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ORIGINAL RESEARCH

Interconnected challenges in caregiving: a multidimensional analysis of stroke survivors' caregivers during the hospital-to-home transition

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Aims

Stroke survivors (SS) face significant challenges during their transition from hospital to home, impacting both their own well-being and that of their caregivers. Informal caregivers, often family members, assume substantial caregiving roles without professional training, leading to emotional strain and caregiver burden. Understanding the experiences of caregivers during this critical transitional period is essential for developing targeted interventions that alleviate burden and improve caregiving outcomes. This study aims to provide a comprehensive, multidimensional understanding of SS caregivers' experiences during the transitional care phase, using Automatic Analysis of Textual Data to uncover complex relationships and hidden patterns in caregivers' narratives.

Methods and results

A qualitative design was employed, utilizing semi-structured interviews with 18 SS caregivers. Data were analysed using Automatic Analysis of Textual Data, applying Exploratory Multidimensional Data Analysis to identify key themes and interconnections within caregivers' experiences. Findings revealed five central themes: the role of social support, the need for practical support, pre-discharge preparation, practical daily challenges, and emotional strain. Social support and practical assistance emerged as crucial factors in reducing emotional burden. Caregivers emphasized the importance of pre-discharge training and clear instructions to navigate the transition. The analysis revealed the interdependence between practical and emotional caregiving demands, highlighting the need for integrated, holistic support systems.

Conclusion

This study underscores the complex, multidimensional nature of caregiving during the transition from hospital to home. Results suggest that effective caregiving interventions must address both practical and emotional aspects, integrating preparation, social support, and practical assistance to enhance caregiver resilience and reduce burden.

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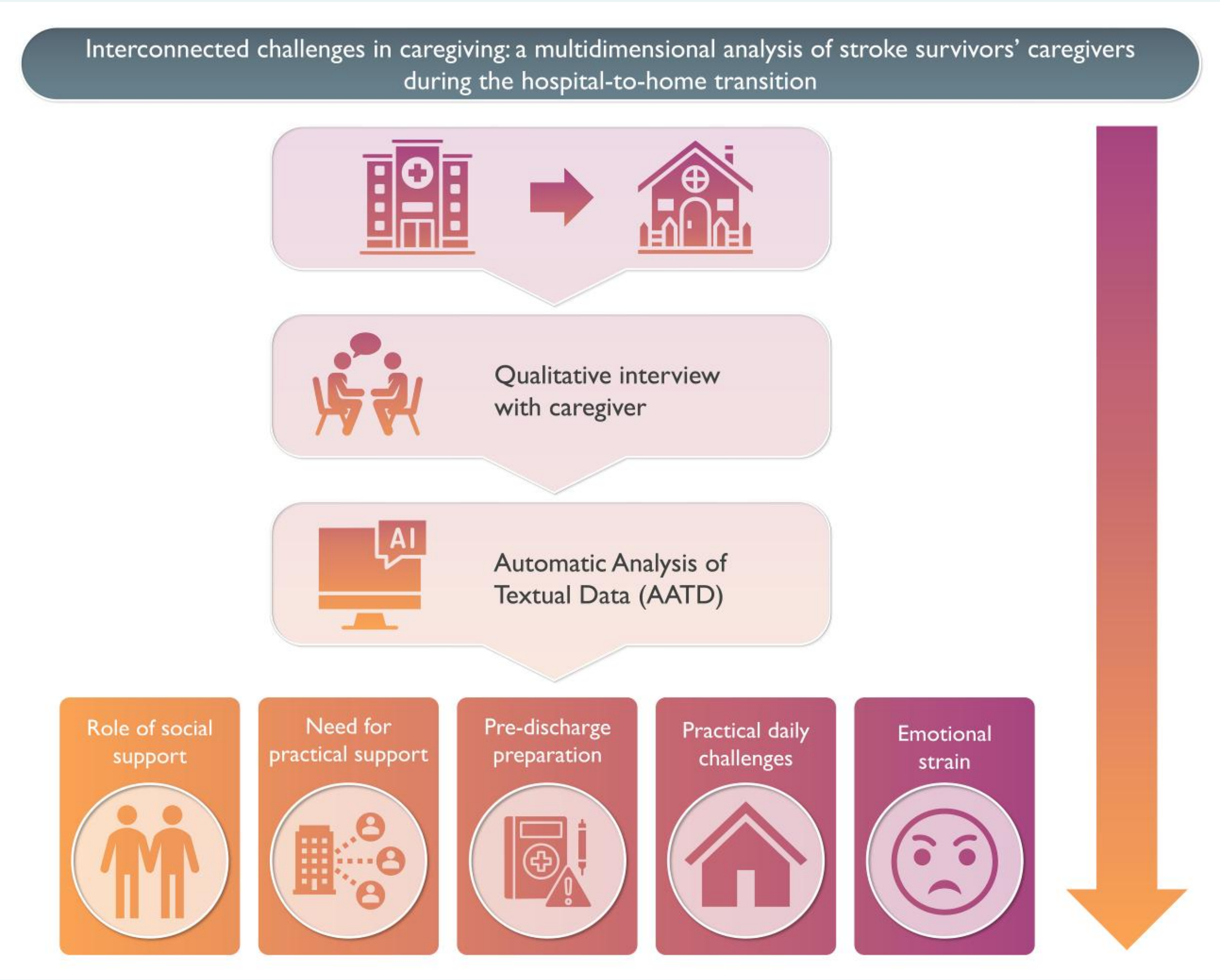
Graphical Abstract



Keywords Caregiver burden • Caregivers • Practical support • Social support • Stroke survivors • Transition

Novelty

- This study is the first to use Automatic Analysis of Textual Data to explore the multidimensional experiences of caregivers for stroke survivors during the hospital-to-home transition.
- Automatic Analysis of Textual Data emphasizes key themes in caregivers' narratives, highlighting overlapping challenges that traditional qualitative methods might overlook.
- Research reveals the interconnected nature of social support, pre-discharge preparation, practical, and emotional challenges faced by caregivers, emphasizing their mutual influence.

