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Case Report

Frailty Driven by Clinical, Social, and Environmental Barriers in an Oxygen-Dependent Older Woman: A Case Report

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ABSTRACT

Background: Frailty is a multidimensional geriatric syndrome characterised by increased vulnerability to adverse outcomes. Beyond biological ageing, clinical conditions, psychosocial factors, and environmental barriers play a critical role in its develop-ment and progression. Oxygen dependence may further compromise physiological reserve and functional capacity.

Case Presentation: We report the case of a 69-year-old community-dwelling woman with a history of pulmonary thromboembo-lism, peripheral vascular disease, and Sjögren's syndrome requiring chronic oxygen therapy. A comprehensive geriatric assess-ment (CGA) revealed moderate dependence in basic activities of daily living (Barthel Index: 85/100) and functional impairment (Katz Index: 4/6), with preserved instrumental function (Lawton Scale: 8/8). Frailty was identified (FRAIL score: 3/5). Physical performance was reduced (Short Physical Performance Battery: 7/12), with markedly decreased gait speed (0.16 m/s) and in-creased risk of falls (Timed Up and Go: 20.66 seconds). Cognitive function was preserved (Mini-Mental State Examination: 29/30; Mini-Cog: 5/5). Emotional assessment revealed clinically significant depressive symptoms (CESD-7: 12/21), despite a non-pathological Geriatric Depression Scale score (4/15). Nutritional status was adequate (Mini Nutritional Assessment: 13/14; BMI: 24.9 kg/m^2). Additional findings included urinary incontinence, sleep disturbances, visual impairment, family dysfunction, social isolation, and environmental barriers.

Conclusion: This case illustrates how frailty may emerge from the interaction of clinical, social, and environmental barriers rather than disease burden alone. Comprehensive geriatric assessment enables identification of these multidimensional factors and supports targeted, multidisciplinary interventions.

Keywords

Multimorbidity, Non-communicable diseases, Older adults, Oral health.

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Introduction

Frailty is a clinical syndrome characterised by reduced physiological reserve and increased vulnerability to stressors, leading to higher risks of disability, hospitalisation, and mortality, and, consequently, is an emerging global health burden [1-3]. Traditionally associated with ageing and chronic disease, frailty is now recognised as a multidimensional condition influenced by biological, psychological, and social factors [1-6].

Social isolation, emotional distress, family dynamics, and environmental barriers have been identified as key contributors to frailty progression, influencing both physical performance and overall wellbeing [4,7]. These factors may act synergistically, accelerating vulnerability even in individuals with relatively preserved cognitive or nutritional status [1,7-9].

Given this complexity, the assessment of frailty requires a comprehensive and multidimensional approach. A comprehensive geriatric assessment (CGA) is considered the gold standard for evaluating older adults, as it systematically integrates medical, functional, cognitive, psychological, and social domains in order to guide clinical decision-making and improve outcomes [10-13]. CGA allows the identification of often-overlooked deficits and the interaction between domains that contribute to functional decline.

Despite its recognised value, CGA remains underutilised in routine clinical practice, particularly in community-dwelling older adults with complex but non-acute conditions. This may lead to under-recognition of frailty and missed opportunities for early intervention.

This case report aims to illustrate how frailty may emerge from the interaction of clinical, social, and environmental barriers, and to highlight the importance of comprehensive geriatric assessment in identifying multidimensional vulnerability and guiding personalised care.

Methods

Comprehensive Geriatric Assessment Methodology

A comprehensive geriatric assessment (CGA) was conducted using a multidimensional approach encompassing functional, cognitive, affective, nutritional, and psychosocial domains, employing validated instruments with established clinical cut-off points.

