BMC Nursing

RESEARCH

Open Access

Enhancing hemodynamic stability: the role of liaison nurses in patient transfers to angiography

Azam Gazerani[1,2], Tayebe Pourghaznein[3,4], Arash Gholoobi[5,6], Kheizaran Miri[7], Mohammad Namazinia[7] and Seyed Reza Mazloum[3,4*]

Abstract

Introduction Angiography is associated with anxiety, stress, and changes in patients' vital signs. The role of the liaison nurse is to bridge gaps and solve problems between departments, thereby preventing the occurrence of undesired complications during patient transfers. Proper preparation of patients by the liaison nurse may lead to an improvement in the hemodynamic status of patients. The present study was conducted to investigate the effect of liaison nurse on hemodynamic status during transfer process to angiography.

Method This randomized controlled trial was conducted from December 2019 to March 2020 on 62 patients who were candidates for elective angiography at Imam Reza Hospital in Mashhad. Participants were selected using a convenience sampling method and then randomly assigned to either the control or intervention group using a lottery system. In the intervention group, patients benefited from the presence of a liaison nurse from the moment the transfer order was issued by the doctor. Tools used included a demographic information questionnaire and a hemodynamic signs checklist. Data were analyzed using SPSS 25 with independent T-tests, paired T-tests, Wilcoxon, Mann-Whitney test, chi-squared, and Fisher's exact test.

Result Following the intervention, the mean systolic blood pressure, heart rate, and respiratory rate in the intervention group were found to be significantly lower than those in the control group ($p < 0.05$). In contrast, the mean body temperature, diastolic blood pressure and the percentage of arterial blood oxygen saturation did not exhibit a statistically significant difference between the two groups ($p > 0.05$).

Conclusion The liaison nurse role emerges as a valuable strategy for enhancing patients' hemodynamic stability, and its implementation can have a positive impact on patient outcomes in hospital settings.

Keywords Liaison nurse, Hemodynamic status, Angiography

*Correspondence:
Seyed Reza Mazloum
Mazlomr@mums.ac.ir
[1]Student Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran
[2]Neyshabur University of Medical Sciences, Neyshabur, Iran
[3]Department of Medical Surgical Nursing, School of Nursing and Midwifery, Mashhad University Medical of Sciences, Mashhad, Iran
[4]Nursing and Midwifery Care Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
[5]Vascular and Endovascular Surgery Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
[6]Department of Cardiovascular Diseases, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
[7]Department of Nursing, School of Nursing and Midwifery, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran

Introduction

Angiography is the standard method of diagnosing coronary artery diseases of the heart [1]. Annually, 1 million angiographies are performed in the United States, and between 16 and 18 thousand cases are reported in Iran [2, 3]. In the Razavi Khorasan province, where the current study was conducted, approximately 3,500 angiography procedures are performed each year at the Imam Reza Hospital, which is one of the main referral centers for cardiovascular care in the region [3].

Despite the numerous benefits of angiography, this method is invasive and can lead to reactions in the autonomic nervous system, particularly a sympathetic response, and increase the effects of anxiety on the body (such as an increased likelihood of arrhythmia, high blood pressure, high heart rate, and even sudden death) [4, 5, 29]. Excessive anxiety can have significant negative effects on heart function and impact hemodynamic parameters [6, 7, 27, 31], which may be associated with increased hospital stay duration, repeated hospitalizations, and reduced patient satisfaction [8, 9, 28]. It can also lead to increased blood pressure and heart rate, consequently resulting in bleeding. Therefore, reducing anxiety and monitoring the hemodynamic status in patients undergoing angiography is of special importance.

One type of anxiety that patients experience during their hospital stay is transfer anxiety. Transfer anxiety refers to the anxiety experienced by an individual who moves from a known and safe environment to an unknown one [10]. Environmental and personal factors are effective in transfer anxiety among different departments. Sudden and simultaneous transfer of patients with others, the absence of consistent nursing attention, lack of information, the shortage of monitoring equipment in the department, change in the environment, and inability to predict the conditions of the new environment all play a role in creating anxiety [10–12, 30].

Evidence indicates that proper preparation of patients before invasive procedures and providing them with adequate information can reduce anxiety, improve hemodynamic status, increase pain tolerance, and promote greater cooperation with the medical team. It can also reduce the need for sedatives and lead to a higher level of well-being and quality of life [11, 13].

To modulate and enhance patient support and education, some countries, including Australia, have introduced a new management approach by defining the role of liaison nurses [14–17, 25, 26]. A liaison nurse is a person who, by assessing patients in transition and through communication and coordination with staff, makes the transfer of patients easier and safer, and by creating a process, establishes an ongoing and effective communication with the patient and their family [10, 18–20].

