RESEARCH ARTICLE

Stress in nurses’ caring for stroke patients and families: a mixed-method study [version 1; peer review: 2 approved with reservations]

Ines Saramago 1, Suzanne Timmons 2, Paul Gallagher 3, Siobhán Fox 4

1 Clinical Nurse Specialist, Centre for Gerontology and Rehabilitation, School of Medicine, University College Cork, University College Cork, Cork, Cork, T12XH60, Ireland
2 Consultant Geriatrician, Mercy University Hospital, and Senior Lecturer, Centre for Gerontology and Rehabilitation, School of Medicine, University College Cork, Cork, Cork, T12XH60, Ireland
3 Consultant Geriatrician, Cork University Hospital and Senior Lecturer, Centre for Gerontology and Rehabilitation, School of Medicine, University College Cork, University College Cork, Cork, Cork, T12XH60, Ireland
4 Postdoctoral Scientist, Centre for Gerontology and Rehabilitation, School of Medicine, University College Cork, University College Cork, Cork, Cork, T12XH60, Ireland

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Abstract

Background: Within nursing, caring for stroke patients and helping them with the recovery of their abilities can be strenuous; even more so when considering the nurse’s scope of practice includes the patient and predicts a supportive role to the caregivers. This type of rehabilitative nursing care can be demanding, and nurses may experience increased levels of stress. Despite the extensive literature about the nursing workload and its connection to occupational stress, very little research has been conducted particularly about stress levels experienced by nurses working with stroke patients, who may experience particularly high stress. The rationale for this research emerged from the scarcity of studies worldwide and especially in Irish stroke units.

Methods: Nurses from stroke and medical wards (n=100) were distributed the Perceived Stress Scale and requested to complete it from the perspective of their workplace. A convenience sample of these nurses were interviewed about their experience of stress.

Results: Of 48 survey respondents, 68% reported ‘moderate’ levels of stress, with higher mean levels in nurses working in medical wards (M=20.10, SD=5.42) than nurses in stroke units (M=16.17, SD=4.41; t(46)=2.757, p<0.01). In interviews with nurses on stroke units (n=11), sources of stress included work performance anxiety (e.g. fear of errors), workload burden/conflicting demands, and family/physician interactions. Coping mechanisms included brief “time outs”, direct problem-solving, and peer support.

Conclusions: The participants’ experiences of stress may help other nurses working with stroke patients to cope better with work-related
stress, and provide guidance to managers in improving the organization of stroke networks.

Keywords
stress, stroke, nursing, mixed methods, families

Corresponding author: Ines Saramago (116221160@umail.ucc.ie)
Author roles: Saramago I: Formal Analysis, Methodology, Visualization, Writing – Original Draft Preparation; Timmons S: Conceptualization, Project Administration, Supervision, Writing – Review & Editing; Gallagher P: Project Administration, Supervision; Fox S: Conceptualization, Project Administration, Supervision, Writing – Review & Editing
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Introduction

Nursing is known to be a stressful profession and this problem is frequently addressed in the literature (Eslami Akbar et al., 2017; Lee & Kim, 2020; Lim et al., 2010; Roberts & Grubb, 2014; Ruotsalainen et al., 2015). Multiple European and international studies have acknowledged the increase demands in the nursing profession leading to an intention to quit their jobs and high turnover rate (Austin et al., 2017; Bordignon & Monteiro, 2019; Heinen et al., 2013; Holland et al., 2019; Kovner et al., 2014; Lee & Kim, 2020; Leineweber et al., 2016; Moloney et al., 2018). Most of the available research identifies nurses as experiencing increased stress levels compared to other healthcare professionals (Geuens et al., 2015; Han et al., 2015; Joice et al., 2012; Müller et al., 2011). However, experiences of stress among nurses working specifically in stroke units remains a relatively unexplored area. Indeed, there is abundant literature on the impact of stress among informal caregivers, but less about the nurses caring for those with stroke (Joice et al., 2012).