Functional Assessment

Functional status was assessed using the Barthel Index [14-15] and Katz Index [14,16,17] for basic activities of daily living (BADL), and the Lawton and Brody Scale [1,14,17-19] for instrumental activities of daily living (IADL). The Barthel Index, is a 10-item instrument that evaluates independence in bathing, dressing, grooming, toilet use, stair use, transfers bed-to-chair, mobility, urinary incontinence, faecal incontinence, and feeding [14-15]. Each item is scored according to the level of assistance required, as follows: bathing/showering (independent: able to bathe or shower completely and enter/leave without assistance; dependent: requires assistance or supervision); dressing (independent: able to dress and undress, fasten clothing and manage accessories; needs help: performs at least half of the tasks independently; dependent: requires assistance with most tasks); personal grooming (independent: performs all grooming activities such as washing, oral care, shaving or applying make-up; dependent: requires assistance); toilet use (independent: able to use the toilet, including transfers, hygiene and clothing; needs help: requires assistance with balance, hygiene or clothing; dependent: requires full assistance); stair climbing (independent: able to go up and down stairs without supervision, may use a handrail; needs help: requires assistance or supervision; dependent: unable to use stairs); transfers (bed to chair) (independent: no assistance required; minimal assistance: requires supervision or minor help; major assistance: requires substantial help but can remain seated; dependent: requires two people or mechanical assistance); mobility (independent: able to walk at least 50 metres without assistance, may use aids except a walking frame; needs help: requires assistance or supervision, or uses a walking frame; independent in wheelchair: able to propel wheelchair independently; dependent: unable to ambulate or propel independently); bladder control (urinary continence) (continent: no incontinence episodes and independently manages devices; occasional incontinence: up to one episode per 24 hours; incontinent: more than one episode per 24 hours); bowel control (faecal continence) (continent: no incontinence episodes and independently manages enemas or suppositories; occasional incontinence: approximately one episode per week; incontinent: more than one episode per week); and feeding (independent: able to eat using any utensils within a reasonable time; needs help: requires assistance with food preparation but feeds independently; dependent: requires assistance for feeding) [14]. The total score ranges from 0 to 100, where higher scores indicate greater independence [14]. Functional status was categorised as follows: total dependence (0–20), severe dependence (21–60), moderate dependence (61–90), slight dependence (91–99), and independence (100) [20]. The Katz Index was used to assess independence in six basic functions: bathing, dressing, toileting, transferring, continence, and feeding [14,16]. Scores range from 0 to 6, with lower scores indicating greater functional impairment [14,16]. Functional status was classified as follows: category A (independent in all basic activities of daily living); category B (independent in all activities except one); category C (independent in all activities except bathing and one additional activity); category D (independent in all activities except bathing, dressing, and one additional activity); category E (dependent in bathing, dressing, toilet use, and one additional activity); category F (dependent in bathing, dressing, toilet use, transfers, and one additional activity); category G (dependent in all six basic activities of daily living); and category H (dependent in two activities but not classifiable within categories C, D, E, or F) [14]. The Lawton and Brody Scale, is an 8-item tool assessing telephone use, transportation, medication management, financial handling, shopping, food preparation, housekeeping, and laundry [14,18]. Scores range from 0 to 8, with higher scores indicating greater independence [14]. Functional status was classified as follows: total dependence (scores 0–1),

severe dependence (scores 2–3), moderate dependence (scores 4–5), mild dependence (scores 6–7), and independence (score 8) [14]. Although extensively used to assess instrumental functioning, the Lawton and Brody Scale was not originally developed as a frailty instrument [1]. Its ability to discriminate frailty remains insufficiently validated, and potential gender-related bias has been reported. However, previous studies have suggested that a score of ≤3 points may identify frail older adults with a sensitivity of 86% (95% CI: 74–94) and a specificity of 93% (95% CI: 89–95) [1].

Physical Performance and Frailty Assessment

Physical performance was evaluated using gait speed, the Timed Up and Go (TUG) test, and the Short Physical Performance Battery (SPPB), applying established cut-off val-ues [14,21-25], all of which are widely used for the identification of frailty and functional decline in older adults.

The Short Physical Performance Battery (SPPB) is a performance-based measure of lower-extremity function that includes standing balance, gait speed, and repeated chair stands [14,21-22,26]. Total scores range from 0 to 12, with higher scores indicating better physical performance [14]. According to the CGA instruments guide from Instituto Nacional de Geriatría, scores <8 points indicate low physical performance [14]. For frailty screening, the most widely accepted threshold is <10 points [1], whereas a cut-off of <6 points has demonstrated a sensitivity and a specificity of 88% (95% CI 76–95; and 83–91, respectively) for identifying frailty [1].

The Timed Up and Go (TUG) test evaluates functional mobility by measuring the time required to stand up from a chair, walk three metres, turn, return to the chair, and sit down [14]. Values ≤10 seconds are considered normal, times between 11 and 13 seconds indicate mild functional disability, and values ≥14 seconds are associated with an increased risk of falls [14]. For frailty screening, a cut-off of ≥18 seconds has demonstrated a sensitivity of 93% (95% CI 82–98) and a specificity of 98% (95% CI 95–99) [1].

Usual gait speed was measured and expressed in metres per second (m/s) [14]. A gait speed of <1.0 m/s has been associated with an increased risk of adverse outcomes [14], including disability, hospitalisation, and mortality. A gait speed of <0.8 m/s is considered indicative of reduced physical performance and constitutes one of the components used in the identification of sarcopenia [1,14].

Cognitive and Affective Assessment

Cognitive function was evaluated using the Mini-Mental State Examination (MMSE) and the Mini-Cog.

The Mini-Mental State Examination (MMSE) is a 30-point cognitive screening instrument that assesses orientation, registration, attention and calculation, recall, language, and visuoconstructive abilities [14,27]. The CGA instruments guide from Instituto Nacional de Geriatría considers a score of 24 points or lower suggestive of cognitive impairment [14]. Therefore, to maintain consistency with this threshold, the severity categories derived from the Mexican Clinical Practice Guideline (CPG; No. IMSS-479-11) were adjusted, defining 25–30 points as normal cognition, 19–24 points as mild cognitive impairment, 14–18 points as moderate cognitive impairment, and ≤13 points as severe cognitive impairment [10].

The Mini-Cog is a brief cognitive screening tool consisting of a three-word delayed recall task and a clock-drawing test, yielding a total score ranging from 0 to 5 points [14,28,29]. Scores of ≤2 points were considered suggestive of cognitive impairment, whereas scores of 3–5 points were considered indicative of preserved cognitive function [14].

Affective status was assessed using the 15-item Geriatric Depression Scale (GDS-15) and the 7-item Centre for Epidemiologic Studies Depression Scale (CESD-7) [14].