Introduction

According to the latest Global Burden of Disease study (2024), ~12.2 million new stroke cases occur globally each year, leading to 6.5 million deaths and causing significant consequences for stroke survivors (SS) (Li *et al.*, 2024).[1] These effects include not only physical issues but also psychological, social, and financial challenges that impact their activities of daily living (ADL) and quality of life (QoL).[2–6]

When SS returns to the community, most are cared for by an informal caregiver, usually a family member without professional training.[7,8] In stroke, the caregiving role is determined by the level of SS dependence, the intensity of care provided, and the caregiver's socioeconomic and health status.[5,9] The high demands of helping with ADL, administering medications, monitoring health, and offering emotional support often led to a well-documented phenomenon, called *caregiver burden*.[5,7,10,11]

Caregiver burden is defined as the degree of complex stress experienced by the caregiver from providing care for a family member and/or loved one over an extended period.[12] It is demonstrated to be associated with emotional strain and health deterioration such as depression, anxiety, poor well-being, and relational issues.[6,13,14] The literature highlighted the necessity to include SS caregivers in the caring process and better preparedness could reduce their burden.[11,13,15], especially during the *transitional period*.[16–18]

The transitional period is defined as the critical phase during which SS transition across healthcare settings, such as transfers between hospitals, rehabilitation centres, or long-term care facilities. In this study, we specifically examine the transition from hospital to home, a more self-managed or caregiver-supported setting.[18,19] The transitional period is critical for SS caregivers, because they start to assume substantial responsibilities, often without the immediate support of healthcare providers and adequate preparedness.[20,21] Understanding SS caregivers' experiences during this transitional period is essential for identifying specific needs, challenges, and strategies for preventing caregiver burden and enhancing the QoL for both members of the caregiver-patient dyad.[11,22]

Many studies[21,23,24] have explored the experiences of SS caregivers during the transitional period. For example, McCarthy *et al.*[24] highlighted that the primary challenges faced by SS caregivers include the caregiving burden and the feeling of 'losing themselves' as individuals. Chen *et al.*[23] found that caregiver burden can be reduced by information sharing, symptom management, and psychological and social support. Veronese *et al.*[21] argued that caregivers of older SS during the transitional home programme experience a sense of loss, an increased workload, and the critical importance of social support.

Although the existing literature emphasizes the importance of exploring the experience of informal caregivers during transitional phases of care, no studies have used the Automatic Analysis of Textual Data (AATD) by Bolasco.[25] Automatic Analysis of Textual Data offers an innovative approach that goes beyond traditional qualitative methods, which typically rely on manual coding of primary themes. If traditional qualitative approaches rely on manual coding and thematic interpretation by the researcher, AATD applies a multimethod statistical framework to uncover patterns within qualitative data. Utilizing advanced software, AATD automatically identifies latent linguistic patterns, hidden details, and complex relationships within the text. By applying algorithms and statistical models, AATD provides a deeper, more comprehensive view of narrative data.[26] AATD has been successfully used in other health-related fields. For instance, it has been applied to patient-reported outcomes, helping to identify themes in narrative survey responses (e.g. AI-PREM for patient experience).[27] It has also been used to analyse electronic health records and detect unmet needs in chronic disease management.[28] In another application, it helped explore open-text feedback from patients to improve healthcare services.[29] Additional examples include a study on health and integration in a multicultural Italian context,[30] and research on the public image of nurses in historical sources.[31] This multidimensional approach enables a richer and more nuanced understanding of SS caregivers' experiences, revealing intricate patterns that may be overlooked in conventional thematic analysis. Using AATD could be crucial for nurses and physicians as it has the potential to uncover subtle, previously unrecognized aspects of caregivers' experiences. Automatic Analysis of Textual Data can enhance clinical decision-making and support the development of tailored interventions and support systems by offering a deeper understanding of caregivers' emotional, social, and practical needs. This approach could contribute to improved patient outcomes and the overall quality of care.

This study aims to provide a comprehensive, multidimensional understanding of SS caregiver experiences during the transitional period, utilizing AATD to reveal hidden patterns and complex relationships within SS caregiver narratives. By uncovering patterns across a broad spectrum of caregiver narratives, the study aims to inform nursing practice and guide the development of targeted interventions to support caregivers and enhance transitional care processes.

Methods

Study design

A qualitative study was conducted to explore SS caregiver experiences during the transitional period. Data were collected through face-to-face interviews with SS caregivers. Data were analysed using AATD,[25] which, transforms textual data into statistical formats allowing for a quantitative-multidimensional statistical analysis.[26] The study report adheres to the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines to ensure comprehensive reporting.[32]

Methodological framework

The methodological framework adopted for data analysis was the Exploratory Multidimensional Data Analysis (EMDA) by Fraire,[33] a seven-stage process designed to uncover hidden patterns and complex relationships within textual datasets. This approach enables researchers to explore textual data from multiple perspectives, making it particularly effective for analysing multifaceted phenomena with interconnected variables, such as health, social behaviour, or environmental impacts.[34] This systematic approach strengthens the analysis' credibility, offering insights beyond those achievable through traditional qualitative methods.[26]

Study setting and recruitment

This study was conducted within a hospital-based project aimed at supporting informal caregivers of SS during the transition from hospital to home. Caregivers were recruited through purposive sampling during the patient's hospitalization at the University Hospital of Padua, Italy. Eligible participants included informal caregivers of SS aged 18 years or older, identified during the hospital-to-home transition phase. All participants were caregivers of SS who had received a first-time diagnosis of stroke and were still hospitalized at the time of recruitment. The inclusion criterion of a new stroke diagnosis was adopted to ensure that caregivers had no prior experience with stroke-related care, thereby allowing for a more consistent analysis of caregiving burden and preparedness during the initial transition. Recruitment continued until data saturation was achieved[35] resulting in a final sample of 18 caregivers.