Providing rehabilitation nursing care can be exhausting and demanding, as stroke survivors are often confronted with multiple losses. Caring for stroke patients and helping them with the recovery of their abilities can be strenuous; especially given that the nurse’s scope of practice includes not just the patient, but also a supportive role to the person’s family. Many clinical guidelines highlight the importance of supporting stroke caregivers emotionally and of encouraging them to be involved in the stroke care (Intercollegiate Stroke Working Party, 2016; National Institute for Health and Care Excellence (NICE), 2013; Scottish Intercollegiate Guidelines Network (SIGN), 2010). Facilitating such involvement can be demanding as conflicts may arise from this interaction and, within a rehabilitation environment, nurses appear to experience more of these conflicts which leads to a high level of stress (Creasy, et al., 2015; Joice et al., 2012; Lee & Kim, 2020; Lehto et al., 2019; Rochette et al., 2014).

The rationale for this research emerges from the scarcity of studies in stroke units worldwide and especially in Irish stroke units, cognizant that nurse stress could negatively impact the patient rehabilitation process (Douglas et al., 2017; Rejnö et al., 2013; UNISON, 2014). This study used a mixed-method approach to address this gap in the literature by exploring nurses’ experiences of stress when supporting stroke patients and their families in two acute stroke units, where the median length of stay of 3 weeks includes early rehabilitation for severe strokes (before transfer to off-site rehabilitation), and the full period of in-patient rehabilitation for patients with minor strokes.

The specific objectives of the study are: to determine the levels of stress experienced by nurses in stroke units compared to nurses working on general medical wards; to explore nurses’ understanding and views regarding stress in stroke units; and to identify how these nurses manage stress. From this, we aimed to make recommendations for nursing practice.

The research question was “What are nurses experiences of stress when dealing with stroke patients and their families?”.

The research question was developed following the SPIDER method (Bettany-Saltikov, 2012; Korsjøns & Moser, 2017; Methley et al., 2014).

Methods

Design

A non-sequential mixed methodology was used, using surveys and face-to-face interviews. Data were collected from two wards, the stroke unit and the immediately adjacent medical ward, in each of the two hospitals in Cork city with acute stroke units (Hospital X and Hospital Y).

Ethics

Ethical approval was granted by the Clinical Research Ethics Committee of the Cork Teaching Hospitals (reference: ECM 3 (o) 10/01/18). All participants were given an invitation letter, an information leaflet and a consent form to be read prior to participating in the study. The documents provided to the participants defined their participation in the study as voluntary and clearly stated the risks and benefits of the study, and the option to refuse to participate in the study or withdraw from the study at any time without prejudice.

Sample

Surveys. In each hospital, there were 25–35 eligible nurses per ward, and 25 surveys were allocated to each study ward (n=100 total distributed), along with information leaflets (See extended data (Saramago, 2020)). These survey packs were provided to the Clinical Nurse Manager (CNM) 2 of each ward who were instructed to distribute them amongst their staff. Reminders were given through weekly visits over 4-5 weeks by the researcher.

Inclusion criteria were: permanent registered nurses and strokes specialist nurses (i.e. graduate education in stroke and working solely with stroke patients), working on the ward/unit (whether part-time or full-time). Exclusion criteria were: relief or agency nurses, and student nurses.

Interviews. In total, 11 nurses working in the stroke units were invited to participate in interviews, using convenience sampling within the eligible cohort. Inclusion criteria were: registered nurses and stroke clinical nurse specialists working in the stroke unit for at least 3 years.

Instruments

The survey used was the Perceived Stress Scale (PSS), originally designed by Sheldon Cohen in 1983 (Cohen et al., 1983) and later shortened to a 10-item version. The PSS is one of the most widely used stress scales and it has been validated in several populations, including college students and workers. The internal consistency and test-retest reliability of the 10-item version are both >0.70, with 12 studies evaluating the former and four studies the later (Lee, 2012). The PSS is frequently used to measure stress in healthcare workers. In this current study, the survey participants were specifically directed to answer the questions in relation to their current workplace. The scale items were not modified in any way.
The survey consists of ten direct questions, and for each question there are five possible answers, on a 5-point Likert scale ranging from 0 (“never”) to 4 (“very often”). The total score per participant can thus range from 0 to 40. For scores between 0 and 13, the participant is considered to have low stress levels. Scores between 14 and 26 correspond to moderate levels of stress, and scores ranging from 27 to 40 indicate perceived high levels of stress.