The GDS-15 is a screening instrument specifically developed for the detection of depressive symptoms in older adults. Scores range from 0 to 15 points [14,30-32]. The CGA instruments guide considers scores of 5 points or greater suggestive of depressive symptomatology [14]. Therefore, to ensure consistency between screening and severity classification, the categories derived from the Mexican CPG-IMSS-479-11 were adjusted, defining 0–4 points as absence of depressive symptoms, 5–9 points as mild depressive symptoms, and ≥10 points as established depression [10].

The CESD-7 is a brief screening instrument for depressive symptomatology in older adults [14,33]. Scores range from 0 to 21 points [14]. According to the CGA instruments guide, scores of <5 points are considered normal, whereas scores of ≥5 points indicate clinically significant depressive symptoms requiring further evaluation [14].

Nutritional Assessment

Nutritional status was assessed using the Mini Nutritional Assessment–Short Form (MNA-SF), complemented by the Malnutrition Universal Screening Tool (MUST) and the SARC-F questionnaire, allowing the identification of malnutrition, risk of malnutrition, and probable sarcopenia [14].

The Mini Nutritional Assessment–Short Form (MNA-SF) is a six-item screening tool designed specifically for older adults [14,34-36]. It evaluates recent food intake, unintentional weight loss, mobility, psychological stress or acute illness, neuropsychological problems, and body mass index (BMI) or calf circumference when BMI cannot be obtained [14]. Total scores range from 0 to 14 points [14]. According to the institutional geriatric assessment guide, scores of 12–14 points indicate normal nutritional status, 8–11 points indicate risk of malnutrition, and ≤7 points indicate malnutrition [14].

The Malnutrition Universal Screening Tool (MUST) is a five-step screening instrument that assesses nutritional risk through three components: body mass index, unintentional weight loss, and the

presence of acute illness associated with reduced nutritional intake [14]. Total scores classify individuals as low risk (0 points), medium risk (1 point), or high risk (≥2 points) for malnutrition [14].

Probable sarcopenia was assessed using the SARC-F questionnaire, a five-item instrument evaluating strength, assistance in walking, rising from a chair, climbing stairs, and falls [14,37]. Scores range from 0 to 10 points, with scores of ≥4 points considered suggestive of sarcopenia, while scores <4 points indicate a low probability of the condition [14].

Family, Social, and Environmental Assessment

Family function was evaluated using the Family APGAR [38]. Social support was assessed using an adapted version of the Older Americans Resources and Services (OARS) scale [14], in which the response format was modified to improve contextual applicability.

The Family APGAR is a five-item instrument developed by Smilkstein to assess an individual's perception of family functioning across five domains: adaptability, partnership, growth, affection, and resolve [38]. Each item is scored from 0 to 2, yielding a total score ranging from 0 to 10 points [38]. Family functioning was classified as functional (7–10 points), moderately dysfunctional (4–6 points), or severely dysfunctional (0–3 points), according to the original scoring system proposed by the author [38].

Older Americans Resources and Services (OARS) Social Resource Scale

Social resources were assessed using an adapted version of the Social Resource Scale derived from the Older Americans Resources and Services (OARS) multidimensional functional assessment instrument [14]. The original conceptual domains of the instrument were preserved, including social contacts, social participation, interpersonal trust, perceived loneliness, satisfaction with social relationships, and availability of support during illness.

Several modifications were introduced to improve comprehensibility, cultural applicability, and clinical utility in community-dwelling older adults. Rather than using the original response structure, items were reformulated into clearly defined ordinal categories that reflected the frequency, availability, and perceived adequacy of social interactions and support. This adaptation was intended to reduce ambiguity in responses and facilitate administration during routine gerontological assessments.

The adapted instrument evaluated the frequency of visits with relatives and friends, the number of individuals available for social interaction, frequency of telephone contact, time spent with other people, availability of trusted persons, perceived loneliness, satisfaction with social relationships, and access to support during illness. Particular emphasis was placed on distinguishing objective social contacts from subjective social experiences. Perceived loneliness was assessed through the question 10 and 11, respectively: *"Do you feel lonely or alone?" *, whereas satisfaction with social relationships was evaluated through the question, *"Do you see your relatives and friends as often as you would like?" * These modifications allowed separate assessment of social isolation, loneliness, and perceived adequacy of social support.

Each item was scored using a four-point ordinal scale ranging from 0 to 3 points, with higher scores indicating more favourable social resources. Item-specific categories were subsequently standardised into four levels of interpretation: **severely impaired social resources**, **impaired social resources**, **good social resources**, and **excellent social resources**. A global social resource score was obtained by summing the individual item scores, allowing an overall assessment of the participant's social support network and social vulnerability.

The adaptation maintained the theoretical framework of the original OARS instrument while improving interpretability, contextual relevance, and applicability within the comprehensive geriatric assessment process. As the modifications primarily involved response categories and scoring procedures, the instrument should be considered an adapted version of the OARS Social Resource Scale rather than a newly developed measure.

While the original conceptual domains were preserved, the response options for items 5 to 13 were reformulated into a unified four-level ordinal structure representing progressively higher levels of social resources: (1) severely impaired, (2) impaired, (3) good, and (4) excellent social resources (Table 1).

