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Early Identification of Vulnerability and Complex Needs: Social Work Admission Assessment Tool

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Abstract

Objectives: To examine the suitability of the Social Work Admission Assessment Tool (SWAAT) in hospital settings, focusing on its association with emergency department use, social work intervention, and hospital readmission.
Method: SWAAT was administered during routine care over a three-month period in the emergency department and internal medicine units of two Portuguese hospitals. The sample included 436 service users aged 20–104 years.
Results: Higher SWAAT scores were associated with more frequent emergency department use and a greater likelihood of social work intervention. Age moderated the relationship between vulnerability and emergency department use. Social work intervention also moderated the association between vulnerability and hospital readmission.
Discussion: These findings support the usefulness of SWAAT as a structured resource for identifying social and clinical vulnerability and supporting referral and decision-making processes within interdisciplinary hospital care.

Keywords

social vulnerability, social work intervention, interdisciplinarity care, hospital readmission, SWAAT

Introduction

The growing complexity of service users' needs demands an interdisciplinary approach that extends beyond the clinical sphere to encompass social, functional and contextual factors which have a direct influence on health outcomes. Interdisciplinarity in healthcare is a key pillar in delivering integrated, effective, and person-centred care. Integrating different fields of knowledge, such as medicine, nursing, social work, psychology and nutrition, enables a more holistic understanding of service users' needs and promotes more tailored, coordinated, and humanised interventions. Studies show that interdisciplinary teams lead to better clinical outcomes, greater user satisfaction, fewer adverse events, and optimised hospital length of stay (Reeves et al., 2017; World Health Organization [WHO], 2023). This approach fosters shared decision-making, ensures continuity of care, and facilitates the development of therapeutic plans that considers each person's social, cultural, and functional contexts. By placing individuals at the centre of interventions, interdisciplinarity can transform care into a more collaborative, integrated, and effective process.

An effective early assessment by an interdisciplinary team, with social work playing a central role, is essential to ensure equitable access to care and safe patient transitions. Including social workers in initial assessments enables the anticipation of social risks, coordination with community resources, and the promotion of sustainable care pathways. This reduces avoidable complications and repeated emergency visits (Cassarino et al., 2021; Guleria et al., 2024; Molina et al., 2025). Furthermore, there is consistent evidence that social and clinical vulnerability is a decisive factor in health service utilisation, particularly frequent emergency department (ED) attendance and risk of hospital readmission (McCarthy et al., 2021; Molina et al., 2025). However, these associations are not uniform; differences in sex and age affect how vulnerability translates into healthcare demand and the need for social work (Andrew & Keefe, 2014; Bertakis et al., 2000; Fortin et al., 2007; Redondo-Sendino et al., 2006).

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Understanding these dynamics is crucial for strengthening integrated, person-centred care and preventing avoidable service use.

Although there is robust international evidence supporting the systematic early identification of patients with complex social needs (Kaneko et al., 2022), there are still no structured instruments in the Portuguese context to support the early detection and systematic identification of patients at risk of complex discharge. Throughout this study, the terms 'patients' and 'service users' are used interchangeably, reflecting the interdisciplinary nature of hospital-based care and social work practice. This hinders timely social work intervention. To address this, the Social Work Admission Assessment Tool (SWAAT) has been developed. This brief, structured assessment instrument is used at hospital admission to support the early identification of patients at risk of complex discharge and guide social work intervention. This study explores the applicability of the SWAAT in Portuguese hospitals, assessing its potential to strengthen social work interventions, integrate care, and ensure the safe and coordinated transitions of patients in a context where such tools are currently lacking.

Importance of Measuring Social and Clinical Vulnerability

The growing recognition of the social determinants of health highlights the importance of understanding the various factors that influence health and illness, which extend the biomedical dimension. Social vulnerability is a multidimensional concept reflecting exposure to social, economic, and environmental risks that undermine the capacity to maintain or restore health. It goes beyond material deprivation to encompass unfavourable social positions that hinder access to resources and social protection. There is a direct association between social vulnerability and disease processes, care provision, and clinical outcomes (Andrew & Keefe, 2014; Mechanic & Tanner, 2007). When an illness occurs, the individual becomes vulnerable, which weakens them not only physically, but also emotionally, socially, and functionally. Illness can disrupt routines, damage relationships, reduce autonomy, and highlight previously hidden inequalities. Hospital admission is a turning point at which these multiple layers of fragility become more visible, requiring an approach that recognises and integrates this complexity. Adopting the biopsychosocial model is therefore essential, as it considers the association between biological, psychological, social, and structural factors (Wade & Halligan, 2017). For this model to be translated into effective clinical practice, interdisciplinary collaboration is indispensable. Collaboration between different professionals enables a more humanised, integrated, and person-centred approach, promoting care that is both more equitable and more holistic. Systematic and early identification of biopsychosocial needs is fundamental to ensuring person-centred responses and promoting continuity, effectiveness, and integration of care.

In hospital settings, social and clinical vulnerability is increasingly being addressed using structured assessment tools that consider clinical, functional, and social factors. These tools allow for the early identification of patients at increased risk during care transitions. Several instruments have been developed to assess patient complexity, including the INTERdisciplinary MEDicine (INTERMED) tool, the Patient-Centred Assessment Method (PCAM) tool, the Complexity of Patients and Intervention Resources (COMPRI) (De Jonge et al., 2001; Smeets et al., 2021) and the SWAAT (Boutin-Foster et al., 2005). Of these instruments, the PCAM stands out for the integration of biopsychosocial dimensions and its demonstrated effectiveness in guiding person-centred interventions, particularly in primary care (Maxwell et al., 2018). The SWAAT stands out for its interdisciplinary approach, with a particular focus on social work, offering a structured pathway for the early referral of patients to Social Work Service upon hospital admission (Kaneko et al., 2022). Unlike broader biopsychosocial assessment instruments, the SWAAT does not merely assess social and clinical vulnerability; it establishes an operational link between the identification of patients' needs, referral for Social Work assessment, and subsequent Social Work intervention. This functionality facilitates coordinated action by the interdisciplinary team, optimises the management of hospital resources such as beds and length of stay, and contributes to safer care pathways. To our knowledge, no previous empirical studies have examined the application or adaptation of the SWAAT beyond the original study by Boutin-Foster et al. (2005). This lack of empirical evidence further underscores the relevance of the present study.