Face to face semi-structured interviews were performed individually in a private office, using an interview guide adapted from King and Horrocks in 2010 (Figure 1). The interview guide

<table>
<thead>
<tr>
<th>Date: __________</th>
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</thead>
<tbody>
<tr>
<td>Age range:</td>
</tr>
<tr>
<td>Gender (Circle):</td>
</tr>
<tr>
<td>Institution:</td>
</tr>
<tr>
<td>Department:</td>
</tr>
<tr>
<td>Total years of work experience:</td>
</tr>
</tbody>
</table>

**Questions:**

1. How long have you worked in the acute stroke unit?
2. What does the term ‘stress’ mean to you?
   a. Or what is your understanding of stress?
3. Can you please tell me about your most recent stressful experience?
   a. How did it make you feel?
4. What do you think are the factors that can induce stress?
   a. Or are there any reasons related to your work that makes you feel more stressed some days than others?
5. How do you deal with stress?
6. What do you think it could be improved to help nurses dealing with stress?
7. Is there anything else you would like to discuss regarding the stress management in nurses dealing with stroke patients and their families?
8. Is there any part of the interview that you would like to revisit?

**Thank you for your collaboration**

*Figure 1. Interview guide.*
consisted of eight open-ended questions, with another three optional ‘prompts’ in case clarification was required. The focus was on stroke nurses’ experiences in dealing with stroke patients and their families.

Data collection

Surveys. The surveys were distributed by the ward manager to eligible nurses; the managers indicated that all available surveys were distributed. Gentle reminders to complete the surveys were given through weekly visits by the researcher over the subsequent 4–5 weeks (noting that the surveys were anonymous, so there was no pressure placed on any one individual to complete a survey, but rather a general reminder to the overall nursing staff).

Interviews. For the realization of the interviews, the Senior Clinical Nurse Managers of the two stroke units were contacted in advance, to discuss the times and dates that would be most convenient for staff. They briefed the ward nurses on the planned interviews. On the agreed days, the nurses on duty were approached and eligibility confirmed, and if interested, they were given an information leaflet to read. They had time to consider this information before the interview slots later that day (at the quietest times on the ward), and could choose to proceed, refuse, or take more time to consider it further (contacting the researcher to ask more questions or to arrange another date). The interviews generally lasted between 25–30 minutes each (one lasted 10 minutes only) and were audio recorded on a digital voice recorder stored in a locked drawer when not in use. The audio files were destroyed after transcription was completed. A consent form was read and signed by the participants. The total number of interviews was decided at the point when data saturation was reached.

Data analysis

Data retrieved from the surveys was analysed using Statistical Package for the Social Sciences version 25. As the data met the assumptions for normality, an independent samples t-test analysis was conducted to compare the total PSS scores between stroke units and medical wards. Interview data was analysed using Thematic Content Analysis as per the Newell and Burnard (2011) model. The author followed this six stage process by: 1 – transcribing data via ‘intelligent verbatim’ and making relevant side notes; 2 – reviewing transcripts and side notes to identify general themes; 3 – summarising extensive sentences into important topics; 4 – screening for similar codes and regrouping them into a list of category coloured codes; 5 – reviewing transcribed interviews and colour coding appropriate sentences; 6 – writing up a report using data extracts. All transcripts were coded by the researcher who conducted the interviews, with a second senior researcher reviewing this coding in one-third of the sample.

An initial nine interviews were performed and analysed. Data saturation appeared to be reached, so a further two interviews were performed and analysed, with no new themes emerging, confirming data saturation.

Results

Surveys

In total, there were 48 surveys completed, representing a 48% response rate if all surveys were distributed, as we were told by the ward managers. There was a bias in response rates between the two hospitals, with 77% of the 48 respondents being from Hospital X. However, there were fairly even proportions of total participants from the medical wards versus the stroke units (n=20 and n=28, respectively, in total). Most respondents (94%) were aged between 25 and 45 and 75% of respondents had a minimum of 3 years’ experience (see Table 1 for sample characteristics (Saramago, 2020)).

Table 2 shows the means and standard deviations for the PSS scores for the total sample and sub-samples (Saramago, 2020). The mean PSS score for the total group was 17.81, i.e. ‘moderate’ stress levels.