Each item was operationalised by mapping its original categorical responses onto this shared interpretative framework. This standardisation allowed for comparability across heterogeneous indicators of social interaction, perceived support, and subjective satisfaction.

Following standardisation of all items into a four-point ordinal response format, the OARS Social Resource Scale was transformed from a qualitative categorical measure into a quantitative composite index.

Each item (items 5–13) was coded from 0 to 3 points, where higher scores indicated better social resources. The total social resource score was obtained by summing the nine items, resulting in a possible score range from 0 to 27 points.

For interpretative purposes, the total score was further categorised into four levels of social resources:
Severely impaired social resources: ≤ 6 points
Impaired social resources: 7–13 points
Good social resources: 14–20 points
Excellent social resources: 21–27 points

This procedure transformed the instrument from a qualitative assessment into a semi-quantitative index, enabling statistical analysis and clinical interpretation within a gerontological assessment framework.

Table 1: Crosswalk between original OARS Social Resources Scale response categories and the adapted social resource classification used in this study.

Item	Response categories (original) — Interpretation (adapted scale)
5.	Never or ≤1/year — Severely impaired social resources Every 4–6 months — Impaired social resources Every 1–3 months — Good social resources ≥1/month — Excellent social resources
6.	None — Severely impaired social resources 1–2 persons — Impaired social resources 3–4 persons — Good social resources ≥5 persons — Excellent social resources
7.	None — Severely impaired social resources Once/week — Impaired social resources 2–6 times/week — Good social resources Daily — Excellent social resources
8.	None — Severely impaired social resources Once/week — Impaired social resources 2–6 times/week — Good social resources Daily — Excellent social resources
9.	No — Severely impaired social resources Limited trust — Impaired social resources Sufficient trust — Good social resources Full trust — Excellent social resources
10.	Always — Severely impaired social resources Frequently — Impaired social resources Sometimes — Good social resources Never — Excellent social resources
11.	Very unsatisfactory — Severely impaired social resources Unsatisfactory — Impaired social resources Satisfactory — Good social resources Very satisfactory — Excellent social resources
12.	No support — Severely impaired social resources Occasional support — Impaired social resources Short-term support — Good social resources Long-term/permanent support — Excellent social resources
13.	Very unsatisfactory — Severely impaired social resources Unsatisfactory — Impaired social resources Satisfactory — Good social resources Very satisfactory — Excellent social resources

Source: Adapted and elaborated by the authors from the original OARS Social Resources Scale. The adapted framework was developed to standardise the interpretation of social resources into four levels: severely impaired, impaired, good, and excellent. All items were coded on a four-point ordinal scale ranging from 0 to 3. The direction of scoring was uniform across all items as follows: Severely impaired social resources = 0 points; impaired social resources = 1 point; good social resources = 2 points; and excellent social resources = 3 points.

Environmental and Mobility Barrier Assessment

Environmental assessment was conducted through a structured home- and context-based evaluation designed to identify physical and functional barriers that may restrict mobility, participation, and independence in older adults. The instrument was based on the standardised items described in the CGA instruments guide from Instituto Nacional de Geriatría, Secretaría de Salud de México, which operationalises environmental determinants of functioning within a comprehensive geriatric assessment framework [14].

Domains of assessment

The evaluation was organised into the following functional domains [14]:

1. **Mobility within the home environment**

Assessment of internal home mobility conditions, including architectural characteristics, circulation spaces, and environmental obstacles that may limit safe movement within the dwelling [14].

2. **Mobility outside the home environment**

Assessment of environmental conditions affecting ambulation in immediate external settings, including access routes, sidewalks, entrances/exits, and surrounding physical infrastructure [14].

3. **Barriers to physical activity**

Assessment of environmental and contextual constraints that limit engagement in regular physical activity, including lack of appropriate spaces, safety concerns, or structural limitations [14].

4. **Barriers to social participation**

Assessment of environmental conditions that restrict participation in social, community, or recreational activities, including accessibility, transport availability, and contextual barriers to engagement [14].

5. **Barriers to mobility in transport systems**

Assessment of accessibility and usability of transport services, including public transport infrastructure, boarding conditions, seating accessibility, and related mobility constraints [14].

6. **Availability of assistive devices**

Assessment of the presence, adequacy, and functional use of assistive technologies and mobility aids (e.g., walking aids, grab bars, wheelchairs) [14].

Response format and coding

Each item was assessed using a dichotomous response format:
Presence of barrier
Absence of barrier

All items were coded individually and subsequently aggregated by domain for analytical purposes [14].

Interpretation of results

Domain-level interpretation was defined as follows [14]:
Presence of ≥1 barrier within a domain: interpreted as environmental limitation affecting functioning in that domain.

No barriers identified within a domain: interpreted as adequate environmental conditions supporting mobility and participation.

At the global level, the presence of at least one barrier in any domain was interpreted as overall environmental limitation,

whereas absence of barriers across all domains was interpreted as environmental adequacy supporting autonomy and participation.

Pharmacological Assessment and Medication Appropriateness Review

A structured medication review was performed using the STOPP/START version 3 criteria [39] to assess the appropriateness of the patient's pharmacological treatment and identify potentially inappropriate medications (PIMs) and potential prescribing omissions (PPOs).