Social and Clinical Vulnerability and ED Use

Although access to the ED is typically linked to clinical severity, recent studies demonstrate that social vulnerability also plays an important role (Guleria et al., 2024; Lezhanska et al., 2024; Molina et al., 2025). Individuals facing social challenges, such as housing instability, food insecurity, and limited access to primary care, are more likely to rely on EDs. For example, Molina et al. (2025) found that 37% of ED users presented at least one social risk, and Mazurenko et al. (2024) emphasised that unmet social needs complicate care delivery and contribute to poorer clinical outcomes. Similarly, Tucher et al. (2024) demonstrated that patients facing both high medical complexity and social risks are more likely to visit the ED. Furthermore, Molina et al. (2020) noted that patients with unmet social needs tend to use the ED more frequently than those without.

Frequent users of the ED typically have severe, chronic, and complex health problems, which are often associated with adverse social and economic circumstances. Their demand may be driven by poverty, social exclusion, limited support networks, difficulty accessing ongoing care, and low health literacy. Those with a history of housing insecurity

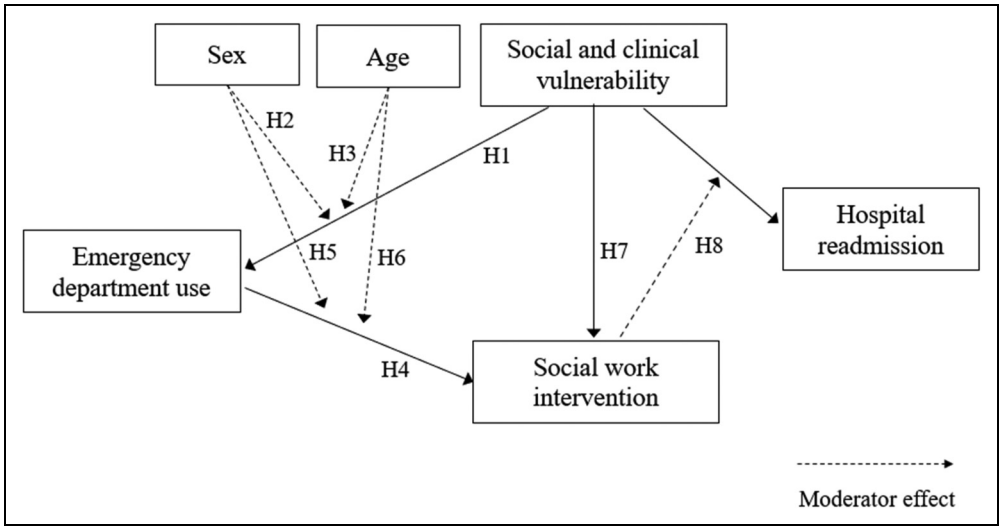


Figure 1. Conceptual model.

or homelessness are particularly prone to repeated use of emergency services (McCarthy et al., 2021). A qualitative meta-analysis by Chen and Lin (2023) confirms that financial difficulties, geographical barriers, low health literacy, and negative experiences of primary care are associated with the inappropriate use of emergency services. Taken together, this evidence suggests that vulnerability increases the likelihood of ED use. Based on this, the following hypothesis is formulated (Figure 1):

Hypothesis 1. Social and clinical vulnerability is positively associated with ED use.

Moderating Role of Sex and Age

Sex and age are well-established factors influencing outcomes in emergency care, with distinct clinical and epidemiological implications. Even after adjusting for comorbidities and severity, men tend to experience worse prognoses, including longer stays, higher hospital admission rates, and greater mortality (Chen et al., 2025). Older adults are at an increased risk of adverse outcomes, particularly mortality from infections and cardiovascular events. Male sex is associated with greater clinical severity in this group (Candel et al., 2021). Beyond direct clinical effects, sex and age may also play a role in shaping patterns of healthcare use. Studies suggest that men and women differ in healthcare-seeking behaviour and access to support networks (Bertakis et al., 2000; Redondo-Sendino et al., 2006). These differences may influence how social and clinical vulnerability translate into ED use. Conversely, the association between vulnerability and ED use tends to weaken with age, likely due to greater contact with continuing care and higher service use among older adults (Andrew & Keefe, 2014; Fortin et al., 2007). Accordingly, the following hypotheses are proposed:

Hypothesis 2. Sex moderates the relationship between social and clinical vulnerability and ED use.

Hypothesis 3. Age moderates the relationship between social and clinical vulnerability and ED use.

ED Use and Social Work Intervention

In hospital practice, social factors have been more widely incorporated into the approach to ED care, in recognition of the fact that social determinants directly influence clinical outcomes and well-being (Molina et al., 2020, 2025). Social workers play a central role in identifying social factors that contribute to repeated use of the ED, providing direct patients and connecting them with community resources. This reduces inappropriate service use and improves responses to patients' needs (Guleria et al., 2024). Interdisciplinary interventions incorporating social workers have demonstrated the capacity to enhance clinical and social outcomes, as well as reducing subsequent emergency attendance (Cassarino et al., 2021; Molina et al., 2025). This evidence supports the following hypothesis:

Hypothesis 4. ED use is positively associated with the need for social work intervention.

Moderating Effects in the ED – Social Work Intervention Link

Studies show sex differences in the accumulation of social factors, requiring tailored responses from hospitals. Davas and Etiler (2024) found that women tend to report more unmet needs for financial reasons and face greater difficulties accessing healthcare. López-Ferreruela et al. (2025) observed that, even following cardiovascular events, women receive

less appropriate care than men despite having a greater burden of comorbidities and vulnerability. This evidence highlights the importance of considering sex as a moderating factor in the relationship between ED use and the need for social work intervention. Social factors affecting health and access to care may differ between men and women, necessitating gender-sensitive approaches to vulnerability and support. Age may also moderate the relationship between ED use and the need for social work intervention. Older adults face barriers such as a lack of caregivers, housing insecurity and social exclusion, which increase clinical and social risk (Wu et al., 2024). Ageing is associated with life transitions that heighten the risk of exclusion, dependence, and emotional distress, particularly in hospital contexts (Tanner et al., 2025; Zaidi, 2014). Integrated responses are therefore essential, with social workers playing a pivotal role in connecting medical care with social support (Thomas, 2024). These patterns suggest that sex and age may influence the relationship between ED use and the need for social work intervention. Taken together, this evidence leads to the following hypotheses:

Hypothesis 5. Sex moderates the relationship between ED use and the need for social work intervention.

Hypothesis 6. Age moderates the relationship between ED use and the need for social work intervention.