Table 3 and Table 4 show the means and standard deviations for the PSS scores for years of experience and age range

| Table 1. Characteristics of surveyed population sample. |
|----------------------------------------|--------|--------|--------|
| Characteristics/ Department           | Stroke (n=28) | Medical (n=20) | Total (n=48) |
| Institution                            |         |        |        |
| Hospital X                             | 23      | 14     | (37) 77% |
| Hospital Y                             | 5       | 6      | (11) 23% |
| Years of Experience                    |         |        |        |
| <3 years                               | 8       | 4      | (12) 25% |
| ≥3 years                               | 20      | 16     | (36) 75% |
| Age Range                              |         |        |        |
| <25                                    | 9       | 2      | (11) 23% |
| 26–35                                  | 11      | 12     | (23) 48% |
| 36–45                                  | 7       | 4      | (11) 23% |
| 46–55                                  | 1       | 2      | (3) 6% |
| ≥56                                    | 0       | 0      | 0       |
Table 2. Perceived Stress Scale scores for the total sample and sub-samples.

<table>
<thead>
<tr>
<th>Department</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke</td>
<td>28</td>
<td>16.18</td>
<td>4.41</td>
<td>9 – 26</td>
</tr>
<tr>
<td>Medical</td>
<td>20</td>
<td>20.10*</td>
<td>5.43</td>
<td>10 – 30</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>17.81</td>
<td>5.19</td>
<td>9 – 30</td>
</tr>
</tbody>
</table>

*(p<0.008)

Table 3. Perceived Stress Scale scores for years of experience.

<table>
<thead>
<tr>
<th>Years of Experience</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;3 years</td>
<td>12</td>
<td>19.08</td>
<td>4.62</td>
<td>12 – 29</td>
</tr>
<tr>
<td>≥3 years</td>
<td>36</td>
<td>17.39</td>
<td>5.36</td>
<td>9 – 30</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>17.81</td>
<td>5.19</td>
<td>9 – 30</td>
</tr>
</tbody>
</table>

Table 4. Perceived Stress Scale scores for age range.

<table>
<thead>
<tr>
<th>Age Range</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤35</td>
<td>34</td>
<td>18.47</td>
<td>4.75</td>
<td>10 – 30</td>
</tr>
<tr>
<td>&gt;35</td>
<td>14</td>
<td>16.21</td>
<td>6.02</td>
<td>9 – 26</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>17.81</td>
<td>5.19</td>
<td>9 – 30</td>
</tr>
</tbody>
</table>

Less experienced nurses had slightly higher PSS scores than more experienced nurses (<3 years of experience: M= 19.08, SD= 4.62; ≥3 years of experience: M= 17.39, SD= 5.36, t (46)= 0.976, p= 0.334); and younger nurses had slightly higher PSS scores than older nurses (<35 years of age: M= 18.47, SD= 4.75; ≥35 years of age: M= 16.21, SD= 6.02, t (46)= 1.384, p= 0.173).

Nurses on medical wards had higher perceived stress levels than their peers on the stroke units (M= 20.10, SD= 5.42 versus M= 16.17, SD= 4.41, respectively; t (46)= 2.757, p=0.008). The magnitude of the differences in the means (3.92, 95% CI: 1.05 to 6.78) was large (eta squared = 0.142), even though both are still “moderate” levels of stress.

Interviews
The interview data from the eleven participating nurses (6 from hospital X and 5 from hospital Y) was coded into five initial themes. These initial five themes were then collapsed into three final higher-order themes (Figure 2): Nurses’ experiences of work-related stress in stroke wards; Factors contributing to work-related stress in stroke wards; Nurses’ coping mechanisms in the stroke environment.