Data collection

A stroke nursing researcher (M. Veronese) led participant recruitment and conducted semi-structured interviews between July and September 2023. Interviews took place one-month post-discharge via video call in participants' natural settings. Interviews were conducted in Italian language, addressing questions on participants' experiences as SS caregivers after discharge, the challenges faced, support needed, desired preparations before discharge, and support received from friends or family (*Table 1*). Interviews concluded when participants had no further comments.[35] Additionally, a brief questionnaire gathered sociodemographic data to describe and analyse the sample. Each session lasted ∼30 min and was digitally recorded.

Data analysis

Data analysis was conducted by a researcher specialized in AATD (M.F.), following Fraire's seven-step model.

Firstly, all interviews were transcribed into a single Word document (hereafter called 'corpus') and checked for accuracy. Transcriptions were translated into English, with back-translation applied to ensure consistency (stage 1). The interviews were originally conducted in Italian and subsequently translated into English to enable international dissemination. The translation process was guided by the principles of conceptual equivalence and cultural sensitivity, with the aim of preserving the meaning and nuances of participants' narratives. Bilingual researchers with expertise in healthcare and qualitative research oversaw the translation, and particular attention was paid to ensuring that the English version accurately reflected the original content.

Table 1 Interview outline

Interview outline
(1) Could you tell me about your experience during the discharge of your loved one regarding their return home?
(2) What were your main difficulties?
(3) What kind of support did you need?
(4) Regarding the pre-discharge phase, what would you have liked to have done to prepare yourself for taking charge of your loved one?
(5) Do you have received support from friends or family?

This approach aimed to minimize interpretive bias and support the validity of the translated data for analysis and publication purposes.[36]

In the *a priori coding phase*, a domain was assigned to each interview question, resulting in five domains: (i) general experience of transitional care, (ii) challenges associated with transition, (iii) specific physical or psychosocial needs of the participants, (iv) the need for better preparedness before discharge, and (v) changes in social relationships. Each interview was then divided into text segments according to these domains, with metadata lines including sociodemographic variables and the question domain (see Supplementary material online, *Table S1*). These metadata lines were useful to choose and select the variable guiding the analysis. At this point, the document was saved in UTF-8 format for software compatibility (stage 2). The *a posteriori coding phase* aimed to examine the data more deeply by creating a structured, quantifiable representation of the text in the form of a data matrix. Descriptive statistics, such as word frequency, co-occurrence, and proximity, were applied to reveal relationships among terms within the text. At the same time, text reliability and consistency were checked in a lexical balance. According to Bolasco,[25] a minimum corpus of 25 000 occurrences (i.e. individual words used in the text) was required to ensure reliability. The *type–token ratio* (the ratio between *types*—unique or different words—and *tokens*—all words, including repeated ones) must be below 20% to ensure sufficient word repetition, establishing patterns and language trends. Furthermore, a *hapax proportion* (words appearing only once in the corpus) below 50% was needed, as a higher proportion of hapax would reduce analysis reliability, given that rare terms do not represent significant trends (stage 4). Subsequently, the chi-square association measure was applied to produce multidimensional statistics (stage 5). At this point, *EMDA Methods and Statistical Packages* were applied. Correspondence analysis (CA) for assessing associations among categorical variables, hierarchical descending classification (HDC) for exploring categorical relationships, and principal component analysis (PCA) for dimensionality reduction were used (stage 6). These techniques allowed us to examine variable interactions within a multidimensional space, gaining insights from different angles. Finally, language tables, numerical data, and graphical outputs for visualization were generated (stage 7).[26,30] IRaMuTeQ 0.7 alpha 2 open source was used as software for data analysis.

Sociodemographic data were analysed with descriptive statistics (mean, standard deviation).

Rigour and reflexivity

According to Lincoln and Guba's criteria for ensuring trustworthiness in qualitative research, several strategies were adopted to strengthen the study's credibility, dependability, and confirmability.[37] The researchers applied bracketing by documenting their own ideas, preconceptions, and assumptions about the phenomenon under study before beginning data collection, to reduce the risk of bias during analysis.[38] To further enhance credibility, all participants were invited to review and confirm the findings (member checking), allowing for critical reflection and increasing the accuracy of the interpretations.

Regarding the computer-assisted textual analysis, the validity of the data was supported by a preliminary lexical balance and a descriptive-exploratory analysis of the corpus to ensure its consistency and adequacy for statistical treatment.[25] In line with Fraire's methodological perspective,[33] the rigour of the automatic analytical procedure and the structure of the software reduce subjective interference by limiting the manipulation of variables. While AATD may not replace the depth of manual thematic coding, it contributes to confirmability by offering a systematic and reproducible analysis of semantic patterns grounded in the participants' actual language.[33]

Ethical considerations

For this study, ethical approval was obtained from the URC of the Azienda Ospedale-Università Padova (ID 5766, 18 May 2023). All participants gave written informed consent. Confidentiality and anonymity were ensured, and data were handled according to current data protection regulations and good clinical practice standards.[39] All participants consented to the use of their data for research purposes.

Results

Sample description

The sample for this study comprised 18 caregivers, with ages ranging from 32 to 78 years, and an average age of 57 years old (SD $\pm$ 13.3). Most participants were female (14 women, 4 men), and 10 were married, 2 were single, 2 were separated/divorced, and 4 were not currently engaged. The caregivers' educational backgrounds varied from primary school[2] to middle school,[5] high school,[11] and university degrees.[4] Regarding employment status, nine caregivers were retired, and nine were employed (*Table 2*).

Corpus description

The corpus comprised 18 interviews, divided into 90 text segments, totalling 28.679 occurrences (individual words) and 2.076 forms (unique words). The type/token ratio was ~7.24%, suggesting a high level of word repetition, which is beneficial for pattern recognition. Additionally, hapaxes represented 2.47% of the total occurrences and 34.10% of the total forms ensuring lexical stability, as rare words have minimal impact on the overall pattern recognition, enhancing the reliability of the analysis (*Table 3*).