The role of the liaison nurse has been examined in various settings, yielding mixed results. Studies focusing on the impact of the liaison nurse in intensive care units (ICUs) have shown that this role can lead to improved hemodynamic status and reduced anxiety in patients. For example, a study by Chaboyer et al. (2010) demonstrated that patients under the supervision of a liaison nurse stabilized more quickly and were transferred from specialized units to general wards sooner [10]. Similarly, a study by Tabanejad et al. (2014) found that the presence of a liaison nurse improved the physical and psychological conditions of patients discharged from ICUs. Conversely, studies conducted in other hospital wards have reported different results [13]. For instance, a study by Elyasi et al. (2020) found that the presence of a liaison nurse did not significantly impact the physical parameters, including hemodynamics and consciousness levels, of patients transferred from specialized units. This discrepancy may be attributed to the differing conditions of patients at the time of transfer to the angiography unit and the potential effects of medications on their hemodynamics [18].

Considering that transferring patients in the post-angiography ward to and from angiography takes up a significant part of the duties of nurses in each shift, but due to the responsibility of caring for several patients, less attention is paid to the patient in transition. Given the limited studies conducted on the impact of the liaison nurse in Iran, the purpose of the present study is to determine the effect of using a liaison nurse in the post-angiography ward on the hemodynamic status of patients undergoing angiography.

Method

Study design

The present study is a randomized controlled trial (RCT) with a pre-test post-test design along with a control group. This study was conducted within the timeframe from December to February in the year 2019 of calendar.

Participants

The study population comprised patients hospitalized in the post-angiography ward of Imam Reza Hospital in Mashhad, who were scheduled to undergo cardiac angiography. The inclusion and exclusion criteria for this study were developed based on the recommendations of the expert panel, which included faculty members from the School of Nursing and Midwifery at Mashhad University of Medical Sciences, as well as cardiologists from the Vascular and Endovascular Surgery Research Center. The inclusion criteria for this study were: (1) non-emergency patients, (2) candidates for cardiac angiography, (3) aged 18 years or older, (4) proficiency in Persian, (5) awareness of time, place, and person, and (6) no use of anti-anxiety medications. The decision to exclude

emergency patients was made based on the premise that in such cases, the attending physician or the medical team may have already played a role similar to that of the liaison nurse in stabilizing the patient's hemodynamic status. By focusing on elective angiography patients, the study aimed to specifically investigate the impact of the liaison nurse's interventions on hemodynamic parameters, without the potential confounding effect of emergency care. Conversely, participants who experienced an uncontrollable event, such as death, transfer to a different department, active bleeding from the catheter during or after angiography, or the need for cardiopulmonary resuscitation, were excluded from the study.

Outcomes

The data collection tools employed in this study consisted of a demographic information questionnaire and a hemodynamic signs checklist. The demographic questionnaire encompassed items related to gender, patient's insurance status, marital status, educational level and income adequacy. We designed these questionnaires specifically for this research, ensuring their alignment with the study's unique objectives and context (Supplementary File 1).

To establish the validity of the demographic information questionnaire, we employed content validity. Specifically, the questionnaire was reviewed and refined by esteemed faculty advisory members and several members of the Scientific Committee of the School of Nursing and Midwifery, Mashhad. Following these revisions, the tool was utilized to collect the necessary data. Furthermore, the questionnaire comprises objective and clear questions that have been commonly used in similar studies, thereby ensuring its reliability in terms of consistency.

This questionnaire was completed before the intervention in the post-angiography section.

The hemodynamic signs checklist encompassed assessments of systolic and diastolic blood pressures, heart rate, respiratory rate, body temperature, and arterial blood oxygen saturation levels. Measurements of these parameters were conducted using a Saadat model monitoring device, manufactured in Iran, along with a mercury thermometer sourced from China. The completion of this checklist occurred in two distinct phases:

1. At the moment the patient's transfer from the post-angiography ward to the angiography unit was ordered (pre-angiography).
2. Immediately after the patient's return to the post-angiography ward following the angiography procedure (post-angiography).

The monitoring device proved to be an effective instrument for assessing hemodynamic indices. To ascertain its reliability and facilitate comparison, the blood pressure of ten patients was measured using a mercury sphygmomanometer, while heart rate was gauged from the radial artery for one minute by the researcher using a stopwatch. Additionally, arterial blood oxygen saturation levels were evaluated using a German-manufactured finger pulse oximeter. The results of the Pearson's correlation tests are critical for evaluating the reliability of our monitoring equipment. While the thermometer showed excellent reliability ($r=1.0$, $p<0.01$), the weak correlation in blood pressure measurements ($r=0.1$) suggests discrepancies that may affect the interpretation of hemodynamic stability in our study. This finding has led to a plan for additional verification steps for the blood pressure monitoring component of our device.

To measure vital signs accurately while considering intervening factors such as oxygen therapy, we employed a standardized protocol. Vital signs, including heart rate, blood pressure, respiratory rate, and oxygen saturation, were recorded using calibrated equipment. Any concurrent interventions, such as oxygen therapy, were documented to account for their potential impact on the measured vital signs. This documentation allowed us to control for these factors during data analysis and ensure the validity of our findings.

Sample size and randomization

The sample size was determined using the formula for comparing means, targeting a 95% confidence level and an 80% test power, which yielded a requirement for 28 individuals per group. To accommodate potential exclusions and ensure added precision, an additional 10% was included, culminating in a total of 31 individuals being analyzed in each group.