Nurses’ experiences of work-related stress in stroke units.
All of the nurses interviewed reported experiencing work-related stress. The majority of experiences were related to psychological stress. The participants often described themselves as feeling “frustrated”, “overwhelmed”, “disappointed”, “anxious”, “nervous”, “worried” and “upset” during their work.
Participants also felt they were unable to cope with the workload and these feelings could lead to a heightened sense of job responsibility. Two participants commented:

“There’s a lot of anxiety involved in it when you are feeling stressed, that you are just nervous that you would forget something, or you do something wrong, and it’s a fairly serious thing if any of those things happen in our job.” (Participant E)

“From my point of view, I think it is that you can’t control the pressure from work, you know... That you need more support from other people to manage/help me.” (Participant B)

Factors contributing to work-related stress in stroke wards. The majority of participants from one hospital identified family involvement as a contributing factor to their increased levels of stress. While in the other hospital, participants often described communication issues with medical teams as contributing factors. The following two distinct comments illustrate this:

“…often when it comes to a stroke patient (…) maybe they are getting past the pathway they are acute, but they haven’t shown massive progress, maybe physically, and then the family doesn’t understand why this stuff isn’t happening. From a nursing perspective, you are doing the medication, observations, ambulate, whatever... but they might need input from occupational therapy, physio and I think then it’s kind of stressful because you can’t provide what they need at that time.” (Participant A)

“I suppose it was a patient that came in, he was less than 24 hours with us and he was going for a repeat computed tomography (CT) Brain just because he was still quite drowsy. One of the medical staff had informed the family that they would talk to them after the CT. But that wasn’t passed on to the nursing staff. The CT was subsequently delayed. All the family (…) have been sitting down there for hours waiting for the doctors to come and the doctors had gone home at that stage and nobody had discussed the CT with them. So, we were just left there to handle the situation.” (Participant J)

In both hospitals, issues with the work environment and job performance were also seen as factors leading to work-related stress in the stroke wards. In terms of job performance, one participant also reported the administration of unfamiliar medication as a stressful factor. As per participant G:

“I had an event where a registrar was charting a new medication (…) which I haven’t been used to giving as a nurse (…) which made me quite anxious and quite stressed. (…) To give a drug that I wasn’t used to give and to be expected to give (…) You just feel that it’s put upon you, you have to do a thing even though, as I told him, it’s my registration at the end of the day, (…) I went home very stressed as well, because it was just very stressful, the man was very young, and he was very sick.”

Nurses’ coping mechanisms in the stroke environment. It was evident that different coping strategies were used, depending on the participant’s personal resources and external factors. Participants gave examples of intrinsic and extrinsic coping mechanisms.

Intrinsic coping mechanisms: “So, I just normally take a minute (…) and it’s just an excuse to leave the situation for a second, get your head together and then go back.” (Participant A)

“I think my main thing as well would be problem solving, I try and just get to the root of the problem, whatever it is.” (Participant H)

Extrinsic coping mechanisms: “…often when it comes to a stroke patient or… my mom is a nurse, so I debrief on her when I go home. (…) Even if we dedicated rounds with doctors or just maybe more communication, more nurses to patient ratio. (…) There’s been a lot of young strokes coming through as well and it’s only amongst ourselves that we might discuss about it but there’s no formal debrief about it. That might help even once/twice a month.” (Participant J)

Discussion
In the present study, the rate of ‘moderate stress’ levels in nurses working on stroke units was 68%, although the mean PSS score was lower than in the nurses working in the adjacent medical ward. In contrast, the available literature suggests that nurses working in a rehabilitation setting have a higher risk of experiencing burnout than nurses working in other clinical areas (Tay et al., 2014). However, the available literature is very scarce and lacks direct comparison of stress levels between stroke nurses and their peers. The following references are examples of this ambiguity. An Irish study (McCarthy et al., 2010) analysed perceived stress levels using the nursing stress scale (M= 47.9, SD= 12.8) for nurses working in medical areas but failed to disclose the characteristics of the patient population in those areas. A recent study focusing only on nurses caring for stroke patients in Chinese neurology wards reported a nursing burnout rate of 90% (Jiang et al., 2016). Similarly, another study had only looked at stress levels in nurses working in medical units (Geuens et al., 2015); in this study, medical nurses reported low stress levels, a mean of PSS score of 9.1. One explanation for these differences may be the use of different instruments to measure stress levels across these studies, for example the Maslach Burnout Inventory, Profession Quality of Life Scale, Revised Nursing Work Index, etc.