Ethical Considerations

This case report was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and current standards for clinical research involving human participants. All personal identifiers were removed prior to manuscript preparation to protect confidentiality and privacy. The report contains no information that would permit direct identification of the participant.

Results

Characteristics of the study population

Medical History

A sexagenarian female patient, resident of Mexico City, with a family history of cardiovascular disease and gastrointestinal malignancy, presented for geriatric evaluation. She is divorced, lived with one daughter, reported economic dependence, and is residing in a dwelling with access to basic urban services. Educational attainment corresponded to upper secondary education (12 years of formal schooling). Her medical history is significant for multiple chronic conditions affecting the musculoskeletal, cardiovascular, vascular, and autoimmune systems.

Relevant diagnoses included peripheral vascular disease, gonarthrosis, chronic low back pain, Sjögren's syndrome, chronic venous insufficiency (grade II), left lower limb thrombosis, sequelae of pulmonary embolism, biventricular insufficiency, lumbar spinal stenosis, and mixed anxiety–depressive disorder.

She reported allergies to ciprofloxacin, sulfonamides, diclofenac, and an unspecified topical agent. Surgical history included two caesarean sections and tonsillectomy. Previous trauma included fractures of the left ankle and fifth metatarsal. She had prior hospitalisations due to pulmonary embolism (secundary to its previously fracture of the left fifth metatarsal) and anaphylactic shock.

Clinical Interview

The patient reported progressive difficulty in walking, urinary incontinence, visual impairment, and sleep disturbances. She denied memory complaints. From a psychosocial perspective, she reported social isolation, family conflict (particularly communication difficulties with her daughter), and perceived harassment from neighbours, generating feelings of fear, pressure, and emotional distress. She also reported bereavement following the death of two siblings. Dietary intake was described as adequate; however, sleep quality was poor.

Physical Examination

General examination revealed a conscious, cooperative, and oriented patient, with preserved hydration and no acute cardiopulmonary compromise. Musculoskeletal evaluation showed functional limitation for ambulation. No peripheral oedema was observed. Peripheral perfusion was preserved. Neurological examination showed no focal deficits, with preserved strength and sensitivity. Moreover, the patient has a history of chronic oxygen dependence exceeding one year and remains on long-term supplemental oxygen therapy.

Diagnostic Assessment and Results

Physical performance assessment revealed a consistent pattern of frailty-related impairment (Table 2). Objective measures demonstrated marked reductions in gait performance, lower extremity function, and mobility. The convergence of frailty screening, physical performance testing, and mobility assessment supported the classification of physical frailty with substantial functional reserve depletion. Although instrumental activities of daily living remained preserved (Table 3), performance-based measures identified significant vulnerability and increased risk of adverse outcomes.

Table 2: Frailty, mobility and physical performance assessment.

Instrument	Result	Interpretation
FRAIL	3/5	Frail
SPPB	7/12	Low physical performance
TUG	20.66 s	High risk of falls
Gait speed	0.33 m/s	Severely reduced gait performance
SARC-F	1/10	Low probability of sarcopenia

Source: Authors' own elaboration based on data collected during the patient's comprehensive geriatric assessment. FRAIL = Fatigue, Resistance, Ambulation, Illnesses, and Loss of Weight; SPPB = Short Physical Performance Battery; TUG = Timed Up and Go; SARC-F = Strength, Assistance with walking, Rise from a chair, Climb stairs, and Falls; s = seconds; m/s = metres per second.

Assessment of basic and instrumental functional capacity demonstrated a heterogeneous profile. Whilst instrumental autonomy remained intact, difficulties were observed in basic activities of daily living, suggesting the presence of early functional decline (Table 3).

Table 3: Functional assessment.

Instrument	Result	Interpretation
Barthel Index	85/100	Moderate dependence
Katz Index	4/6, H clasification	Partial functional impairment
Lawton and Brody	8/8	Independent in instrumental activities

Source: Authors' own elaboration based on data collected during the patient's comprehensive geriatric assessment.

Cognitive evaluation showed preserved global cognitive function across screening instruments. No evidence of clinically significant cognitive impairment was identified (Table 4). In contrast, emotional assessment revealed an important psychosocial burden (Table 4). The participant reported persistent sadness, fear, interpersonal conflict, sleep disturbance, and previously bereavement following the loss of two sisters. Furthermore, she described ongoing neighborhood harassment and feelings of being trapped within her home environment. Although depressive symptoms did not reach the threshold for major depression on the GDS-15, the CESD-21 identified clinically relevant depressive symptomatology requiring further evaluation.

Table 4: Cognitive and emotional assessment.

Instrument	Result	Interpretation
Mini-Cog	5/5	No evidence of cognitive impairment
MMSE	29/30	Preserved cognition
GDS-15	4/15	Within normal range
CESD-21	12/21	Clinically significant depressive symptoms

Source: Authors' own elaboration based on data collected during the patient's comprehensive geriatric assessment. MMSE = Mini-Mental State Examination; GDS-15 = 15-item Geriatric Depression Scale; CESD-21 = 21-item Center for Epidemiologic Studies Depression Scale. Mini-Cog = Mini-Cog Cognitive Screening Test.

Nutritional screening demonstrated adequate nutritional status across all instruments (Table 5). Body mass index remained within the normal range, and no recent weight loss was documented. Both screening tools consistently indicated a low probability of malnutrition, suggesting that nutritional compromise was not a major contributor to the observed frailty phenotype.