The sample size determination formula:

$$\mathrm{N} = (\mathrm{Z1} - \alpha/2 + \mathrm{Z1} - \beta)^2 * \left(\mathrm{S1}^2 + \mathrm{S2}^2\right) / (\mathrm{X1} - \mathrm{X2})^2$$
$$\mathrm{Z1} - \alpha/2 = 1.96$$
$$\mathrm{Z1} - \beta = 0.84$$
$$\mathrm{X1} = 51.8$$
$$\mathrm{S1} = 7.89$$
$$\mathrm{X2} = 57.23$$
$$\mathrm{S2} = 6.36$$
$$\mathrm{N} = 28$$

To guarantee randomization and reduce bias, the participants were randomly allocated to either the intervention or control group. This randomization was achieved through time blocking, wherein patients admitted on odd days were placed in the control group, and those admitted on even days were allocated to the intervention group, using a lottery system. While blinding participants in this trial posed challenges, the individuals assessing outcomes and the statisticians were blinded to the intervention type, ensuring objectivity in data analysis.

Data collection

The researcher, after obtaining ethical clearance from the Mashhad University of Medical Sciences' ethics committee and research deputy, proceeded to Imam Reza Hospital in Mashhad, Iran, with an introduction letter. After coordinating with the hospital director, the head nurse was briefed on the objectives and methodology of the research. The researcher visited the post-angiography department daily to select the research units. The objectives of the study were explained to the patients, and those who met the inclusion criteria were included in the study after obtaining written consent.

In this hospital, the hospitalization and surgical process for patients scheduled for elective cardiac angiography was as follows: Patients would present to the hospital on the day of the surgery and be admitted to the post-angiography department. Once the physician's transfer order was received, the patient, along with their medical records and nurse or assistant, would be taken to the angiography waiting room. The patient would then wait there for their turn for surgery and subsequently be transferred to the operating room for angiography. After the procedure, the patient would be transferred back to the post-angiography department.

In the intervention group, patients were provided with a liaison nurse (who was also the researcher) from the time of the physician's transfer order. The patient was then transferred to the angiography department under the supervision of the liaison nurse and the responsible nurse of the patient. In this study, the researcher, who was also a liaison nurse, played a key role in providing care to patients in the intervention group. As a liaison nurse, the researcher was responsible for enhancing communication, providing emotional support, and individualizing care for patients undergoing angiography.

In the intervention group, the nurse liaison initially conducted a file review and gained a general understanding of the treatment process and specific clinical conditions of each patient. After establishing communication, the liaison nurse utilized a standardized patient education booklet to provide necessary information to the patient and their family. This booklet covered topics such as:

- The method and necessity of performing angiography.
- Pre- and post-catheterization care.
- Dietary recommendations.
- How to access the nursing staff.
- The expected duration of the angiography procedure.

The liaison nurse reviewed the contents of the booklet with the patient and their family, answered any questions or concerns they had, and ensured that the patient was mentally prepared for the transfer to the angiography department. This standardized educational material was developed and validated by the expert panel, including faculty members from the School of Nursing and Midwifery and cardiologists, to ensure the consistency and comprehensiveness of the information provided to the patients.

The nurse liaison measured the patient's hemodynamic signs and recorded them on a specific form. They checked the organs related to breathing and the heart and administered the necessary medications before angiography. They stayed with the patient until it was time for angiography, and after coordinating with the operating room, the nurse liaison, along with an assistant nurse, safely transferred the patient to the waiting area, adhering to safety protocols. Upon transfer, essential information about the patient's clinical condition was delivered to the receiving nurse using the ISBAR method, and the patient was familiarized with the new environment. The nurse liaison accompanied the patient during angiography, informing them about the patient's condition and the completion time of catheterization. After the angiography and the patient's return to the recovery room, the nurse liaison checked the patient's consciousness and the catheterization site for any hematoma or bleeding. If desired by the patient, an early meeting was arranged with their companion to improve the patient and family's psychological condition. After the patient's condition stabilized, necessary arrangements were made for their transfer from recovery to the post-angiography ward. After transferring the patient to the post-angiography ward, the patient's hemodynamic signs were checked again. After removing the sandbag or opening the TR BAND and improving the patient's general condition, at the end of the intervention, when handing over the patient to the nurse, a report of the actions taken based on the ISBAR model was provided to ensure the completeness of the information, enhance the quality of transfer, improve communication with other nurses, and maintain continuity of care.

(The duration of the liaison nurse's duties was 24 h). The main responsibilities of the liaison nurse are listed in Table 1 (Table 1).

The measurements were made by the liaison nurse. And after the end of the research, the measurements of the liaison nurse ended.

The control group received standard care, which included routine preparation and transfer to the angiography department by the responsible nurse, without the presence of a liaison nurse or the specific interventions provided in the intervention group. Routine procedures were performed for the patient by the responsible nurse after angiography, which were also undertaken in the intervention group by the patient's responsible nurse.

