an aspect that was not considered in this questionnaire, and those with no access at all to geriatric rehabilitation are unknown.

In our study, the URFs have an average of almost 5 referral hospitals with a range of 1–30 hospitals. This reflects the disparity in accessibility and geographic dispersion according to local Health Care Systems. Responders referred that closeness to tertiary hospitals should be desired, but the importance of geographical accessibility to all older adults in need should also be considered.

2023-PEC introduces specific objectives regarding discharge: the standard for returning to the previous home is set at 60–70% (including prior institutionalization); and a standard for referral to long-stay units <10% cases. In neurorehabilitation, the rate of new institutionalization is stratified by level of dependency at discharge, <35% (high dependency) and <17% for the rest.

These results underline the need for national consensus integrating general recommendations and processes, standards stratification to optimize effectiveness and efficiency of these units and patients' opinions to improve care quality and standards. Several models of quality indicators for intermediate care have been proposed both in Europe and US,<sup>21,25,44–46</sup> but probably the FRU Spanish model is a specific and high quality model between Tertiary Hospital and community or nursing skilled facilities, therefore the indicators considered should encompass prompt clinical and geographical accessibility, geriatric syndromes assessment, functional improvement and length of stay, secondary prevention and specific clinical process-specific outcomes, discharge status (domiciliary versus institutionalization), functional recovery, rehospitalizations or discharge back to hospital, mortality and costs of care. These quality indicators development and application should be assessed by users and older adults' opinions.

This study should be followed by a registry-type further research which will allow further benchmarking opportunities, a national consensus of policies, guidelines, quality indicators adjusted to our health system,<sup>21</sup> and a progressive reinforcement of resources and geriatric specialty doctors planning, firstly guaranteeing access to specific geriatric acute and postacute specific and board (MIR) certified care in those autonomous communities with a lack of geriatric medicine development, and at the same time assuring that actual functioning units meet a minimum set of quality indicators. Stablishing those units with higher experience and better outcomes as benchmarking/learning opportunities, rather than signaling deficiencies of those units with lower development. The use of a minimum data set of quality indicators is desired because it can serve to improve quality of health care, accessibility, health and reimbursement policies.

### *Limitations*

This work has many limitations that have been mentioned when discussing results. Firstly, data are only available from 32% of potential identified centers and 58% of identified ones. A selection bias towards geriatrician-led units is likely reflecting at least high-quality standards units. However, for those centers where

activity is not audited, answers about indicators may not be accurate. Lastly, as responses were anonymous, it was not possible to relate FRU characteristics centers with sociodemographic and healthcare characteristics of their local areas. Also, the study did not include functional outcome measures which is its main limitation, but as the researchers predicted, there is a lack of internal audit in many centers, so functional outcome measures would not have been possible to obtain. This should be the main addition in a registry type study, which could not be made at this point.

## Conclusions

This study provides the most comprehensive and up-to-date overview of characteristics and functioning of hospital-FRUs in Spain. There is a need for a coordinated national plan allowing continuous monitoring through a systematic and standardized registry, supported by scientific societies, by patients' aggrupation's and central government. This approach would facilitate not only the detailed analysis of clinical and functional results but also design and implementation of evidence-based improvement strategies and high-quality patient centered care.

For future analyses, incorporating quality standards that consider care and functional outcomes and patient experience as key indicators is essential. This holistic approach would improve users' needs and expectations, strengthening the impact of URFs in health systems.

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## Conflict of interests

The authors declare no conflict of interests.

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