Table 5: Nutritional assessment.

Instrument	Result	Interpretation
MNA-SF	13/14	Normal nutritional status
MUST	0	Low risk of malnutrition
BMI	24.97 kg/m²	Normal weight
Recent weight loss	No	Stable body weight

Source: Authors' own elaboration based on data collected during the patient's comprehensive geriatric assessment. MNA-SF = Mini Nutritional Assessment–Short Form; MUST = Malnutrition Universal Screening Tool; BMI = Body Mass Index; kg/m² = kilograms per square metre.

Sensory evaluation identified visual impairment and dental problems, without hearing loss. Risk assessment for pressure injuries yielded discordant findings. The Braden Scale indicated minimal risk, whereas the Norton Scale suggested a moderate level of vulnerability (Table 6). Although no current skin integrity problems were identified, reduced mobility and functional impairment justify ongoing surveillance.

Table 6: Pressure injury risk assessment.

Instrument	Result	Interpretation
Braden Scale	24/24	Low risk
Norton Scale	14/20	Moderate risk

Source: Authors' own elaboration based on data collected during the patient's comprehensive geriatric assessment.

The social assessment identified a complex pattern characterised by the coexistence of available support and significant relational strain. Although overall social resources were classified as adequate, the participant reported social isolation, reduced participation in recreational activities, and persistent conflict with family members. Family functioning was severely compromised according to the APGAR score, indicating substantial dysfunction within the household support network (Table 7).

Table 7: Social and family assessment.

Instrument	Result	Interpretation
OARS Social Resources Scale	17/27	Good social resources
Family APGAR	2/10	Severely dysfunctional family

Source: Authors' own elaboration based on data collected during the patient's comprehensive geriatric assessment.

Environmental assessment revealed multiple barriers affecting mobility, participation, and engagement in physical activity (Table 8). Obstacles were identified both within the home environment and in community participation domains. These barriers may contribute to reduced activity levels, social withdrawal, and worsening physical function, reinforcing the multidimensional nature of the participant's frailty.

Table 8: Environmental barriers and social participation.

Instrument	Result	Interpretation
Environmental Barriers Scale (EBEFM)	Positive	Presence of environmental barriers
Affected domains		
Indoor and outdoor mobility barriers	Present	Home environment (indoor and outdoor) contains obstacles that may restrict safe mobility and functional independence
Physical activity barriers	Present	Environmental conditions may limit engagement in regular physical activity and exercise
Social participation barriers	Present	Factors within the environment hinder participation in social and community activities
Transportation barriers	Present	Limited accessibility, affordability, reliability and safety of community transportation
Assistive device barriers	Absent	No environmental obstacles related to the use of assistive devices were identified

Source: Authors' own elaboration based on data collected during the patient's comprehensive geriatric assessment.

Overall, the comprehensive geriatric assessment identified a multidimensional frailty profile characterised by significant physical vulnerability, preserved cognitive function, clinically relevant depressive symptoms, severe family dysfunction,

environmental barriers, and moderate impairment in basic activities of daily living. Despite maintaining independence in instrumental activities and adequate nutritional status, the coexistence of physical, psychological, social, and environmental deficits places the participant at increased risk of disability, falls, hospitalisation, and further loss of functional capacity.

Diagnosis

Differential Diagnosis

The diagnostic assessment considered several conditions commonly associated with functional decline in older adults: age-related decline in physical performance; sarcopenia and probable physical deconditioning; frailty syndrome; depressive symptoms associated with psychosocial stressors; mobility impairment related to chronic musculoskeletal and vascular disease, and functional decline secondary to multimorbidity

Final Diagnosis

Based on the comprehensive geriatric assessment, the patient was diagnosed with:

a) Physical frailty syndrome, confirmed by FRAIL screening and performance-based measures.
b) Low physical performance, evidenced by impaired gait speed, reduced SPPB score, and prolonged Timed Up and Go test.
c) Moderate dependence in basic activities of daily living with preserved instrumental autonomy.
d) High risk of falls.
e) Clinically significant depressive symptoms associated with bereavement, family conflict, social isolation, and perceived neighbourhood harassment.
f) Environmental barriers affecting mobility, physical activity, and social participation.
g) Multimorbidity, including chronic vascular, musculoskeletal, and autoimmune conditions.

Interconsultations

The findings of the comprehensive geriatric assessment support referral to a multidisciplinary team aimed at addressing the physical, emotional, social, and environmental determinants of health.

Recommended interconsultations include:

a) Geriatric medicine for longitudinal management of frailty and multimorbidity.
b) Physical and rehabilitation medicine for mobility optimisation, strength training, and fall prevention.
c) Mental health services for evaluation and management of depressive symptoms and psychosocial distress.
d) Social work services to address family dysfunction, social isolation, and environmental challenges.
e) Nursing follow-up focused on health promotion, preventive care, and monitoring of functional status.

Treatment

The pharmacological assessment considered the patient's diagnoses, comorbidities, functional and cognitive status, laboratory findings, and current medication profile. Findings from the STOPP/START evaluation were integrated into the clinical decision-making process to guide medication optimization and deprescribing strategies.