Table 1 Responsibilities and actions of the liaison nurse

Number	Responsibility	Actions
1	Establishing Communication Between Two Sections	study of patient records/ coordination with the angiography department for proper timing of transfer to and from that department/ communication with the post-angiography department for information on transfer time/ receiving reports from the angiography nurse regarding the process of providing reports on the overall care process and important points in the post-angiography department to the angiography nurse/ providing the contact number of the liaison nurse to the staff of the post-angiography department.
2	Care And Physical And Emotional Support	introduction, calling the patient by name, encouraging them to talk about their feelings, assessing specific patient needs, reviewing body systems, especially cardiovascular and respiratory, administering necessary medications, providing a suitable room and bed, and necessary facilities in the post-angiography department for patients discharged from angiography.
3	Support And Education For The Patient And Family	talking with the patient's companion, addressing their questions and concerns about angiography, explaining the reasons for catheterization to the patient and family, informing the family about the current status and the patient's recovery process, providing education before and after the procedure to the family and patient, and notifying them of the discharge time. allowing visits from the patient's companions if the patient desires

The duties of the nurse in the control group included continuous control and monitoring of the patients after angiography in terms of clinical conditions, preventing hematomas and complications of angiography, as well as admitting new patients, completing records, registering hemodynamic states, sending tests, and transferring patients to angiography and returning them.

Statistical analysis

After the data collection was complete, it was entered into a computer, and statistical analysis was performed using SPSS software, version 25. Descriptive statistics such as frequency distribution, mean, and standard deviation were used to categorize and describe the data. Inferential statistics were utilized to test the hypothesis. The Kolmogorov-Smirnov and Shapiro-Wilk tests were used to determine whether the data followed a normal distribution. The chi-square test was applied to qualitative variables to assess the homogeneity of the two groups and the research objectives. For quantitative variables with a normal distribution, an independent t-test was used, whereas the Mann-Whitney test was employed for those without a normal distribution. Internal comparisons included a paired t-test for normally distributed variables and the Wilcoxon test for others. All tests were conducted with a 95% confidence level and a significance level of 0.05.

Result

The final analysis was conducted on 61 individuals (30 in the intervention group and 31 in the control group). One person in the intervention group withdrew from the study due to the need for special care (Fig. 1).

The average age of the study participants in the control group was 56.6 with a standard deviation of 9.11, while in the intervention group, it was 58.03 with a standard deviation of 8.9. There was no statistically significant difference between the two groups ($p=0.63$). Both groups had a similar age distribution. Most participants in both groups were male, married, and there was no significant difference in their education level. No significant differences were observed in other personal characteristics, and the groups were homogeneous ($p>0.05$) (Table 2).

The results showed a statistically significant decrease in systolic blood pressure in the intervention group before intervention, from 142.23 with a standard deviation of 19.24 to 138.60 with a standard deviation of 17.84 ($p=0.002$). Systolic blood pressure in the control group was not statistically significant ($p=0.36$). The average diastolic blood pressure did not show a statistically significant difference in both groups before and after the intervention. Additionally, there was no significant difference in the comparison of mean diastolic blood pressure between the groups after the intervention. The heart rate in the intervention group decreased significantly from an average of 75.00 with a standard deviation of 14.00 to 71.71 with a standard deviation of 12.06 ($p=0.02$). This indicates a decrease in heart rate after the intervention in the intervention group compared to before the intervention. The heart rate in the control group slightly increased after the intervention, but this change was not significant. No significant difference was observed between the groups after the intervention.

The respiratory rate in the intervention group before the intervention was an average of 17.50 with a standard deviation of 3.61, which decreased to 14.91 with a standard deviation of 2.90 after the intervention. This change was statistically significant ($p=0.001$), indicating a decrease in respiratory rate after the intervention in the intervention group compared to before the intervention. In the control group, there was no significant change in the respiratory rate before and after the intervention. Additionally, the comparison between groups showed that the respiratory rate in the intervention group was significantly lower than the control group after the intervention ($p=0.001$). The average arterial blood oxygen and body temperature did not show a statistically significant difference in both control and intervention groups before and after the intervention ($p>0.05$) (Table 3).