Social and Clinical Vulnerability and Need for Social Work Intervention

Dimla et al. (2022) emphasise the central role of social workers in supporting transitions from hospital to the community, especially when there is limited family support, scarce resources, or safety concerns after discharge. Similarly, Heenan (2023) highlights the challenges of managing complex cases where clinical discharge depends on social factors, emphasising the importance of effective collaboration between clinical and social teams. High clinical scores are often associated with a greater likelihood of requiring social work intervention, particularly when linked to social indicators that exacerbate vulnerability. Therefore, the following hypothesis is proposed:

Hypothesis 7. Social and clinical vulnerability is positively associated with the need for social work intervention.

This relationship raises another question: in addition to identifying which patients are more likely to require social work intervention, it is important to consider whether such intervention affects outcomes related to vulnerability, especially the likelihood of being readmitted to hospital. This theoretical framework provides a basis for exploring the ways in which social work interventions interact with vulnerability to influence the rate of hospital readmission.

Moderating Role of Social Work Intervention between Vulnerability and Hospital Readmission

Consistent links have been found between social vulnerability, including poverty, housing instability, and social exclusion, and an increased risk of hospital readmission (Davis et al., 2023; Molina et al., 2020; Yan et al., 2022). Those who are more socially vulnerable often require more intensive support from social work teams, whose role is to mitigate these risks (Gehlert & Browne, 2019). There is evidence that early intervention by social workers can reduce the length and cost of hospital stays, as well as lowering readmission rates, by promoting continuity of care and improving patient experiences (Berkowitz & Schlehofer, 2025; Petruzzi et al., 2023; Steketee et al., 2017). In the United Kingdom, integrating social work into hospitals, for instance by employing Citizens Advice Bureau consultants, has reduced discharge times by addressing issues such as benefits, housing, and financial support (Administrative Justice Council, 2021). More broadly, continuity and integration of care are recognised as key strategies for optimising clinical outcomes, reducing service fragmentation, and promoting equitable access (Ashe et al., 2023; Kodner & Spreeuwenberg, 2002; Valentijn et al., 2013). Taken together, this evidence suggests that the relationship between vulnerability and readmission depends on social work intervention being present. This evidence supports the following hypothesis:

Hypothesis 8. Social work intervention moderates the relationship between social and clinical vulnerability and hospital readmission.

In summary, the literature consistently shows that social vulnerability, alongside clinical factors, influences the use of hospital services, particularly EDs, and affects patients' clinical and social outcomes. The early identification of these factors through structured assessment tools, such as SWAAT, is a key strategy for guiding interdisciplinary interventions, optimising resources and promoting, the continuity and integration of care. Overall, this evidence highlights the importance of such tools. The study advances our understanding of the applicability of the SWAAT in hospital settings by testing the proposed research hypotheses on the relationships between social and clinical vulnerability, ED use, the need for social work intervention and hospital readmission.

Method

Study Context

The present study was conducted in two public hospitals that are part of the Portuguese National Health Service. The inclusion of two hospitals was intended to capture organisational and contextual diversity, thereby ensuring that the SWAAT

instrument could be used in a variety of service environments. One site is a large, university-affiliated hospital located in an urban area, while the other is a network of hospitals serving a mixed urban–rural population. These differences enabled the inclusion of service users from a variety of backgrounds and organisations. The objective of the study was not to make comparisons between the hospitals or to test the hypotheses separately for each site, but rather to obtain a more extensive and diverse sample of service users.

Participants

The sample included 436 service users, the majority of whom were male (58.3%). The age ranged from 20 to 104 years, with a mean of 74.0 years ($SD = 14.5$). The distribution of ages was found to be negatively skewed, with a median age of 77 years. The largest marital status groups were as follows: married (45.0%) and widowed individuals (31.2%). Most participants were retired (79.4%) and had low educational attainment, with 54.8% having completed only primary education and 12.2% being illiterate. From a clinical perspective, the data indicates that 60.8% reported four or more ED visits in the past year, 60.9% required social work intervention, and 21.8% experienced at least one unplanned hospital readmission within 30 days of discharge. Sample characteristics are shown in Table 1.

Table 1. Sociodemographic and Clinical Profile of the Participants.

		N	%
Sex	Female	182	41.7
	Male	254	58.3
	Total	436	100.0
Marital status	Married	196	45.0
	Divorced	45	10.3
	Single	37	8.5
	Cohabiting	22	5.0
	Widowed	136	31.2
	Total	436	100.0
Employment status	Employed	58	13.3
	Unemployed	24	5.5
	Retired	346	79.4
	Employee	5	–
	Self-employed	3	–
	Total	436	100.0
Educational level	Illiterate	53	12.2
	First cycle (primary education)	239	54.8
	Second cycle (lower secondary)	80	18.3
	Third cycle (upper secondary)	49	11.2
	Higher education	15	3.4
	Total	436	100.0
Medical consultations	No	178	40.8
	Yes	258	59.2
	Total	436	100.0
Medication adherence	No	96	22.0
	Yes	340	78.0
	Total	436	100.0
Social work case file	No	331	76.3
	Yes	103	23.7
	Total	434	100.0
Exemption for economic insufficiency	No	221	50.8
	Yes	214	49.2
	Total	435	100.0
Emergency department use (visits in the past year)	<4 ED visits	171	39.2
	≥4 ED visits	265	60.8
	Total	436	100.0
Need for social work intervention	No need	135	31.0
	Need	301	69.0
	Total	436	100.0
Readmission (30-day unplanned hospital readmission for the same clinical condition)	No readmission	341	78.2
	Readmission	95	21.8
	Total	436	100.0

Abbreviation: ED = emergency department.

Measures

Social and Clinical Vulnerability. Although the SWAAT was originally developed to identify hospitalised patients requiring social work assessment due to complex discharge needs, the domains it encompasses extend beyond discharge logistics. The SWAAT, a brief six-item instrument developed by Boutin-Foster et al. (2005), was designed to facilitate the early identification of patient's social needs and their referral to Social Services during hospital admission.

The instrument encompasses key domains relevant to discharge planning and social intervention. As shown in Table 2, these domains can be conceptually aligned with established dimensions of social and clinical vulnerability, encompassing functional, cognitive, social, institutional, subjective and transitional aspects. This conceptual correspondence supports the interpretation of the SWAAT total score as an operational indicator of social and clinical vulnerability at the time of hospital discharge.