Nevertheless, in the current study the majority of nurses working on stroke units reported being stressed, and a further qualitative analysis explored the experience, influence and coping methods related to this stress. Multiple stressors were cited; with common issues including the workload and multi-tasking requirements. There appeared to be hospital-specific issues also, i.e. family involvement in one hospital, and communication issues with doctors in the other, larger hospital. This is somewhat supported in the available literature which
demonstrates that in smaller hospitals, nurses and physicians have greater communication levels when compared to larger hospitals (Hailu et al., 2016). This may influence the relationship between families and staff in multiple ways. Apart from the obvious possibility that a smaller unit fosters more personal relationships between staff and families, it is possible that larger units foster more family-to-family peer support, which may lead to negative comparisons of care, or alleviate the need for seeking information from the nursing staff (Kessler et al., 2014; Morris & Morris, 2012). Staff having time to build a relationship with families may also influence these relations, and this may have differed between the two units.

The stressful experiences expressed by the nurses in the present study have also been reported in previous studies. Specifically, feelings of anxiety and frustration and issues with lack of time, increase in the workload and lack of adequate nursing staff ratios are common to the available literature (Barreca & Wilkins, 2008; Joice et al., 2012; Lee & Kim, 2020; Sveinsdottir et al., 2006; Theofanidis & Gibbon, 2016). Family involvement and communication issues with medical teams are also cited in several studies (Barreca & Wilkins, 2008; Joice et al., 2012; Lee & Kim, 2020; Sveinsdottir et al., 2006; Theofanidis & Gibbon, 2016).

When nurses were asked to reflect on their coping mechanisms, a variety of strategies were identified in the current study, including seeking some “time-out”, seeing a problem as a solvable challenge, and peer support. Taking a break from a stressful situation, more training opportunities, and relying on support from colleagues and managers were also mentioned in the literature (Barreca & Wilkins, 2008; Joice et al., 2012; Lee & Kim, 2020; Sveinsdottir et al., 2006; Theofanidis & Gibbon, 2016).

Limitations and recommendations
A number of limitations exist in the present study. This study was based in two hospitals in a single city. The response rate at 48% was adequate given the reliance on the ward manager to distribute the surveys. A convenience sampling technique was chosen for study interviews, but may have allowed selection bias. The sample size for the interviews is relatively small, but data saturation was reached. Findings may not be generalizable to other nurse populations who work with patients with stroke in acute or rehabilitation settings. Another limitation is the subjective nature of the measurement instrument. However, stress is a subjective experience and bias was somewhat mitigated through the use of a validated quantitative scale.

Finally, performing repeat assessments of stress levels, as part of a longitudinal design, would be useful to help explore effectively how work experience may affect the stress experiences and coping mechanisms over time of nurses working with stroke patients. Occupational stress in stroke rehabilitation units remains a relatively unexplored area of research. Therefore, it’s important that future researchers concentrate their efforts in this field.

Conclusion
Chronic stress in nursing staff is an ongoing issue and has been widely investigated under the umbrella term ‘burnout’. The present study adds to available literature with the majority of participants expressing levels of ‘moderate stress’, and mean stress levels higher in nurses working on medical wards than those working on stroke units. A variety of reasons for stress were identified during interviews, with the most frequent issues being family involvement, medical team communication, the work environment and their job performance.

Suggestions to alleviate stress experienced by rehabilitation nurses include:
- Improve communication between staff, particularly between members of the multidisciplinary team, by communication training and the use of appropriate feedback tools to ensure a closed loop in the communication process;
- Educate families about stroke and its complications to enable relatives to participate appropriately in the rehabilitation process;
- Improve access to and uptake of formal counselling for stroke nurses to ensure stressful events are dealt with in a timely and confidential manner;
- Encourage and provide ongoing training to stroke nurses as well as the other members of the multidisciplinary team to ensure all members work towards the same goals.

Data availability

**Underlying data**

**Interview data.** The interview transcripts will not be stored in an open access repository, due to their potentially identifiable nature. However the anonymous and retracted (i.e. de-identified) transcripts can be made available upon email request to the first author, with a valid reason for the request provided, such as completion of secondary analysis.