Multidimensional analysis

Correspondence analysis

According to the *a priori* coding, CA identified five main themes within the transitional care experience: 'The role of social support,' 'The need for practical support,' 'Pre-discharge preparation needs,' 'Practical daily challenges,' and 'The experience of transitioning' distributed across four quadrants in the factorial plane (*Figure 1*).

In the top-left quadrant, the theme 'The role of social support' (in blue) reflected the positive impact of social connections on caregiving. Keywords such as 'interaction,' 'social,' 'family,' and 'engage' highlighted the importance of social interactions and family involvement, which helped SS caregivers reduce stress and stay motivated. Social engagement was a beneficial element in the transitional care experience. In the top-right quadrant, the purple cluster, called 'The need for practical support,' emphasized the need for comprehensive support services, including psychological assistance and respite. Keywords like 'caregiving,' 'support,' and 'service' underscored the significance of multifaceted support to meet both the physical and emotional demands of caregiving. The bottom-right quadrant, marked by green keywords, was called 'Pre-discharge preparation need.' Caregivers expressed a strong need for structured information and resources to ease the transition home. Terms like 'preparation,' 'discharge,' and 'plan' highlighted the importance of training and collaboration with healthcare providers to ensure caregivers felt prepared for their roles. This cluster, positioned near the 'need for practical support' cluster, underscored the distinct but connected importance of pre-discharge preparation. In the bottom-left quadrant, the themes 'Practical daily challenges' (in red)

Table 2 Participants' sociodemographic characteristics

ID	Age	Gender	Status	Type of work	Educational status
CR01	78	F	Married	Retired	High school
CR02	51	F	Married	Not engaged	High school
CR03	55	F	Single	Worker	High school
CR04	57	F	Married	Worker	High school
CR05	75	F	Married	Retired	Middle school
CR06	71	F	Married	Retired	Middle school
CR07	41	F	Single	Worker	High school
CR08	55	F	Married	Worker	Degree
CR09	51	M	Married	Worker	Middle school
CR10	76	F	Married	Retired	Primary school
CR11	50	M	Married	Worker	High school
CR12	74	F	Married	Retired	High school
CR13	32	F	Single	Worker	High school
CR14	47	F	Separated/divorced	Worker	Degree
CR15	52	M	Single	Worker	Middle school
CR16	44	M	Single	Worker	Degree
CR17	56	F	Married	Not engaged	Middle school
CR18	68	F	Separated/divorced	Retired	High school

Table 3 Lexical balance for text reliability and consistency

Lexical balance	
Corpus	18 interviews
Number of texts	90
Number of occurrences	28 679
Number of forms	2076
Number of hapax	708 (2.47% of occurrences—34.10% of forms)
Mean of text occurrences	318.66

and 'The experience of transitioning' (in grey) emerged as combined. On the one hand, keywords related to practical challenges, such as 'schedule,' 'appointment,' difficulty,' 'challenge,' 'call,' and 'bedroom', reflected the daily and practical demands imposed by caring for the SS. On the other hand, keywords like 'frustration,' 'walk,' 'day,' 'return,' 'basic,' 'house,' 'pressure,' and 'rehabilitation' indicated the impact that the stroke has on caregivers, particularly regarding the moment when the patient returns home. This combination reflects the coexistence of practical and emotional challenges in the caregiving experience. The return home is described as a critical phase, during which participants report increased daily difficulties, feelings of frustration, and a need to adjust to a new routine.

Hierarchical descending classification

The HDC, based on Reinert's method, identifies four main classes representing distinct themes in SS caregivers' concerns and needs (*Figure 2*). The total percentage of covered text in the analysis is 84.89%, divided into the different clusters.

Class 1: *Practical Challenges* (31.4%) included keywords like 'bed,' 'walk,' 'mobility,' and 'fall,' emphasizing the physical demands of caregiving. This cluster highlighted the practical challenges SS caregivers face in supporting patients with mobility, safety, and daily tasks. Ensuring physical assistance and reducing risks is essential for improving patients' safety and QoL.

Class 2: *Preparation and Transition* (20.8%) involves terms such as 'home,' 'transition,' 'discharge,' and 'instruction.' This cluster focuses on the need for detailed preparation and planning to ensure a smooth transition from hospital to home care. Effective discharge planning with comprehensive guidance helps SS caregivers feel better equipped and confident in managing care at home.

Class 3: *Emotional and Psychological Support* (30.1%) includes words like 'support,' 'emotional,' 'stress,' and 'assistance,' underscoring SS caregivers' need for psychological and emotional support. Stroke survivors caregivers face substantial stress and benefit from emotional support and financial assistance to handle caregiving demands. This highlights the importance of offering comprehensive resources to help SS caregivers cope with their responsibilities.

Class 4: *Social Interaction and Communication* (17.7%) focused on keywords such as 'social,' 'engage,' 'interaction,' and 'conversation,' reflecting the significance of social support for SS caregivers. Maintaining social interactions helps SS caregivers manage the emotional demands of caregiving and supports their mental well-being.

The dendrogram from the cluster analysis shows two macro-clusters. The first macro-cluster, comprising Class 3 (Emotional and Psychological Support) and Class 2 (Preparation and Transition), indicates that SS caregivers' emotional well-being is linked to adequate preparation and support during transitions. Structured planning and effective discharge processes help reduce SS caregivers' stress, enhancing resilience and emotional stability. The second macro-cluster, which includes Class 4 (Social Interaction and Communication) and Class 1