The SWAAT total score is obtained by summing the six item scores, yielding values ranging from 0 to 13, with higher scores indicating greater levels of social and clinical vulnerability. As proposed by Boutin-Foster et al. (2005), scores may be classified into three levels to guide the timing of social assessment: 1–2 indicate low-level need (assessment within 72 h of admission), 3–6 indicate intermediate need (assessment within 24–48 h), and scores above 6 indicate high need (assessment within 24 h of admission). This classification reflects increasing social complexity and associated risk, facilitating the prioritisation of Social Services resources and promoting timely intervention. Accordingly, in the present study, the SWAAT total score was used as an operational measure of social and clinical vulnerability.

ED Use. The utilisation of ED services was determined by the number of visits reported in the preceding year (Whiteside

Table 2. Association between Social Work Admission Assessment Tool (SWAAT) Domains and Vulnerability Dimensions.

SWAAT domain Boutin-Foster et al. (2005)	Vulnerability dimensions
Ambulation	Functional/clinical (Andrew & Keefe, 2014; Wade & Halligan, 2017)
Mental status	Cognitive (Fortin et al., 2007; Andrew & Keefe, 2014)
Living situation	Social (Mechanic & Tanner, 2007; McCarthy et al., 2021)
Current social services	Institutional support (Kaneko et al., 2022; Molina et al., 2025)
Self-perceived need for additional services	Subjective (Chen & Lin, 2023; Maxwell et al., 2018)
Assistance in going home	Transitional (Boutin-Foster et al., 2005; Cassarino et al., 2021)

et al., 2021). For analysis, this measure was categorised into two groups: those with fewer than four ED visits (<4 visits) and those with four or more ED visits (≥4 visits). This cut-off is employed to differentiate between frequent and non-frequent ED users, and to identify patterns of recurrent service utilisation (Gordon et al., 2019).

Need for Social Work Intervention. A structured needs assessment has been associated with a reduced incidence of unnecessary emergency service use and an improved patient experience (Cassarino et al., 2021). Furthermore, it has been shown to facilitate safer transitions between hospital and community settings (2022). Additionally, systematic screening and referral programs for social needs with emergency services have been linked to the adoption of such assessments (Wallace et al., 2020).

In the participating hospitals, the SWAAT was administered at admission by healthcare professionals as part of the initial assessment process. The information obtained through the SWAAT supported the identification of patients who required referral to the Social Work Service for a comprehensive social work assessment. Accordingly, the need for social work intervention was operationalised as a dichotomous variable (yes/no), indicating the identification of patients requiring intervention by the Social Work Service during the patient's hospital stay (Boutin-Foster et al., 2005).

Hospital Readmission. Hospital readmission was defined as the occurrence of at least one unplanned admission to a hospital within 30 days of discharge, related to the same clinical condition as the previous hospital episode. This variable was coded as dichotomous (yes/no), in accordance with standard indicators of short-term hospital readmission (Cassarino et al., 2021; Tucher et al., 2024).

Adaptation of the SWAAT

The adaptation of the SWAAT to the Portuguese context was conducted through a rigorous methodological procedure to ensure the conceptual, linguistic, and cultural equivalence of the instrument (International Test Commission, 2017). The initial authorisation was obtained from the original authors (Boutin-Foster et al., 2005), along with the formal guidelines for translation and utilisation of the instrument. The SWAAT was subsequently translated independently by two certified translators who were acquainted with the context and objectives of the tool, yielding two preliminary versions. These versions were reviewed by a panel of experts, comprising two physicians and two nurses with experience in hospital settings. The panel examined the translation, harmonised terminology and produced a consensual Portuguese version.

To ensure fidelity to the original content, the instrument underwent back-translation by two independent English-speaking translators. A comparison was made between the resulting versions and the original instrument to verify the preservation of both conceptual and operational meanings. After this phase, a pre-test was conducted using the preliminary Portuguese version of the SWAAT with a sample of 20 ED users from the same two National Health Service hospitals, administered by nursing professionals. The procedure has been demonstrated to facilitate the identification of potential comprehension difficulties, linguistic ambiguities, or cultural inadequacies. This has resulted in minor adjustments being made to improve clarity and clinical applicability.

Procedures

The collection of data was conducted with the formal authorisation of the administrations of the two participating hospital units, as well as the corresponding ethical approvals. Prior to data collection, preparatory meetings were held with teams from both healthcare units, involving social workers, the hospital administrator, and nursing staff to clarify practical issues of the instrument's application. As the SWAAT was administered by nurses or physicians, these clarifications focused primarily on these two professional groups.

The SWAAT was administered during routine clinical care over a three-month period (November 2022 to February 2023), following the patient's initial clinical assessment in the ED or internal medicine units of two hospitals. The primary method of data collection was through the utilisation of standard clinical anamnesis. In instances where patients exhibited cognitive impairment or were non-communicative, data were obtained from proxy informants, such as family members or caregivers.

Table 3. Descriptive Statistics and Correlations Between Study Variables.

	Mean	*SD*	1	2	3	4	5
1. Sex[a]	0.42	–					
2. Age	73.98	14.54	.10*				
3. SWAAT total score[b]	6.21	3.11	.13**	.45***			
4. Emergency department use[c]	0.61	–	−.21***	.08	.08*		
5. Need for social work intervention[d]	0.69	–	−.22***	.34***	.54***	.35***	
6. Readmission[e]	0.22	–	−.22***	.13**	.09*	.37***	.27***

Note: $N = 436$. SWAAT = Social Work Admission Assessment Tool; ED = emergency department.
[a]Dummy variable: 0 = male; 1 = female. The proportion of females is reported.
[b]Scale ranges from 1 to 13.
[c]Dummy variable: 0 = <4 ED visits, 1 = ≥4 ED visits. The proportion of cases with ≥4 visits to the ED is reported.
[d]Dummy variable: 0 = no need, 1 = need. The proportion of cases with need is reported.
[e]Dummy variable: 0 = no readmission, 1 = readmission. The proportion of cases with readmission is reported.
*$p < .05$. ** $p < .01$. *** $p < .001$.

In the ED, the SWAAT was administered within the first 8 h following admission to ensure early identification of social vulnerabilities. When patients were transferred to inpatient care prior to this interval or where an initial evaluation did not occur in the ED, the instrument was administered upon admission to the ward by the nurse responsible. This procedure enabled the systematic integration of social assessment into the clinical pathway, thus ensuring consistency in data collection across services. A total of 436 assessments were completed, with 213 conducted at the university-affiliated hospital and 223 at the regional hospital network, reflecting routine patient flow during the study period.