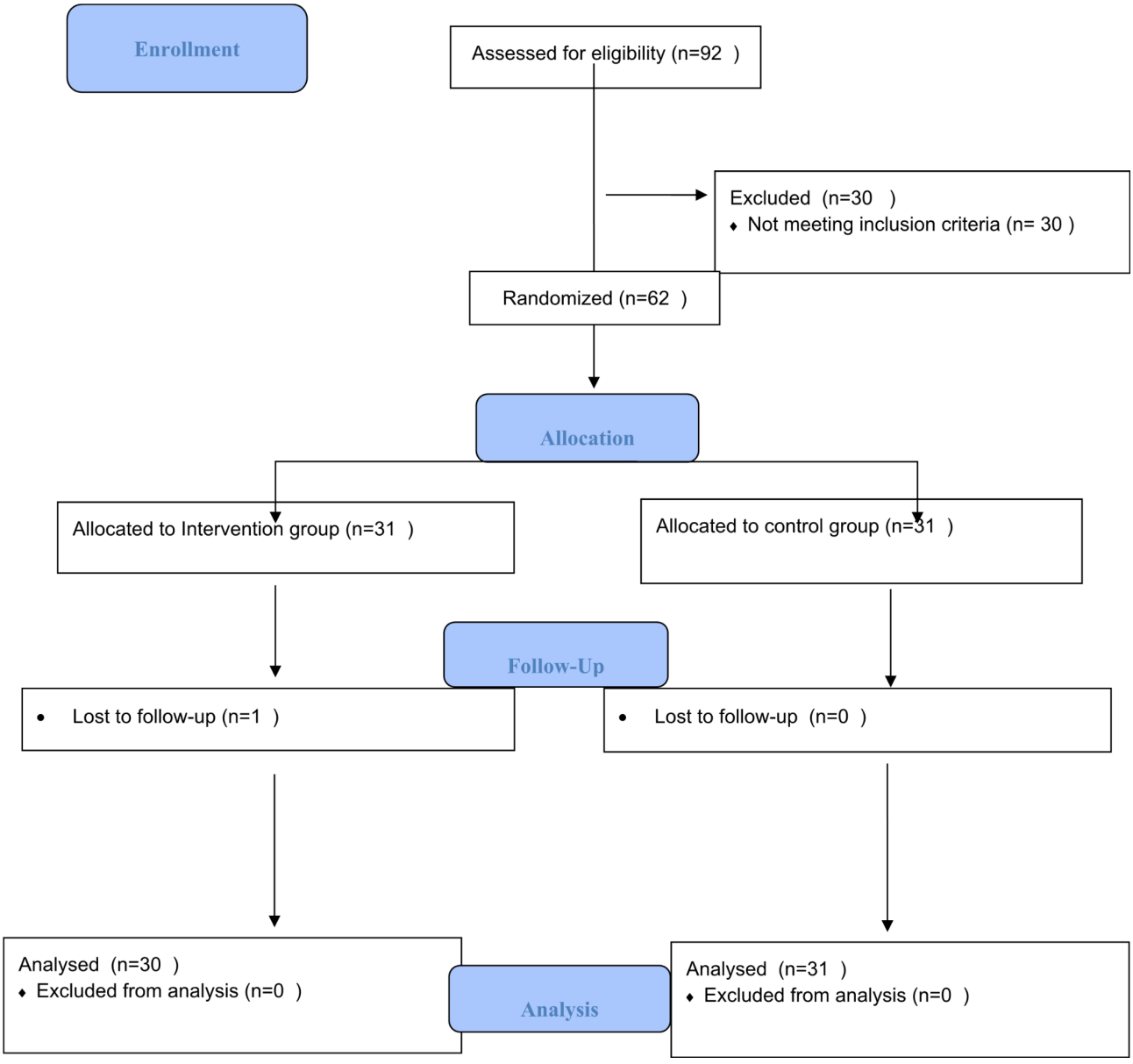

Fig. 1 The flow and process of selecting participants

Discussion

The current research aimed to determine the impact of utilizing a liaison nurse in the angiography ward on hemodynamic status. The study results indicated that the use of a liaison nurse led to a reduction in systolic blood pressure, respiratory rate, and heart rate within the normal range. However, the intervention did not have a significant effect on body temperature and arterial blood oxygen levels.

In relation to the impact of the liaison nurse on hemodynamic symptoms, the study aligns with Chaboyer et al.'s findings (2010) [10]. Chaboyer et al.'s study (2010) demonstrated that patients under the monitoring of a liaison nurse achieved stability more quickly and were transferred from specialized care units to general units, reducing the likelihood of returning to the ICU. The liaison nurse contributed to the stability of vital signs, facilitating the transfer to specialized care units, allowing patients to move more quickly to conditions suitable for recovery and transfer to the angiography ward. Tabanejad et al.'s study (2014) also supported the current study, showing that the presence of a liaison nurse improved the physical and psychological conditions of discharged patients from specialized care units, indicating a positive impact on physical outcomes [13]. However, the findings of Elyasi et al.'s study (2020) were inconsistent with the present study, as they reported that the involvement of a liaison nurse did not influence physical parameters,

Table 2 Distribution of frequency of individual characteristics of research units in the control and intervention groups

Variable	Group		*P*
	Intervention (30)	Control (31)	
Age (mean ± SD)	58.03 ± 8.9	56.6 ± 9.11	*$P=0.63$
Gender n (%)			
Female	10 (33.3)	12 (38.7)	**$P=0.662$
Male	20 (66.7)	19 (61.3)	
Marital status n (%)			
Single	4 (13.3)	2 (6.5)	**$P=0.510$
Married	26 (86.7)	29 (93.5)	
Education n (%)			
Elementary	22 (73.3)	22 (77.4)	**$P=0.914$
Guidance	6 (20.0)	4 (12.9)	
Diploma and above	2 (6.6)	3 (9.7)	
Income n (%)			
Less than enough	24 (80.0)	24 (77.4)	***$P=0.461$
Enough or more than enough	6 (20.0)	7 (22.6)	
History of angiography n (%)			
No	20 (66.7)	20 (64.5)	**$P=0.807$
Yes	10 (33.3)	11 (35.3)	
Patient's insurance status n (%)			
Armed forces insurance	1 (3.3)	0 (0)	**$P=0.703$
Social Security Insurance	12 (40)	9 (29)	
Rural insurance	9 (30)	14 (45.2)	
health insurance	6 (20)	6 (19.4)	
Free insurance	2 (6.7)	2 (6.5)	

* Independent T-test ** Chi-square test *** Mann-Whitney test

including hemodynamics and alertness, in patients being transferred from specialized care units [18]. This discrepancy may be attributed to differences in the patients' conditions upon transfer to the angiography ward, where anxiety and the anticipation of post-surgical results could influence hemodynamic symptoms.