Previous Pharmacological Treatment

Rivaroxaban 1 tablet every 24 h (3 years)
Hypromellose ophthalmic drops every 6 h (2 years)
Omeprazole 1 tablet every 24 h (3 years)
Fluticasone inhaled every 12 h (2 years)
Vitamin B complex 1 tablet every 24 h (1 year)
Paracetamol 1 tablet every 24 h (3 years)
Amitriptyline 1 tablet every 24 h (2 years)
Polymeric diet every 12 h (1 month)
Celecoxib 1 tablet every 24 h (2 months)
Long-term oxygen therapy (2 L/min continuously for 24 h/day for 3 years)

A multidimensional, person-centred intervention plan was established based on the results of the comprehensive geriatric assessment.

Current Pharmacological Treatment

Following a comprehensive geriatric pharmacological assessment based on the Screening Tool of Older Persons' Prescriptions and Screening Tool to Alert to Right Treatment version 3 criteria, several potentially inappropriate prescribing practices and clinically relevant prescribing omissions were identified. Amitriptyline was considered potentially inappropriate because of its high anticholinergic burden, which is associated with an increased risk of falls, functional decline, cognitive impairment, and urinary incontinence in older adults [40,41]. Gradual withdrawal was therefore recommended, with substitution by a selective serotonin reuptake inhibitor as a safer therapeutic alternative.

Celecoxib was identified as inappropriate due to the patient's history of heart failure and concurrent anticoagulant therapy. The combination of nonsteroidal anti-inflammatory drugs and anticoagulants significantly increases the risk of major bleeding events, while cyclooxygenase-2 inhibitors may contribute to cardiovascular decompensation [40,42]. Immediate discontinuation was therefore recommended.

Long-term use of omeprazole was also reviewed. In the absence of a clear ongoing indication, deprescribing was recommended because prolonged proton pump inhibitor therapy has been associated with an increased risk of osteoporotic fractures, enteric infections, and micronutrient deficiencies [40,43].

Inhaled fluticasone therapy was assessed during the pharmacological review. As the ongoing indication for inhaled corticosteroid treatment required specialist confirmation, the patient was referred to the pulmonology service for comprehensive respiratory evaluation and determination of the need for continued therapy [44].

Vitamin B complex supplementation was identified as potentially unnecessary because no documented vitamin deficiency or evidence-based indication was present. Discontinuation was therefore recommended [40].

Chronic use of acetaminophen for persistent pain was reviewed. Optimization of pain management was recommended, including consideration of duloxetine as an alternative therapeutic option for chronic musculoskeletal pain with an associated affective component, while maintaining a multimodal non-pharmacological approach [45,46].

Long-term home oxygen therapy was reviewed as part of the pharmacological and clinical assessment. Considering the need to verify the appropriateness of continued oxygen supplementation, the patient was referred to a pulmonology specialist for further evaluation and determination of ongoing treatment requirements [47].

Rivaroxaban therapy was considered appropriate given the patient's history of pulmonary thromboembolism. However, avoidance of concomitant nonsteroidal anti-inflammatory drugs was emphasized because of the substantially increased risk of bleeding associated with this combination [48].

In addition, several clinically relevant prescribing omissions were identified according to the START criteria. These included the absence of a selective serotonin reuptake inhibitor in a patient with clinically significant depressive symptoms, lack of vitamin D supplementation in a frail older adult at high risk of falls, absence of recommended immunizations including influenza, pneumococcal, and coronavirus disease 2019 vaccines, and the need for a comprehensive multimodal strategy for chronic pain management [40,46,49,50].

Based on these findings, an individualized management plan was established that included deprescribing of inappropriate medications, initiation of escitalopram, vitamin D supplementation (800–1000 UI/day) with calcium (1000–1200 mg/day (total diet + supplementation) according to clinical evaluation, optimization of analgesic therapy, updating of the vaccination schedule, continuation of hypromellose ophthalmic lubricant and polymeric nutritional supplementation, and multidisciplinary follow-up by geriatric medicine, cardiology, and pulmonology. The primary objectives were to reduce medication-related adverse events, improve functional status and quality of life, and prevent progressive clinical deterioration [1,40,41,44,46].

Non-pharmacological interventions included:

a) Individualised physical rehabilitation programme focused on lower-limb strengthening, balance training, and gait re-education.
b) Fall prevention strategies incorporating environmental risk reduction and mobility education.
c) Progressive multicomponent exercise programme adapted to functional capacity and cardiovascular tolerance, incorporating low-impact aerobic exercise, breathing exercises, balance and postural control training, gait re-education, flexibility exercises, and progressive muscle-strengthening activities.
d) Pulmonary rehabilitation interventions including diaphragmatic and controlled breathing exercises, oxygen therapy self-management education, activity-related oxygen saturation monitoring, and exercise prescription tailored to respiratory tolerance.
e) Psychological support aimed at coping with emotional distress, and perceived social stressors.
f) Social interventions designed to strengthen support networks and improve family communication.
g) Health education focused on self-management, healthy ageing, and preventive care.

The patient continues long-term home oxygen therapy via nasal cannula at 2 L/min, as previously prescribed.