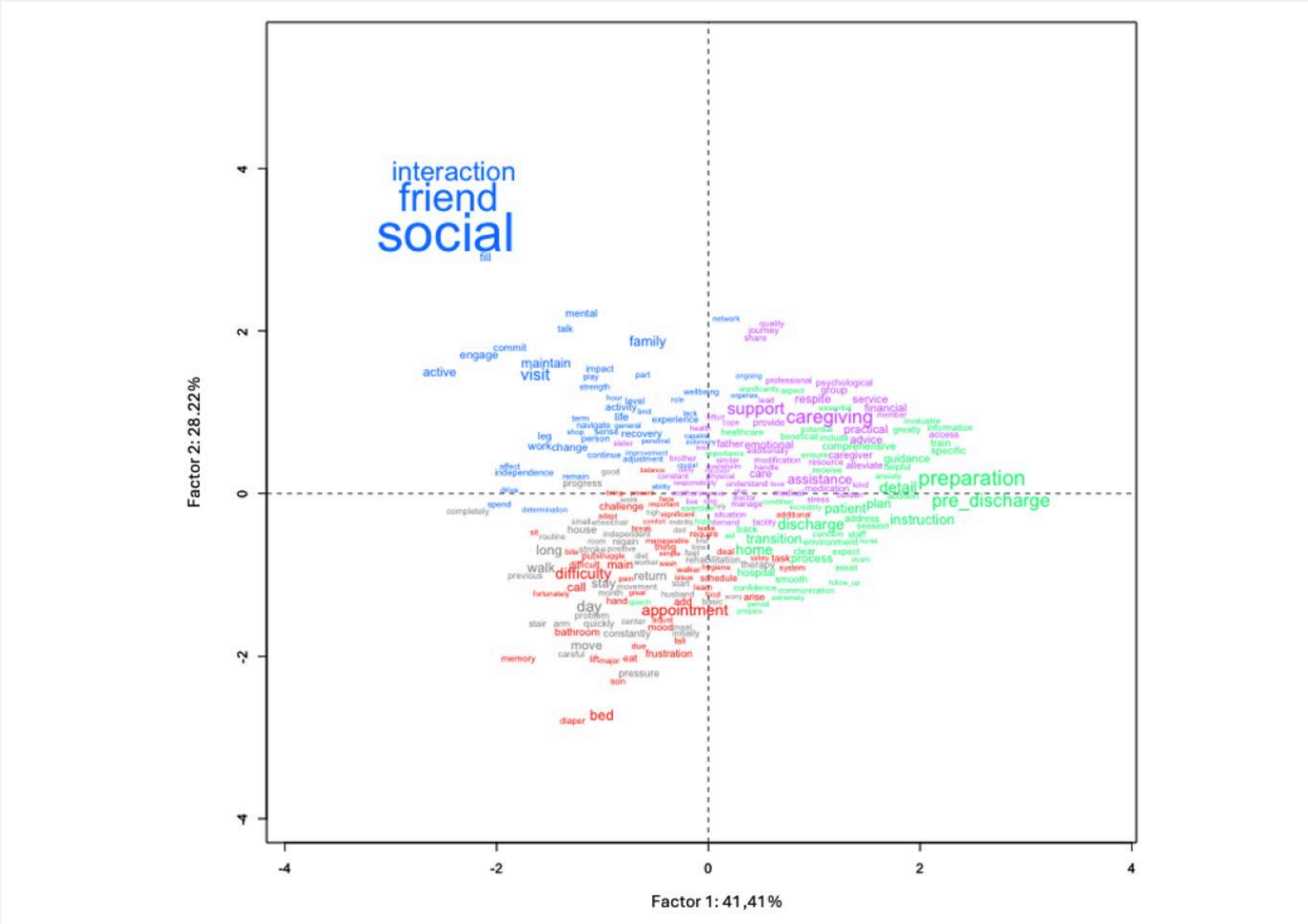


Figure 1 Correspondence analysis according to question domain.

(Practical Challenges), suggests that social support and communication networks help SS caregivers manage practical caregiving tasks. Social interaction provides emotional and logistical support, alleviating the strain of daily caregiving challenges.

Principal component analysis

The PCA maps SS caregivers' needs and experiences across two main components (factors), highlighting key themes and their relationships (*Figure 3*). This representation divides clusters into four quadrants, each reflecting a different caregiving aspect.

The proximity of clusters 1 and 4, *Practical Challenges* and *Social Interaction*, suggested that social support can alleviate some burdens associated with practical caregiving demands. Similarly, the closeness of clusters 2 and 3, *Preparation and Transition*, and *Emotional and Psychological Support* indicated that thorough preparation could reduce emotional strain on SS caregivers. These spatial distributions illustrated how practical and logistical challenges intersect with social and emotional support, underscoring the need for a comprehensive caregiving approach that addresses both operational and emotional aspects. The left side of the axis, encompassing *Preparation* and *Emotional Support*, emphasized the importance of planning and psychological well-being. In contrast, the right side, including *Practical Challenges* and *Social Interaction*, highlighted the practical and social dimensions of caregiving.

The two principal components provided a clearer understanding of the structure underlying caregivers' experiences. Factor 1 (horizontal axis), which explained 45.33% of the variance, spanned from social interaction on the right to practical challenges on the left. This component reflects how support from family and professionals helps caregivers manage practical tasks and reduce emotional strain.

Factor 2 (vertical axis), accounting for 30.26% of the variance, ranged from emotional and psychological support at the bottom to physical and practical challenges at the top. The upper half highlighted physical caregiving needs, while the lower half emphasized emotional and social resources for SS caregiver resilience. This factor illustrated how daily caregiving difficulties contribute to emotional stress and highlights that emotional strain is largely a result of insufficient practical support in the caregiving process. Together, factors 1 and 2, accounting for 73.63% of the total variance, underscored the multidimensional nature of caregiving. This spatial arrangement emphasized the need for an integrated caregiving approach that combines practical assistance, social networks, thorough preparation, and psychological care, ultimately enhancing SS caregivers' well-being and resilience and improving care quality.