This project contains the following underlying data:
- Survey Data Analysis.xlsx (Spreadsheet containing survey data)

**Extended data**


This project contains the following underlying data:
- Survey Participant Information Leaflet.pdf (Study participants information sheet for the survey)
- Interview Participant Information Leaflet.pdf (Study participant information sheet for interviews)

Data are available under the terms of the Creative Commons By Attribution 4.0 (International data waiver (CC BY 4.0).
References


Open Peer Review

Current Peer Review Status: 🆕  🆕

Version 1

Reviewer Report 07 January 2021

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Claire Donnellan
School of Nursing and Midwifery, Faculty of Health Sciences, Trinity College Dublin, Dublin, Ireland

Reviewer report for manuscript: Stress in nurses’ caring for stroke patients and families: a mixed-method study

Reviewed this manuscript with interest and consideration regarding its importance in contributing to understanding the concept stress as experienced by nursing health professionals in their delivery of stroke care. There is certainly merit and value in examining organisational stress as experienced by health professionals involved in contributing towards and delivering healthcare interventions across the stroke care pathway. Nursing healthcare professionals tend to have studied and examined the organisational stress concept in greater detail in comparison to other healthcare professionals as part of interdisciplinary teams.

Some broader considerations to account for and acknowledge when examining such a topic in relation to stroke care and would suggest acknowledge as part of introduction and/or in discussion.

- Some explanation or acknowledgement of the essential or valuable nursing contribution and interventions across all stages of the stroke care pathway including rehabilitation needs to be included or perhaps provide some clarity regarding the nursing function and role specifically in relation to rehabilitative approaches. If can clarify in the paper that it is the post hyperacute into early rehabilitative phase that is of interest as part of the stroke care pathway or define phases involved in context of stroke units included in study.

- Given the essential nursing intervention necessary for interdisciplinary team (IDT) working – would there have been merit in examining other IDT members experiences of stress and compare with those of nursing? I wasn't clear as to why nursing were examined exclusively given international stroke guidelines have emphasised IDT working for stroke care and management.

- I wasn't clear what the reason was for comparing specialised nursing stroke care delivery with that of nursing care in general acute healthcare wards. Perhaps another specialised entity such as specific critical or cardiac care or indeed other specialised gerontological
rehabilitation care would have some similar organisational/professional specifics/environmental elements to actually compare with.

- Some consideration that nursing competencies and specialised skills in stroke management vary considerably across the island of Ireland and indeed across Europe. Specialised nurse training and educational programmes in all facets of the stroke care pathway are very limited or non-existent relative to training and postgraduate programmes available to other disciplines of the IDT.

- Given 80% of all post hyperacute stroke care arguably can be considered nursing care, would have liked to know what the nursing professionals' efforts were in ensuring use and adherence to the widely available recommended stroke guidelines. Given this level of direction to deliver care is available, it would be interesting to know if and how they incorporate these into their practice and if helps in alleviating some of their stress.

### Method and results

- To provide some justification why a mixed method design. For example, was one aspect intended to inform the other. What was the purpose of a mixed-method approach?

- Provide some explanation how SPIDER was used for developing the research question to help understand the mixed method nature of the study – maybe include a sentence as part of the method.

- Could limit the word count use on ethics section – some content included is a given.

- Some detail on the actual clinical sites would be helpful – teaching hospitals, staff/patient ratio, bed numbers etc – what are the environmental and organisational factors to consider when understanding comparisons between these clinical areas.

- Would not mix data collection methods with describing study sample. Would include survey format and details under data collection subheading along with instruments, interviews etc.

- If can report internal consistency and test-retest reliability as cronbach’s alpha $\alpha$ and test-retest as $r$.

- A reference to support sentence - The PSS is frequently used to measure stress in healthcare workers.

- Have some reservation on examining stress as the only variable given the documented factors associated with stress and burnout in healthcare workers. Interview schedule did not include any questions on available supports, anything concerned with training or continuous professional development e.g. empowering nursing personnel working in their respective specialisations, promotional or other benefits available to them.

- Job satisfaction measures and other emotional/psychological health measures are usually included in these types of organisational studies.

- Would remove interview schedule as a figure as doesn't add to the paper and highlights the schedule's limitations.
Who were the researcher and senior researcher? See page 5 under data analysis – insert initials in brackets.

Given the modest sample size for conducting the quantitative analysis, would have used a non-parametric comparison statistic test.