Ethics on Data Collection

The study protocol was reviewed and approved by the Ethics Committees of the two participating hospital units, which assessed its scientific, methodological, and ethical adequacy. All procedures were carried out in accordance with the relevant institutional and legal requirements, including good clinical practice standards, health data protection regulations, and the principles of the Declaration of Helsinki.

The collection of data was conducted in accordance with ethical principles for health research as set out by the World Medical Association (2013). The principles of anonymity and confidentiality were strictly adherend to, and written informed consent was obtained from the patients prior to their admission. During the preliminary admission procedure, the designated nurse elucidated the objectives of the study, emphasising its voluntary nature and the right of participants to withdraw at any time without compromising the standard of care. The instrument was applied only after obtaining written consent.

The provisions of the General Data Protection Regulation (GDPR) were fully observed, ensuring that all data were collected exclusively for scientific purposes and without any possibility of individual identification. The study was conducted with full clinical independence, and patients' decisions regarding participation had no impact on the healthcare provided. The study was carried out in accordance with stringent ethical and legal standards, ensuring the protection of participants' rights, the integrity of data, and the autonomy of clinical care throughout the research process.

Data Analysis

A descriptive analysis was conducted using means, standard deviations, and correlations among the study variables. To test the research hypotheses involving main effects (H1, H4, and H7), several procedures were employed. The parametric *t*-test was used to test Hypothesis 1, given the large sample size, the symmetric distribution of the outcome variable, and the adequacy of the mean as a representative measure. Pearson's correlation was used to test Hypothesis 4. To test Hypothesis 7, a logistic regression was conducted, as the outcome variable was dichotomous.

For hypotheses positing moderating effects (H2, H3, H5, H6, and H8), logistic regression models including the respective interaction terms were estimated. Interaction effects were plotted at the 16th, 50th and 84th percentiles of the moderator. To probe significant interactions, the Johnson–Neyman (JN) technique (Hayes, 2022) was applied. Statistical analyses were conducted in R Version 4.5.1 (R Core Team, 2025).

Results

Descriptive Statistics and Correlations

Table 3 presents the results of descriptive statistics and bivariate correlations for the study variables.

Testing the Hypotheses

Hypothesis 1 posited that social and clinical vulnerability would be positively associated with ED use. As previously outlined, the SWAAT score was utilised as an operational metric of social and clinical vulnerability at the time of hospital admission. The findings of the study indicated that

Table 4. Regression Results for Moderations.

		Outcome: Emergency department (ED) use[a]			
		Coeff.	SE	*Z*	*p*
Hypothesis 2a	Constant	−0.76	0.71	−1.06	.289
	Predictor SWAAT total score[b]	−0.04	0.01	−0.40	.689
	Moderator Sex	0.43	0.45	0.96	.339
	Interaction SWAAT total score * Sex	0.08	0.07	1.23	.220
Hypothesis 2b	Constant	−3.56	1.03	−3.45	.001
	Predictor SWAAT total score	0.69	0.18	3.85	<.001
	Moderator Age	0.05	0.02	3.60	<.001
	Interaction SWAAT total score * Age	−0.01	0.01	−3.76	<.001

Note: $N = 436$. SWAAT = Social Work Admission Assessment Tool.
[a]The outcome is a dummy variable, and a binary logistic regression was conducted.
[b]Social and clinical vulnerability was operationalised using the SWAAT total score as a proxy measure.

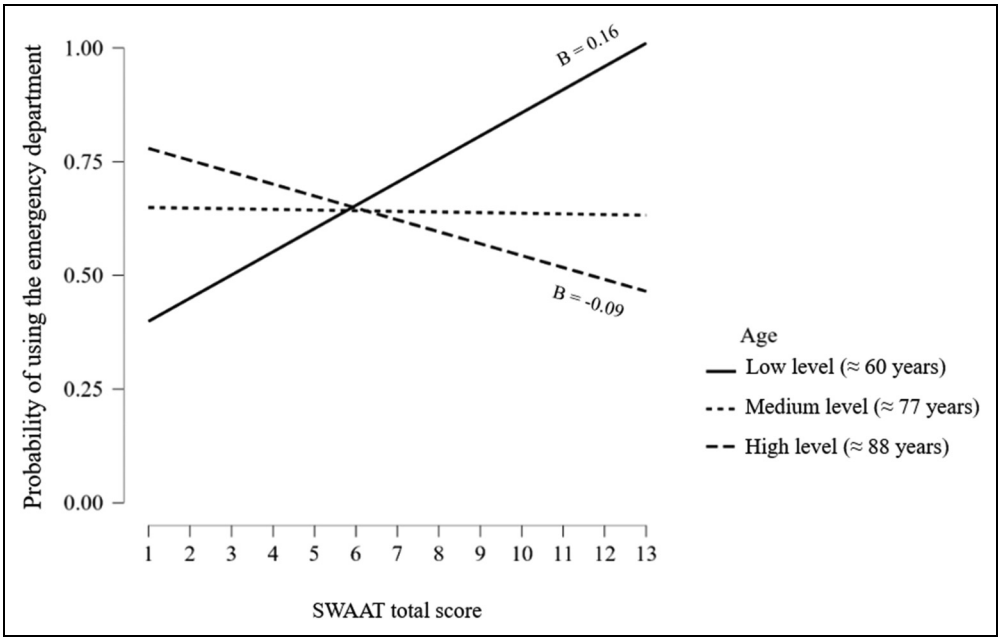


Figure 2. Moderating effect of age on the relationship between Social Work Admission Assessment Tool (SWAAT) total score and emergency department use.
Note: The *y*-axis shows the predicted probabilities of emergency department use derived from the logistic regression model. The SWAAT total score was used as a proxy measure of social and clinical vulnerability.

individuals who utilised the ED with greater frequency (≥4 ED visits) exhibited a higher mean SWAAT score ($M = 6.42$) in comparison with those who utilised the ED with less frequency (<4 ED visits), who demonstrated a lower mean score ($M = 5.88$). This result indicates a marginal yet significant mean difference, $t\ (291) = -1.65$, $p = .050$, 95% CI [−1.17, 0.10], thereby providing empirical support for Hypothesis 1.