Clinical Course

At the time of assessment, the patient remained clinically stable without evidence of acute medical decompensation. Nevertheless, persistent limitations in social participation were observed. Emotional distress related to family conflict continued to influence her overall wellbeing. No falls, hospital admissions, or major adverse clinical events were reported during the evaluation period of two months.

Clinical Outcomes

The comprehensive geriatric assessment identified a multidimensional frailty profile characterised by marked impairment in physical performance despite preserved cognitive function and instrumental independence. Objective measures consistently demonstrated increased vulnerability to disability and falls.

The most relevant clinical findings guided the development of a multidisciplinary intervention plan targeting modifiable risk factors and promoting healthy ageing were: physical frailty and reduced physiological reserve; high risk of falls; moderate dependence in basic activities of daily living; clinically significant depressive symptoms; social isolation and severe family dysfunction; and environmental barriers limiting mobility and community participation.

Comments

This case illustrates the complex and multidimensional nature of frailty in later life. Although the patient retained independence in instrumental activities of daily living and showed no evidence of cognitive impairment, objective measures revealed substantial deficits in physical performance, mobility, and physiological reserve. This apparent dissociation highlights the limitations of relying exclusively on functional independence when evaluating vulnerability in older adults. The case also demonstrates the interaction between biological, psychological, social, and

environmental determinants of health. Chronic multimorbidity, depressive symptoms, family dysfunction, social isolation, and environmental barriers likely contributed synergistically to the development and maintenance of frailty. Importantly, the comprehensive geriatric assessment facilitated the identification of vulnerabilities that may not have been apparent through routine clinical evaluation alone. The findings support the value of multidimensional assessment in guiding personalised interventions, risk stratification, and clinical decision-making in geriatric practice.

Discussion

Frailty is increasingly recognised as a multidimensional clinical syndrome characterised by diminished physiological reserve and increased vulnerability to adverse health outcomes [1-7]. Although traditionally associated with physical decline, contemporary models emphasise the contribution of psychological, social, and environmental determinants to the development and progression of frailty. The present case illustrates how these domains interact to produce a complex vulnerability profile in an older adult living in the community.

The most striking finding was the coexistence of preserved cognitive function and instrumental independence with substantial impairment in objective measures of physical performance. The patient demonstrated markedly reduced gait speed, a low SPPB score, and prolonged Timed Up and Go performance, all of which have been consistently associated with disability, falls, hospitalisation, institutionalisation, and mortality in older populations. These findings support the diagnosis of physical frailty despite the preservation of higher-order functional abilities. Such dissociation highlights the importance of incorporating performance-based measures into routine geriatric assessment, as functional independence alone may underestimate the degree of physiological vulnerability.

Another relevant aspect of this case is the contribution of multimorbidity to frailty development. The coexistence of cardiovascular, vascular, musculoskeletal, and autoimmune conditions likely contributed to reduced mobility, decreased exercise tolerance, and progressive physical deconditioning. Previous thromboembolic disease, chronic venous insufficiency, lumbar spinal stenosis, gonarthrosis, and chronic pain may have collectively accelerated functional decline by limiting physical activity and reducing participation in daily activities.

Beyond physical health, psychosocial factors appeared to play a substantial role in the patient's overall clinical status. Although cognitive performance remained preserved, clinically significant depressive symptoms were identified in the context of social isolation, family conflict, perceived neighbourhood stressors, and reduced participation in recreational and social activities. These findings are consistent with evidence demonstrating that social vulnerability and psychological distress are independently associated with frailty progression, poorer quality of life, and increased healthcare utilisation among older adults [51-53].

The environmental assessment further highlighted the multidimensional nature of vulnerability. Barriers affecting mobility, physical activity, transportation, and social participation were identified, suggesting that the patient's functional limitations cannot be explained solely by medical conditions. Environmental constraints may contribute to reduced community engagement, decreased physical activity levels, and worsening social isolation, thereby reinforcing the cycle of frailty [54-57]. These findings support current frameworks that conceptualise frailty as the result of interactions between intrinsic capacity and the surrounding environment.

An additional noteworthy observation was the discrepancy between the SARC-F screening result and the performance-based assessments. Whilst the SARC-F suggested a low probability of sarcopenia, objective measures revealed severe impairment in gait and lower-extremity performance. Similar discrepancies have been reported in previous studies and highlight the limited sensitivity of questionnaire-based screening tools when used in isolation [58-61]. This finding reinforces the value of combining subjective and objective assessments within a comprehensive geriatric framework.

In conclusion, this case demonstrates how Comprehensive Geriatric Assessment facilitates the identification of vulnerabilities that may remain undetected through conventional disease-oriented evaluation. By integrating physical, functional, cognitive, emotional, social, and environmental domains, CGA provided a more complete understanding of the patient's health status and informed the development of a multidisciplinary intervention plan. The case supports current recommendations advocating multidimensional assessment as a cornerstone of frailty management in primary care and community-dwelling older adults.

Clinical Implications

This case underscores the need for routine frailty screening using both performance-based and multidimensional assessment tools. Preservation of instrumental independence should not be interpreted as the absence of vulnerability, particularly when substantial deficits in physical performance are present. Early identification of physical frailty, psychosocial distress, and environmental barriers may facilitate targeted interventions aimed at maintaining functional independence, preventing disability, and improving quality of life in older adults.

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