A clinical trial conducted by Noroozi et al. (2019) revealed that patients transferred from the emergency department with the assistance of a liaison nurse exhibited lower average anxiety levels and heart rates compared to those transferred using the standard method. However, the study found no significant differences in systolic and diastolic blood pressure or respiratory rate between the two groups [21]. These findings are in line with our study, suggesting that the presence of a liaison nurse positively influences specific vital signs. In addition to heart rate, our study demonstrated a decrease in respiratory rate, as well as systolic and diastolic blood pressure, in patients under the care of a liaison nurse. Considering that angiography is an invasive procedure that can impact stress hormone secretion, leading to elevated blood pressure, heart rate, and respiration, the intervention by the liaison nurse in our study likely mitigated these effects and prevented an increase in these variables among the patients [22].

Furthermore, Hanson Hiss's study (2016) found that cancer patients who received preoperative support from a liaison nurse had significantly better hemodynamic status compared to those receiving routine care [23]. This finding supports the current study's results, highlighting the positive impact of liaison nurses on hemodynamic outcomes.

Additionally, Lerzman et al.'s study (2011) demonstrated that providing information to patients and updating their families on surgical progress helped them overcome emotional stress and fear, and that liaison nurses played a significant role in promoting the well-being of patients' families during surgery [24]. This study's results emphasize the importance of improving waiting room conditions, which is in line with the current study's findings, highlighting the significance of conducting studies on patients in this setting.

Elyasi et al.'s study (2020) revealed that hemodynamic variables remained unchanged in patients under the care of a liaison nurse in specialized care units. Due to the inconsistencies and contradictions among various studies, the researchers emphasized the need for further investigations. The findings of their study differ from those of the present study, which could be attributed to variations in the health conditions of patients hospitalized in specialized care units who are candidates for

Table 3 Mean and standard deviation of hemodynamic indices in patients undergoing cardiac angiography in the intervention and control groups

Variable	Group		*P*value
	Intervention (30)	Control (31)	
SBP (Mean ± SD)			
Pretest	142.23 ± 19.24	133.22 ± 29.66	***0.10
Posttest	138.60 ± 17.84	144.32 ± 18.32	***0.22
Intragroup comparison	*0.002	*0.36	
DBP (Mean ± SD)			
Pretest	87.19 ± 19.24	84.48 ± 13.23	***0.48
Posttest	81.30 ± 19.62	87.10 ± 14.20	***0.18
Intragroup comparison	*0.10	*0.24	
Pulse rate (Mean ± SD)			
Pretest	75.00 ± 14.00	67.60± 11.81	****0.2
Posttest	71.71 ± 12.06	70.01 ± 12.90	****055
Intragroup comparison	**0.02	**0.32	
Respiratory rate (Mean ± SD)			
Pretest	17.50 ± 3.61	17.12 ± 3.91	***0.70
Posttest	14.91 ± 2.90	18.60 ± 5.11	***$P < 0.001$
Intragroup comparison	*$P < 0.001$	*0.08	
SPO2 (Mean ± SD)			
Pretest	95.90 ± 2.31	96.81 ± 2.51	****0.49
Posttest	95.21 ± 2.41	93.20 ± 15.71	****0.12
Intragroup comparison	**0.06	**0.21	
Temperature			
Pretest	36.31 ± 0.5	36.10 ± 0.3	***0.33
Posttest	36.41 ± 0.4	36.62 ± 0.4	****0.87
Intragroup comparison	*0.11	**0.15	

*Paired t test **Wilcoxon *** Independent T-test **** Mann-Whitney test

heart catheterization. In the mentioned study, nearly one-fourth of the patients had a history of stroke, and almost all had a history of ICU admission. Furthermore, the discrepancy in results might be explained by the use of medications that influence hemodynamics, which are frequently administered in the ICU. It is worth noting that, similar to the present study, Tabanneghad et al.'s study did not observe a significant difference in arterial blood oxygen levels following the intervention [18].

The current study has some limitations that should be considered. One limitation was the individual and familial differences among the participants, which could have influenced their hemodynamic responses to the intervention. To address this, the researchers attempted to control for potential confounding factors by ensuring homogeneity between the control and intervention groups in terms of demographic characteristics.

Additionally, the use of a monitoring device for blood pressure measurement, which showed some discrepancies when compared to the gold standard mercury sphygmomanometer, may have affected the interpretation of the hemodynamic stability findings. To mitigate this limitation, the researchers conducted additional verification steps to ensure the reliability of the blood pressure data. Future studies should consider using more precise and validated measurement devices to obtain accurate hemodynamic assessments.