Hypotheses 2 and 3 predict that the relationship between social and clinical vulnerability and the use of emergency services is moderated by sex and age (respectively). Firstly, it was examined whether sex moderates the relationship between social and clinical vulnerability (measured by the SWAAT score) and ED use (Hypothesis 2). Secondly, the same relationship was investigated, with age serving as the moderating factor (Hypothesis 3). The interaction between SWAAT score and sex was not significant ($B = 0.08$, $Z = 1.23$, $p = .220$, 95% CI [−0.05, 0.21], Table 4). In contrast, the interaction between SWAAT score and age was significant ($B = -0.01$, $Z = -3.76$, $p < .001$, 95% CI [−0.02, −0.00]). Consequently, Hypothesis 3 was the only one that was supported.

To examine the moderation effect of age, simple slopes were plotted at the 16th, 50th, and 84th percentiles (Figure 2), reflecting the negative skewness of the age distribution. To probe the interaction, the JN technique (Hayes,

Table 5. Regression Results for Moderations.

		Outcome: Need for social work intervention			
		Coeff.	SE	Z	*p*
Hypothesis 4a	Constant	0.00	0.23	0.00	1.000
	Predictor Emergency department use	2.17	0.37	6.46	<.001
	Moderator Sex	−0.07	0.31	−0.21	.834
	Interaction Emergency department use * Sex	−1.43	0.45	−3.15	.002
Hypothesis 4b	Constant	−4.86	1.02	−4.76	<.001
	Predictor Emergency department use	2.88	1.32	2.18	.029
	Moderator Age	0.07	0.01	4.89	<.001
	Interaction Emergency department use * Age	−0.02	0.02	−0.97	.335

Note: $N = 436$.

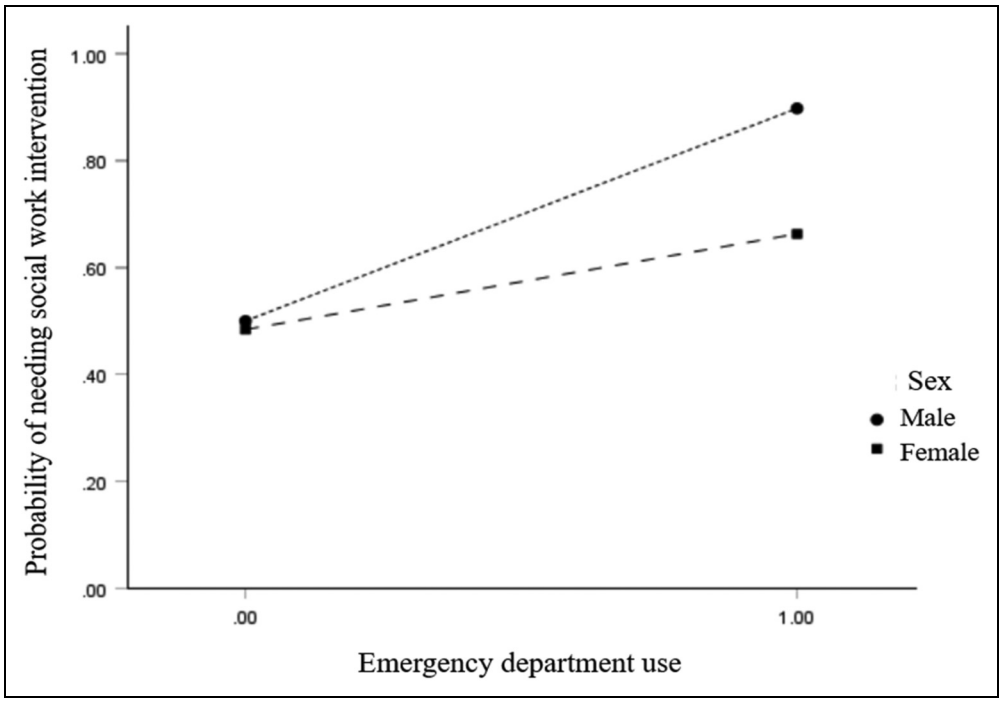


Figure 3. Moderating effect of sex on the relationship between emergency department use and the need for social work intervention. *Note:* The *y*-axis shows the predicted probabilities of the need for social work intervention derived from the logistic regression model.

2022) was applied. The results showed that for ages between 20 and 60 (~18% of the sample), the relationship between SWAAT total score and ED use was positive and significant ($p < .001$), whereas for ages above 88 (~13% of the sample), this relationship was significant ($p < .05$) but negative and weaker.

Hypothesis 4 predicted that ED use would be positively associated with the need for social work intervention. Using dummy-coded variables for *ED use and need for social work intervention*, a moderate and significant correlation was observed ($r = .35$, $p < .001$). This finding suggests that individuals who more frequently utilise the ED have a greater need for social work intervention, thereby supporting Hypothesis 4.

To test the moderating effects of sex (Hypothesis 5) and age (Hypothesis 6) on the relationship between ED use and the need for social work intervention, a logistic regression model including the respective interaction terms was estimated (Table 5). The interaction between ED use and sex was significant ($B = -1.43$, $Z = -3.15$, $p = .002$, 95% CI [−2.32, −0.54]), whereas the interaction between ED use and age was not significant ($B = -0.02$, $Z = -0.97$, $p = .335$, 95% CI [−0.05, 0.02]). Accordingly, only Hypothesis 6 was supported.

To interpret the significant interaction effect, simple slopes were plotted and probed. For males, the relationship between ED use and need for social work intervention was positive (Figure 3) and significant (simple slope = 2.17, $Z = 6.46$, $p <$

Table 6. Regression Results for Moderations Effects.

	Outcome: Hospital readmission			
	Coeff.	SE	Z	*p*
Constant	−3.83	0.75	−5.08	<.001
Predictor SWAAT total score[a]	0.20	0.12	1.71	.087
Moderator Need for social work intervention	3.76	0.85	4.44	<.001
Interaction SWAAT total score * Need for social work intervention	−0.32	0.13	−2.44	.015

Note: $N = 436$. SWAAT = Social Work Admission Assessment Tool.
[a]Social and clinical vulnerability was operationalised using the SWAAT total score as a proxy measure.

.001, 95% CI [1.51, 2.83]). For females, the relationship was also positive and significant, although weaker (simple slope = 0.74, $Z = 2.43$, $p = .015$, 95% CI [0.14, 1.34]).

Hypothesis 7 posited that social and clinical vulnerability, as measured by the SWAAT score, would be positively associated with the need for social work intervention. The results indicated that higher SWAAT total scores were associated with an increased likelihood of requiring social work intervention, $OR = 1.66$, *Wald test* $(1) = 93.68$, $p < .001$, CI 95% [1.50, 1.84], supporting Hypothesis 7.