Discussion

This study offers valuable insights into SS caregivers' experiences during the critical transition from hospital to home, focusing on the interconnectedness between practical support, social support, pre-discharge preparation, and emotional stress. While existing literature has often

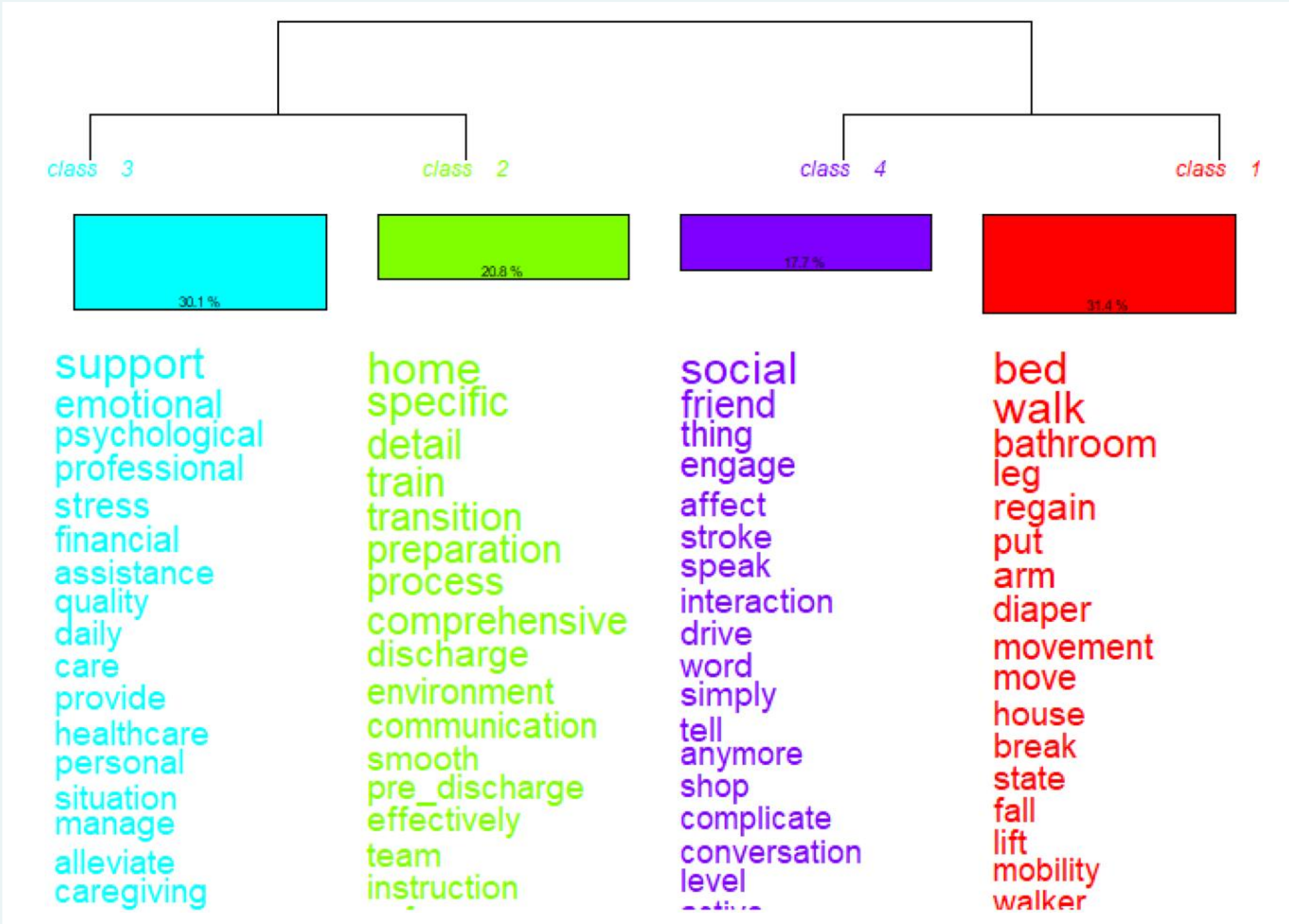


Figure 2 Cluster analysis.

highlighted these themes individually, the use of the AATD allowed us to understand how these aspects interact and reinforce each other and to extract latent dimensions, offering a more integrated understanding of caregiving during this transition.

One key finding was that the caregivers' experience was made of practical and emotional challenges related to daily difficulties. This dual pressure reflected the transitional vulnerability of caregivers, who are expected to take on a clinical-like role without formal training. This not only heightens emotional distress but also risks care quality, suggesting a need for formal caregiver preparation protocols. The transition from hospital to home often places caregivers in a complex situation where they must simultaneously balance physical caregiving tasks, emotional and psychological demands, and social and logistical needs.[1,15,40,41]

From our analysis, multi-faced practical support to meet both the physical and emotional demands of caregiving emerged as crucial in reducing caregivers' emotional burden, helping them feel more confident and less overwhelmed. These findings suggested that practical support not only facilitates caregiving tasks but also serves as a psychological anchor for caregivers during uncertain and emotionally taxing periods. When caregivers receive structured assistance, such as clear instructions, regular contact with professionals, or access to community resources, they feel less isolated and more competent, which in turn reduces emotional overload. Indeed, as described by the literature, caregivers with sufficient practical assistance usually experience less stress.[42] The lack of structured support during the transition period often exacerbates feelings of frustration and burden,[24,43] while regular check-ins with healthcare professionals may offer crucial guidance and support, further enhancing caregivers' well-being.[44,45] This highlights the need to move beyond fragmented or task-based support and towards a continuum of care that integrates practical guidance with emotional containment. Without such integration, caregivers may remain technically equipped but emotionally unprepared to face the challenges of the post-discharge phase.

Similarly, support from family and friends emerged as a key element in caregivers' ability to cope with caregiving challenges, empathizing with the crucial role of caregivers in managing daily caregiving tasks. This finding highlighted the buffering role of informal networks, which may be undervalued in clinical planning. Healthcare systems could strengthen these networks by facilitating caregiver support groups or linking caregivers with local resources. This suggests that social interaction can provide not only emotional resilience but also practical coping strategies, reducing the overall strain of caregiving. According to Kazemi *et al.*,[42] caregivers with strong social connections report feeling less isolated and more capable of managing caregiving demands, while Akosile *et al.*[45] and Hu *et al.*[44] stated that social engagement and strong social networks could reduce burnout and buffer against caregiver burden.