Another limitation was the single-center nature of the study, which may limit the generalizability of the findings. The researchers recommend conducting multi-center studies in the future to enhance the external validity of the results. Furthermore, the study focused on the impact of the liaison nurse during the transfer process to the angiography department, and the long-term effects on patient outcomes were not evaluated. Longitudinal studies are needed to examine the sustained benefits of the liaison nurse role.

Despite these limitations, the current study provides valuable insights into the potential benefits of the liaison nurse in improving the hemodynamic stability of patients undergoing angiography procedures. The findings can inform the development of targeted interventions and the integration of the liaison nurse role within the healthcare system to enhance patient care and outcomes.

Conclusion

The liaison nurse role emerges as a valuable strategy for enhancing patients' hemodynamic stability, and its implementation can have a positive impact on patient outcomes in hospital settings. To facilitate the integration of this role into clinical practice, it is recommended that a policy summary of this research be disseminated to the job classification committee and the nursing assistant at the Ministry of Health. This will help promote the recognition and adoption of the liaison nurse position within the healthcare system, ultimately benefiting patients undergoing angiography and other invasive procedures.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12912-024-02337-6.

Supplementary Material 1

Acknowledgements

This research is the outcome of a master's thesis project with the code 980909 and ethical approval (IR.MUMS.NURSE.REC.1398.076) granted by the Faculty of Medical Sciences at Mashhad University of Medical Sciences. The researchers express their gratitude to the authorities and the Research and Development Deputy of Mashhad University of Medical Sciences for their support. Special thanks are extended to the patients who participated in this study and the staff of the Angiography Department at Imam Reza (AS) Hospital in Mashhad for their cooperation in implementing the intervention and providing valuable nursing care.

Author contributions

All authors have read and approved the manuscript. Study design: AG, SRM; data collection and analysis: SRM, AG, TP; manuscript preparation: AG, SRM, AG, KM, MN.

Funding
This study was under the financial aegis of Research Deputy Mashhad University of Medical Sciences.

Data availability
The datasets generated in the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate
This study was approved by the ethics committee of Mashhad University of Medical Sciences (IR.MUMS.NURSE.REC.1398.076) and complied with the Declaration of Helsinki; informed consent has been obtained from the subjects. The study purpose and importance were explained to participants, who met the inclusion criteria, and they signed the written informed consent form. Patients were informed that they are free to leave the study anytime without any effect on their treatment plan should they wished to do so. All methods were performed in accordance with the relevant guidelines and regulations, which are aligned with the Declaration.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Received: 11 January 2024 / Accepted: 10 September 2024
Published online: 19 September 2024