Hypothesis 8 proposed that social work intervention moderates the relationship between social and clinical vulnerability and hospital readmission. The interaction between SWAAT score and social work intervention contributed significantly to hospital readmission ($B = -0.32$, $Z = -2.44$, $p = .015$, 95% CI [−0.57, −0.06], Table 6), supporting Hypothesis 8. Probing the interaction showed that the relationship between SWAAT score and hospital readmission was negative (Figure 4) and significant among individuals who required social work intervention (simple slope = −0.11, $Z = -2.19$, $p = .029$, 95% CI [−0.22, −0.01]). In contrast, this relationship was positive and not significant among those who did not require social work intervention (simple slope = 0.20, $Z = 1.71$, $p = .087$, 95% CI [−0.03, 0.44]).

Discussion and Application to Practice

This present study analysed the suitability of the SWAAT in hospital contexts, with a particular focus on the relationships between social and clinical vulnerability, utilisation of ED, need for social work intervention, and hospital readmission. The findings of this study contribute to a more nuanced understanding of how vulnerability is operationalised at hospital admission and how social work intervention interacts with clinical trajectories and service utilisation.

Social and Clinical Vulnerability and ED Use

As predicted in Hypothesis 1, higher levels of social and clinical vulnerability, as measured by the SWAAT at hospital

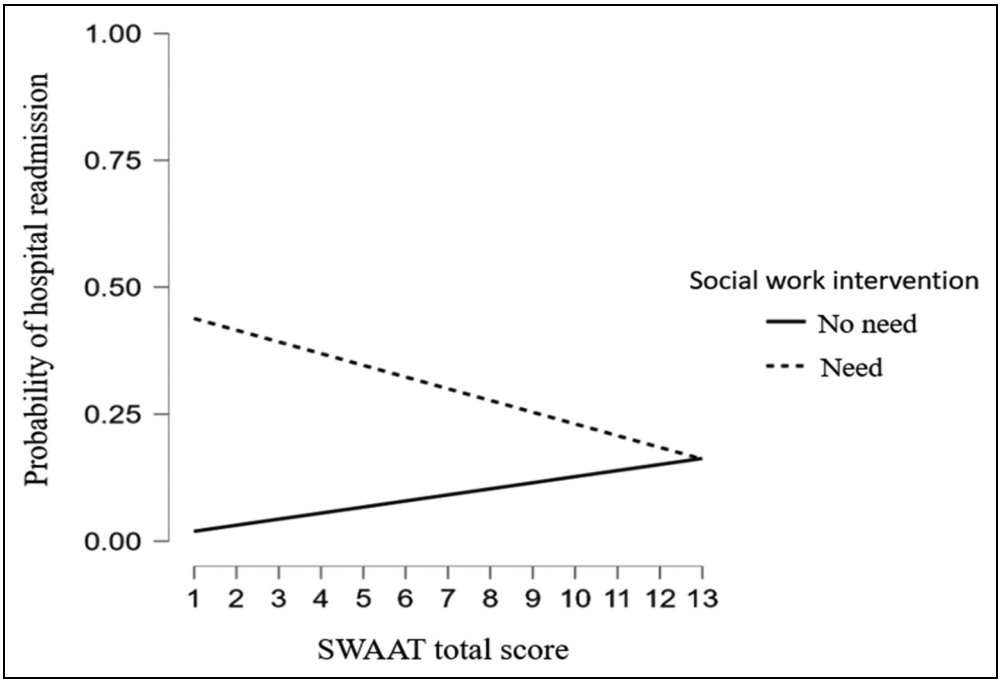


Figure 4. Moderating effect of social work intervention on the relationship between social and clinical vulnerability and hospital readmission.
Note: The *y*-axis shows the predicted probabilities of hospital readmission derived from the logistic regression model. The Social Work Admission Assessment Tool (SWAAT) total score was used as a proxy measure of social and clinical vulnerability.

admission, were associated with more frequent use of the ED. This finding is consistent with existing evidence showing that social risks, such as housing instability, limited access to primary healthcare, and inadequate social support, have a decisive role on patterns of ED use, beyond clinical severity alone (Guleria et al., 2024; Lezhanska et al., 2024; Mazurenko et al., 2024; McCarthy et al., 2021; Molina et al., 2020). These results reinforce the idea that frequent use of the ED often reveals a lack of social support and structural barriers rather than inappropriate help-seeking behaviour. Vulnerability does not operate in isolation, but rather it operates in combination with clinical complexity, the organisation of the healthcare system, and access to community care. From this perspective, SWAAT measures a component of vulnerability that contributes to ED use, which reinforces its value as an early screening tool within hospital admission processes.

Moderation of Sex and Age in the Vulnerability and ED Use Relationship

The moderation analyses revealed different results for sex and age. Contrary to Hypothesis 2, sex did not moderate the relationship between social and clinical vulnerability and ED use. This finding suggests that the link between vulnerability to ED use operate similarly for men and women in this context. While previous studies have found sex differences in clinical severity, hospital admission, mortality health-seeking behaviours (Bertakis et al., 2000; Candel et al., 2022; Chen et al., 2025; Redondo-Sendino et al., 2006), these disparities may affect overall service use levels rather than changing the strength to the association between vulnerability and ED use. In summary, although men and women may differ in health outcomes or basic patterns of use, the association between social and clinical vulnerability and ED use appears to be similar for both sexes. By contrast, Hypothesis 3 was confirmed, suggesting that age significantly moderates the relationship between vulnerability and ED use. The results showed that for people aged 20–60, there was a positive and significant relationship between the total SWAAT score and ED use. Conversely, for those aged over 88, this relationship was still significant, but weaker and negative. This suggests that age affects the link between vulnerability and ED use. It was found that this connection was stronger among adults and middle-aged adults. However, as people get older, this relationship tends to weaken and may even reverse. One way to think about this is that older adults frequently visit the ED because they have health problems and see doctors more often as they age.

Therefore, vulnerability does not have much of an influence on older adults because they already use the ED frequently. Among younger individuals, however, vulnerability may play a more decisive role in precipitating ED use, particularly in the absence of stable support networks or access to primary care. These findings highlight the importance of considering age-specific pathways through which vulnerability affects service use (Guleria et al., 2024; McCarthy et al., 2021; Tucher et al., 2024).