Furthermore, pre-discharge preparation was related to caregiver emotional strain. Despite existing discharge protocols, many caregivers report receiving only technical instructions, without psychological support or strategies to cope with the emotional load. This gap suggests the need for a more holistic discharge model integrating emotional

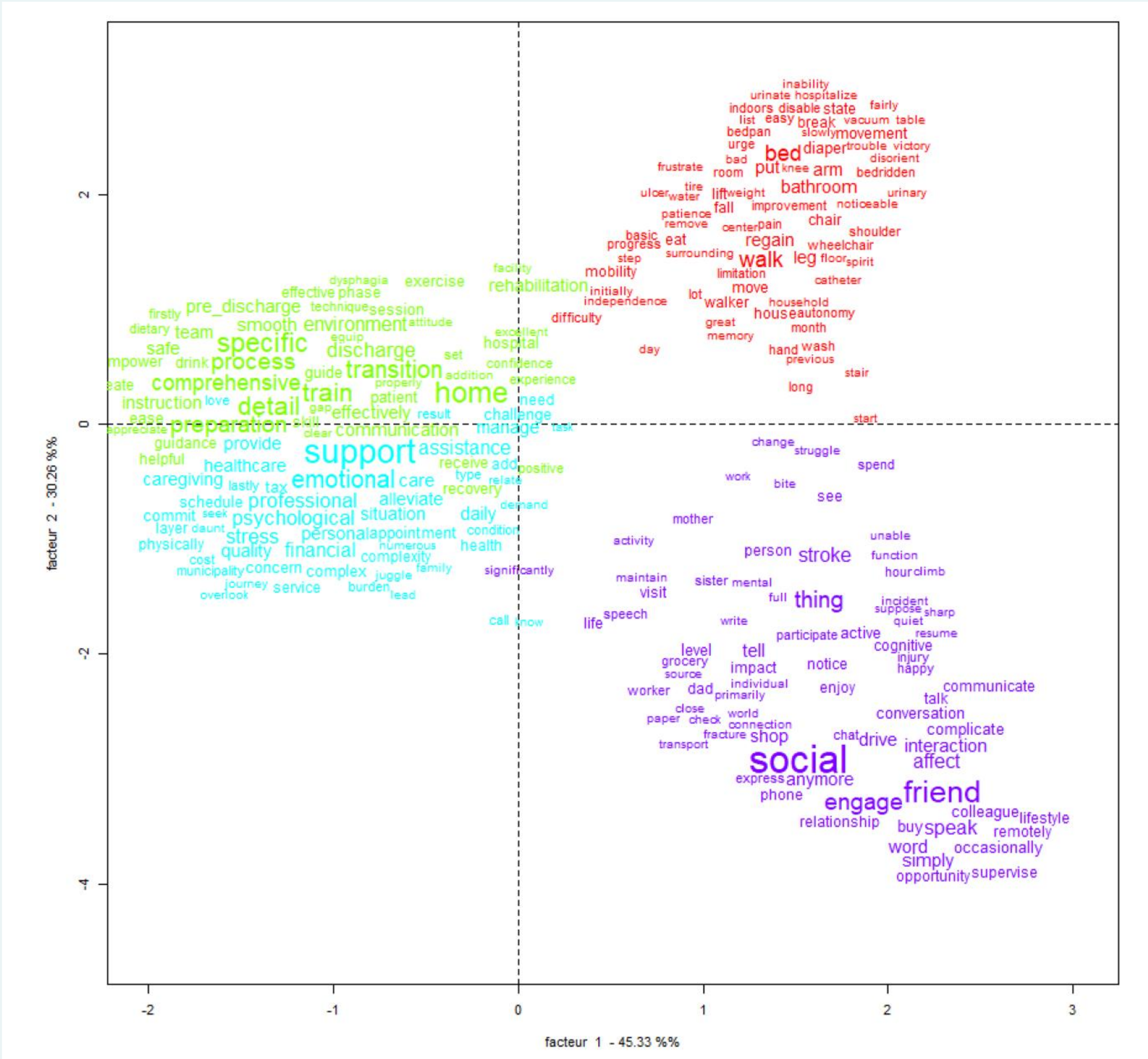


Figure 3 Principal component analysis.

readiness. This aligns with existing evidence showing that practical training and clear information from healthcare providers before discharge, covering medical tasks and emergency protocols, were demonstrated to enhance caregivers' confidence and reduce stress, foster a proactive approach, and reinforce caregivers' sense of control and resilience.[46–50] Inadequate preparation for the caregiving role increases caregiver stress and decreases their ability to manage the daily challenges associated with stroke care.[16,21] However, our study highlighted that preparation alone is not sufficient; it must be reinforced by ongoing support to ensure that caregivers feel adequately assisted and can effectively manage the transition process. This highlighted the interdependence of practical and emotional aspects of caregiving, suggesting that providing practical resources not only improves caregivers' ability to manage tasks but also their emotional well-being. The lack of practical support increases emotional stress, and emotional strain often makes it more difficult to manage practical tasks effectively. Thus, addressing both the practical and emotional needs of caregivers through improved preparation and support mechanisms is essential for reducing the impact of caregiving burdens and enhancing the overall caregiving experience. For effective transitions, a holistic discharge approach involving a multidisciplinary team is essential, as it equips caregivers with accessible instructions and strengthens their understanding of the care plan.[51]

This study presents several key strengths that contribute to its novel and significant findings in understanding the SS caregiving experience during the transition from hospital to home. Firstly, the application of multidimensional qualitative analysis provides a comprehensive approach to exploring the interconnectedness of caregiving themes. While much of the existing literature often examines these themes separately, this study offers a more holistic understanding by highlighting how these elements interact and reinforce each other. Another strength of this study is its emphasis on the real-world relevance of the findings. By focusing on caregivers' needs during the critical transition period, the study identifies specific areas where interventions can make a tangible difference in supporting caregivers, such as pre-discharge preparation, structured support, and fostering social engagement. Additionally, this study offers valuable insights into the importance of comprehensive, integrated support systems for caregivers, encompassing both practical and emotional aspects. The identification of social support as not only an emotional but also a practical resource is an important contribution to caregiving literature, as it shows how caregivers benefit from social engagement in managing both the emotional and logistical demands of caregiving. The multidimensional nature of the AATD approach provided a deeper understanding of how practical, emotional, and social dimensions interact in shaping the caregiver experience. Rather than isolating themes, this method captured how these elements converge within caregivers' narratives, revealing latent structures that may not emerge through traditional coding. This interpretive depth underscores the importance of developing integrated interventions that reflect the complexity of real-world caregiving, rather than addressing issues in a compartmentalized way. The results underscore the need for multidisciplinary collaboration and holistic discharge planning, suggesting that a coordinated, well-rounded approach to caregiving can greatly improve both caregiver and patient outcomes.