Tables 2-4 could be presented as a single descriptive table of PSS scores by sample characteristics.

Clarity required for years of experience in what e.g. is < or > 3 years for the specialised stroke nurses in actual stroke care experience. Expertise is not necessarily defined by years of experience, but the nature and level of training in the specialist field are also important considerations.

Why report t test results when not significant. Only report differences’ results that are statistically significant. If can include set level of significance in data analysis section.

The discourse results indicate some extracts that suggest hyperacute phase of the stroke care pathway and the study introduction and aim indicate that the rehabilitative process is of interest – clarify stage of stroke care pathway or what aspects of stroke care are addressed within the clinical stroke units included in the study e.g. include hyperacute management and then early rehabilitation intervention.

Figure 2 is not legible.

Stroke units and stroke wards used interchangeably – stick with preferred term stroke units.

Not defined what is meant by extrinsic and intrinsic coping mechanism. Extracts read more like informal coping responses to stressful events.

Discussion

Including means scores of another measure e.g. on page 7 nursing stress scale (M= 47.9, SD= 12.8) for nurses working in medical areas is meaningless because not comparable with the PSS scores reported in this study and without knowing the parameters of a specific measure.

Would have compared findings with those of other acquired and traumatic head injury associated studies given the similar nature of patient consequences nursing personnel must address and manage.

Narrative findings indicated a limited IDT working in operation and suggest nursing practice in isolation of an IDT approach.

There was no sense of examining supports or professional development resources available that usually can help with empowering nursing professionals in their practices and alleviating stress levels as a result.

Some discussion or justification/explanation warranted as to why nurses working in stroke units had lower stress levels compared to nurses working in general wards in the context of
characteristics within this study.

Is the work clearly and accurately presented and does it cite the current literature?  
Partly

Is the study design appropriate and is the work technically sound?  
Partly

Are sufficient details of methods and analysis provided to allow replication by others?  
Partly

If applicable, is the statistical analysis and its interpretation appropriate?  
Partly

Are all the source data underlying the results available to ensure full reproducibility?  
Partly

Are the conclusions drawn adequately supported by the results?  
Partly

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** Gerontology, Cerebrovascular Disease, Neuropsychology/Neurobiology, Gerontological Nursing.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Reviewer Report 26 November 2020

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Bernard Gibbon

Institute of Clinical Sciences, Thompson Yates Building, University of Liverpool, Liverpool, UK

This report presents a useful addition to the literature on stroke nursing and care of families. This area of research is underrepresented in the literature and this study provides valuable fresh insights into the challenges faced by nurses working stroke units, especially in the areas of team working and interaction with relatives.

The literature used to support the study is appropriate and contemporary and the aims of the
study are clear, though I am not convinced by the report that the specific objective of determining the level of stress experienced in stroke unit compared to nurses working on general medical wards is fully explored. Certainly, the survey data is presented from nurses in both environments and differences are noted but there is very little discussion about the comparison between the two. In the event the stroke unit nurses appear to be reporting or experiencing less stress than the general medical wards nurses, and this appears to the same in both data collection sites. I think some discussion of this would enhance the paper. Why were general medical ward nurses not interviewed if this is a mixed methodology study? What were the factors causing stress in this population and why was it reported to be higher than for stroke unit nurses? No details about staffing levels are reported, though I do accept that ‘norms’ or policies are scant in this area.

The data collection instrument the PSS is an appropriate tool and the interview questions and prompts are appropriate and it is pleasing to see ethical committee approval was granted.

The discussion appears to be mostly focussed on the experienced of stroke unit nurses but the conclusions formed appear to be derived from published literature (communication between nurses and physicians is better in smaller than bigger hospitals) rather than emerging from the present study as reported.

Both the quantitative survey data and qualitative interview data appears to be appropriately analysed and the extracts provided to support the qualitative data appear appropriate and provide ‘verification’ of the claims made.

The limitations are clearly stated, and the recommendations are appropriate. The conclusions do not always show how they have emerged from the present study as the nurses working on the general medical wards are not reported to have participated in the interviews. The strategies suggested to alleviate stress whilst intuitively appropriate are new information and do not appear, as reported, to have emerged from the present study.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Partly
**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** Stroke rehabilitation.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.