ED Use and Need for Social Work Intervention

In line with Hypothesis 4, frequent use of the ED was positively associated with the need for social work intervention. This finding is consistent with the literature showing that patients exposed to adverse social conditions are more likely to repeatedly use emergency services due to difficulties accessing regular care and an increased risk of clinical decompensation (Guleria et al., 2024; McCarthy et al., 2021; Molina et al., 2020). The literature also highlights the need for a structured response in the ED that integrates social services as a key component in the assessment and management of these cases (Molina et al., 2025).

Individuals who frequently access emergency services often face complex social circumstances requiring assessment, coordination and connection to community resources. From a clinical perspective, this result highlights the ED as a critical entry point for identifying patients whose social needs remain unmet. Rather than being viewed solely as an outcome, frequent ED use may also function as an indicator prompting social service involvement. This finding reinforces the importance of early social assessment in acute care settings. Integrated interventions delivered by interdisciplinary teams that include social services have been shown to improve care pathways and reduce avoidable service use, particularly among vulnerable populations (Cassarino et al., 2021; Petruzzi et al., 2023; Reeves et al., 2017; Steketee et al., 2017).

Moderation of Sex and Age in the ED Use and Social Work Intervention Relationship

Moderation analyses revealed that sex (Hypothesis 5) but not age (Hypothesis 6) conditioned the relationship between ED use and the need for social services. The association was stronger among men than women. Although prior research highlights women's greater accumulation of social vulnerabilities (Davas & Etiler, 2024; López-Ferreruela et al., 2025), the findings suggest that frequent ED use may constitute a more salient indicator of unmet social need among men. This association may reflect sex differences in the complexity of situations presented in emergency services. Men who frequently use emergency services have more severe symptoms and poorer outcomes, which may signal underlying problems requiring assessment or social support (Candel et al., 2022; Chen et al., 2025).

In contrast, age did not significantly moderate the relationship between ED use and social service intervention. This suggests that, once patients reach a threshold of frequent

ED use, the likelihood of requiring social services is comparable across age groups. This finding aligns with research indicating that, after controlling morbidity, quality of life, and social factors, age-related differences tend to decrease (Giannouchos et al., 2022; Redondo-Sendino et al., 2006).

Social and Clinical Vulnerability and Need for Social Work Intervention

According to Hypothesis 7, a higher SWAAT score was associated with a greater likelihood of social services intervention. This result provides empirical support for the conceptual alignment between the SWAAT domains and the core dimensions of social and clinical vulnerability. The instrument was effective in identifying patients whose clinical trajectories were shaped by social complexity, who were therefore more likely to benefit from social services involvement.

In the context of hospital practice, this conclusion is particularly important, as it supports the use of SWAAT as a prioritisation tool to ensure that patients are referred to social care services in a timely manner. This contributes to the efficient allocation of social care resources and enables earlier intervention in cases where there is a higher risk of complex discharge (Molina et al., 2025).

Moderation of Social Service Intervention in the Relationship Between Vulnerability and Hospital Readmission

The findings supported Hypothesis 8, showing that social work intervention moderates the relationship between social and clinical vulnerability and hospital readmission. Among patients who received social work intervention, greater vulnerability was associated with a reduced probability of readmission, whereas no significant association was observed among those who did not receive such intervention. This suggests that social work involvement may have a buffering effect, whereby targeted intervention mitigates the adverse consequences of vulnerability on short-term readmission risk (Cassarino et al., 2021; Petruzzi et al., 2023). The results reveal that patients with higher levels of vulnerability may benefit from structured social intervention. This highlights the potential for timely and targeted responses to alter risk trajectories.

Despite the cross-sectional design of the study, the findings are consistent with evidence showing that early and integrated social service intervention can enhance continuity of care, address discharge barriers, and reduce avoidable readmissions. From this perspective, the results reinforce the strategic integration of social work into hospital admission and discharge planning processes. These findings are theoretically consistent with the biopsychosocial model, which posits that social and contextual factors interact with the disease process to influence clinical outcomes (Wade & Halligan, 2017). Early social interventions may therefore modify post-discharge risk trajectories by addressing the factors that affect continuity of care. In a hospital setting, systematic assessment approaches such as SWAAT enable the timely identification of complex needs and guide personalised social response plans, facilitating safe transitions and reducing avoidable readmissions (Boutin-Foster et al., 2005; De Jonge et al., 2001; Smeets et al., 2021).

Several limitations should be acknowledged. First, SWAAT was used as an operational measure of social and clinical vulnerability. Although conceptually justified, it may not capture all relevant dimensions of vulnerability. Second, the study was conducted in two hospitals within a single national health system; therefore, the findings cannot be generalised. The hospitals were selected to reflect the heterogeneity of hospital contexts within the national health system, and data were collected over a three-month period to ensure a sufficiently large number of cases. However, because participants were included according to routine hospital flow, the sample should not be interpreted as representative of all ED users in Portugal. Third, the cross-sectional design does not allow causal inferences regarding the effects of social service intervention on readmission. Future studies examining the hypothesised effects should therefore employ longitudinal designs.

Despite these limitations, the study provides empirical support for the applicability of SWAAT in hospital settings and contributes to understanding the mechanisms linking vulnerability, service use and social work intervention.

The findings of this study have several practical implications for hospital care. They support the incorporation of structured assessment tools such as the SWAAT into routine hospital admission procedures to facilitate the early identification of patients with complex social and clinical needs and the timely referral to the Social Work Service. Such an approach may contribute to more individualised care planning and facilitate timely intervention for patients at increased risk of adverse outcomes.

The findings further support the view that social workers' interventions – including biopsychosocial assessment, mobilisation of support networks, linkage to community resources, and discharge coordination – may contribute to safer care transitions and reduced avoidable adverse events. These findings are consistent with previous evidence emphasising the role of structured discharge planning, system navigation support, and interprofessional collaboration as key components for improving continuity of care (Dimla et al., 2022; Petruzzi et al., 2023; Steketee et al., 2017).

From an organisational perspective, the findings reinforce the importance of incorporating structured social assessment into healthcare processes. In contexts where standardised tools are not routinely used, such as Portugal, SWAAT may contribute to more consistent referral practices, strengthen interdisciplinary collaboration, and support more transparent and equitable decision-making. The implementation of shared

referral pathways and signalling protocols may further enhance hospitals' capacity to identify and respond to social risk factors at an earlier stage.

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Data Availability

The data are not publicly available due to data protection and ethical considerations. Please contact the corresponding author to discuss reasonable requests for access to the data that support the findings of this study.

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