Implications for nursing practice

Our findings suggest several implications for nursing practice. From a clinical perspective, healthcare facilities should implement integrated support programmes for SS caregivers, combining practical assistance and social support. Structured preparation before discharge is essential, with training on daily care tasks and emergency protocols helping to reduce caregiver stress and boost their competence. The involvement of multidisciplinary teams is also key to providing a clear, accessible discharge plan that supports continuity of care.

From a policy standpoint, the study highlights the need for health systems to prioritize policies that facilitate access to social support and structured training for SS caregivers, especially during transitions. Allocating resources for respite care and encouraging peer support networks could help mitigate caregiver isolation.

Lastly, this study underscores the importance of further research on how social support and preparation impact caregivers' psychological well-being, with a focus on cultural and socioeconomic factors. Future research should consider combining traditional qualitative methods with AATD to deepen understanding and evaluate long-term support outcomes. Moreover, although this study did not focus specifically on gender differences, the predominance of female participants highlights the gendered nature of informal caregiving roles. This finding aligns with broader literature showing that women disproportionately assume caregiving responsibilities, often without adequate preparation or support. Future caregiver support programmes should consider the specific needs and expectations associated with gender roles, especially given that men may adopt different coping strategies or be less likely to seek help. Integrating a gender-sensitive approach into training and discharge planning could enhance the effectiveness of interventions by aligning them more closely with caregiver identity, preferences, and social context.

From a nursing perspective, the study highlights the importance of preparing caregivers not only from a procedural standpoint but also through emotional and relational support. Stroke nurses play a pivotal role in this process by providing targeted pre-discharge education tailored to caregivers' everyday challenges, such as mobility assistance, medication management, and communication with health services. In light of our findings, stroke nurses should consider integrating structured, caregiver-centred sessions into the discharge planning process, including simulation-based demonstrations, emotional support check-ins, and follow-up calls in the early post-discharge phase. These nursing-led actions can bridge the gap between institutional planning and the lived experiences of caregivers, ultimately reducing caregiver stress and improving continuity of care. Stroke nurses can also play a key role in identifying early signs of caregiver burden and initiating timely support interventions, particularly during the critical first weeks post-discharge.

Overall, while transitional care has been extensively studied over the past two decades, particularly in the context of stroke, this study introduces a novel methodological contribution by applying AATD to the narratives of informal caregivers. Unlike traditional thematic analysis, which often requires segment-by-segment manual coding, AATD enabled the identification of latent semantic structures, co-occurrence patterns, and multidimensional relationships between practical, emotional, and systemic dimensions of caregiving. This approach revealed not only the known challenges of discharge preparation and emotional burden but also the subtle interplay between caregiver vulnerability and proactive responsibility, a duality often underexplored in the literature. The projection of thematic clusters and factorial dimensions uncovered a continuum ranging from relational distress to systemic navigation, offering a more integrated understanding of the caregiving experience during the hospital-to-home transition. By combining statistical textual analysis with qualitative interpretive reasoning, this study contributes a layered perspective to existing transitional care research, supporting the development of more nuanced, integrated interventions that respond to both the emotional and practical needs of caregivers.

Limitations

This study offers valuable insights, but several limitations should be noted. The sample, limited to SS caregivers from a single hospital, may affect the generalizability of findings and the potential variations related to cultural or geographic diversity. Moreover, the study did not collect detailed information on participants' cultural or socioeconomic backgrounds. The absence of this demographic data limits the ability to explore how such variables may influence perceptions of caring behaviours. Future research should consider multi-centre recruitment and more diverse samples to examine how factors such as culture, region, or healthcare setting may shape caregivers' perceptions and experiences. Furthermore, a comprehensive demographic profiling to allow for deeper analysis of how cultural and socioeconomic variables may influence perceptions of caring behaviours within healthcare teams.

Although the sample included both male and female participants, men were underrepresented, reflecting the gender imbalance commonly observed in informal caregiving roles. This limited our ability to explore gender-specific caregiving experiences. Future studies should aim to recruit more gender-balanced samples to allow for meaningful subgroup analysis and a deeper understanding of male caregivers' perspectives. Additionally, while AATD provides an innovative approach to text analysis, its automated coding might miss subtle nuances. Combining AATD with manual thematic analysis could enhance data interpretation. Lastly, AATD's focus on language may overlook non-verbal cues; adding observational methods could yield a fuller understanding of caregivers' needs.

Conclusions

This study advances understanding of SS caregivers' experiences during the critical transitional period following a stroke. The findings highlight the need for comprehensive SS caregiver support programmes that integrate social, practical, and emotional resources tailored to individual needs.

To translate these insights into practice, healthcare teams, particularly stroke nurses, should implement structured, pre-discharge education that includes hands-on training, simulation exercises, and clear instructions for daily care tasks. Establishing follow-up mechanisms such as early post-discharge check-ins and peer support groups can further reduce caregiver burden and improve continuity of care. These interventions, when led by nursing professionals, can directly improve caregiver competence and well-being.

Future research should explore how gender, culture, and socio-economic factors shape caregiving experiences, and how these dimensions can inform the development of targeted interventions. Additionally, further refinement of AATD in combination with traditional qualitative methods could offer deeper insights into the dynamic and multifaceted nature of caregiving.

Supplementary material

Supplementary material is available at *European Journal of Cardiovascular Nursing* online.

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Author contributions

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Data availability

Data supporting the findings of this study are available from the corresponding author on reasonable request.

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