References

1. Carroll DL, Malecki-Ketchell A, Astin F. Non-pharmacological interventions to reduce psychological distress in patients undergoing diagnostic cardiac catheterization: a rapid review. Eur J Cardiovasc Nurs. 2017;16(2):92–103.
2. Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, Cushman M, Das SR, De Ferranti S, Després J-P, Fullerton HJ. Heart disease and stroke statistics—2016 update: a report from the American Heart Association. Circulation. 2016;133(4):e38–360.
3. Nikfarjam M, Firouzkouhi M, Shahdadi H, Abdollahimohammad A. Comparison of the effectiveness of nursing consultation and guided imagery-based training on stress and anxiety in angiography candidates: a clinical trial. Medical-Surgical Nurs J. 2020;9(3): 1-7
4. Jayakar JP, Alter DA. Music for anxiety reduction in patients undergoing cardiac catheterization: a systematic review and meta-analysis of randomized controlled trials. Complement Ther Clin Pract. 2017;28:122–30.
5. Hajhosseiny R, Munoz C, Cruz G, Khamis R, Kim WY, Prieto C, Botnar RM. Coronary magnetic resonance angiography in chronic coronary syndromes. Front Cardiovasc Med. 2021;8:682924.
6. Bedaso A, Ayalew M. Preoperative anxiety among adult patients undergoing elective surgery: a prospective survey at a general hospital in Ethiopia. Patient Saf Surg. 2019;13(1):1–8.
7. Keyvanlou F, Saeid Y, Vafadar Z. The effect of the role of intensive care units' liaison nurse on patient outcomes: a systematic review. 2018.
8. Chandrababu R, Rathinasamy EL, Suresh C, Ramesh J. Effectiveness of reflexology on anxiety of patients undergoing cardiovascular interventional procedures: a systematic review and meta-analysis of randomized controlled trials. J Adv Nurs. 2019;75(1):43–53.
9. Akar M, Miri K, Mazloum SR, Hajiabadi F, Hamedi Z, Vakilian F, Dehghan H. The impact of cardiopulmonary rehabilitation in phase II cardiac rehabilitation program on the health-related quality of life of patients undergoing coronary artery bypass graft surgery. Curr Probl Cardiol. 2024;49(2):102221.
10. Chaboyer W, Thalib L, Foster M, Elliott D, Endacott R, Richards B. The impact of an ICU liaison nurse on discharge delay in patients after prolonged ICU stay. Anaesth Intensive Care. 2006;34(1):55–60.
11. Moradi T, Adib-Hajbaghery M: **The Effect of a Multi-Modal Preparation Package on Anxiety in Patients Undergoing Coronary Angiography**. *International Cardiovascular Research Journal* 2015, **9**(1).
12. Alizadeh-Taghiabad B, Mazloum SR, Miri K, Namazinia M. Determining the frequency of burn wound dressing for clinically competent nursing students: establishing standards based on learning curves. BMC Med Educ. 2023;23(1):678.
13. Tabanejad Z, Pazokian M, Ebadi A. A systematic review of the liaison nurse role on patient's outcomes after intensive care unit discharge. Int J Community Based Nurs Midwifery. 2014;2(4):202.
14. Kitney P, Tam R, Bennett P, Buttigieg D, Bramley D, Wang W. Handover between anaesthetists and post-anaesthetic care unit nursing staff using ISBAR principles: a quality improvement study. ACORN: J Perioperative Nurs Australia. 2016;29(1):30–5.
15. Aued GK, Bernardino E, Lapierre J, Dallaire C. Liaison nurse activities at hospital discharge: a strategy for continuity of care. Rev Latinoam Enferm. 2019;27.
16. Aued GK, Bernardino E, Silva OBMd, Martins MM, Peres AM. Lima LSd: Liaison nurse competences at hospital discharge. Revista Gaúcha De Enfermagem. 2021;42.
17. Ribas EN, Bernardino E, Larocca LM, Poli Neto P, Aued GK. Silva CPCd: nurse liaison: a strategy for counter-referral. Revista brasileira de enfermagem. 2018;71:546–53.
18. Elyasi E, Khatiban M, Mohammadi Y, Shamsizadeh M. The impact of an ICU liaison nurse program on physiological parameter and level of consciousness in discharging patients in the intensive care unit: a randomized clinical trial. Avicenna J Nurs Midwifery Care. 2020;28(3):227–38.
19. Endacott R, Chaboyer W, Edington J, Thalib L. Impact of an ICU liaison nurse service on major adverse events in patients recently discharged from ICU. Resuscitation. 2010;81(2):198–201.
20. Shakeri D, Ebadi A, Jafari I. The effect of the liaison nurse on satisfying patients transformed from the emergency department. J Crit Care Nurs. 2020;13(3):31–9.
21. Noroozi M, Khosravi S, Hekmatpoo D. The effect of liaison nurse on patient anxiety and vital signs during cardiac care unit admission: a randomized clinical trial. Revista Latinoam De Hipertension. 2019;14(3):271–6.
22. Stephens-Woods K. The impact of the surgical liaison nurse on patient satisfaction in the perioperative setting. Can Oper Room Nurs J. 2008;26(4):6–7.
23. O'sullivan A, Boyd B, O'Shaughnessy M, MacIntyre A, Begley C. Evaluation of the introduction of a postnatal ward liaison neonatal nurse. J Neonatal Nurs. 2015;21(1):34–9.
24. Lerman Y, Kara I, Porat N. Nurse liaison: the bridge between the perioperative department and patient accompaniers. AORN J. 2011;94(4):385–92.
25. Miri K, Mohammadi E, Vanaki Z: **Trend in the role of licensed practical nurses in health care system: A situational analysis**. In: *Nursing forum: 2021*: Wiley Online Library; 2021: 9-18.
26. Miri K, Vanaki Z, Mazloum SR: **The life cycle of nursing organizations and role development in Iran: A situational analysis**. *Journal of Research Development in Nursing and Midwifery* 2023, **20**(2):44-49.
27. Haji Ali Beigloo R, Mohajer S, Eshraghi A, Mazlom SR: **Self-administered Medications in Cardiovascular Ward: A study on Patients' Self-efficacy, knowledge and Satisfaction**. *Evidence Based Care* 2019, **9**(1):16-25.
28. Bagheri S, Valizadeh Zare N, Mazlom SR, Mohajer S, Soltani M: **Effect of implementing family-centered empowerment model on burden of care in caregivers of the elderly with Parkinson's disease**. *Evidence Based Care* 2019, **9**(3):41-48.
29. Dalir Z, Reihani Z, Mazlom R, Vakilian F: **Effect of training based on teach back method on self-care in patients with heart failure**. *Journal of Mazandaran University of Medical Sciences* 2016, **25**(134):209-220.
30. Karimi FZ, Taghipour A, Latifnejad Roudsari R, Kimiaee SA, Mazloum SR, Amirian M: **Psycho-social effects of male infertility in Iranian women: a qualitative study**. *The Iranian Journal of Obstetrics, Gynecology and Infertility* 2016, **19**(10):20-32.
31. Hosseini SJ, Eidy F, Kianmehr M, Firouzian AA, Hajiabadi F, Marhamati M, Firooz M: **Comparing the effects of pulsatile and continuous flushing on time and type of peripheral intravenous catheters patency: a randomized clinical trial**. *Journal of Caring Sciences* 2021, **10**(2):84.

Publisher's note