The Impact of Short-Term Solutions of Nursing Shortage on Nursing Outcome, Nurse Perceived Quality of Care, and Patient Safety

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Abstract BACKGROUND: Nurses represent a significant proportion of the entire healthcare workforce. Unfortunately, the world is plagued with the shortage of qualified nurses to deliver safe, dignified, compassionate care. OBJECTIVE: The objective of the study was to determine the relationships between overtime and floating as short-term solutions and nursing outcomes, nurse-perceived quality of care and patient safety among registered nurses in Saudi Arabia. SETTING/DESIGN: A cross-sectional study was conducted at King Abdullah Medical City (KAMC) located in Makkah, Saudi Arabia. SUBJECTS AND METHODS: The study was conducted for two months (from July 20, 2020 to August 20, 2020), including both inpatient and outpatient registered nurses who had worked for, at least, one year at KAMC either as part-time or full-time. Nurses who had worked for less than one year, nurse educators, nurse managers and clinical nurse specialists were excluded. Measuring Variables included demographic characteristics, job satisfaction, intention to leave, nursing perceived quality of care, perceived patient safety, patient safety, patient acuity and dependency, workload and floating. A pre-designed questionnaire was distributed to willing nurses. Data were non-normally distributed and Scatter plots were also generated. T-test was used to find the relation of floating and overtime with sample characteristics. RESULTS: A total of 337 registered nurses completed the questionnaire. Majority of the participants were from 41-50 years of age group (60.5%), and non-Saudi nationals (90.5%). Statistically significant relation of age groups with development of pressure ulcers (p = 0.030) was found. Nationality showed significant relation with job satisfaction (p = 0.008), quality of care (p = 0.006) and patient safety (p <0.05). Specialist nursing category showed significant association with quality of care (p = 0.008) and pressure ulcers development (p = 0.050). Education level, overtime floating showed significant association with intention to leave (p <0.05). Nationality, extended shifts and mandatory overtime had significant association with job satisfaction. Hospital data showed significant association of overtime with medication error. CONCLUSION: Unmarried Saudi nurses have potential to provide quality of care to the patient with satisfied patient safety, especially in the days of overtime and increased workload.

Keywords: nursing shortage, nursing outcome, nursing floating, perceived quality of care, patient safety, Saudi Arabia

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1. Introduction

Nurses play an essential role in healthcare systems, representing a significant proportion of the entire healthcare workforce [1]. Nurses play a crucial role in the quality of care improvement, which provide patients education and support. At the same time, the nurse can provide health promotion & psychosocial services include assessment, health education, counselling & appropriate referral [2,3,4,5,6]. About 23 million nurses work in the healthcare sector globally [1]. According to the American Nurses Association, 1.1 million additional nurses are required to cover the existing gap in the healthcare system [7]. Saudi Arabia largely relies on expatriate healthcare workers including nurses [8]. This dependency translates to a profound shortage in workforce particularly in the nursing profession [9]. Some of the issues that have been associated with nursing shortage in Saudi Arabia include a limited number of training institutions for nursing, overreliance on expatriate workforce and disproportionate distribution of health workforce [10].

Many negative nursing outcomes have been associated with the prevailing nursing shortage in Saudi Arabia. Most of these nursing outcomes revolve around the inadequacy

of the nursing workforces, such as job dissatisfaction and intention to quit the nursing profession. Previous studies have established a positive correlation between nurse shortage and job dissatisfaction among nurses. Majority of nurses who work in facilities struggling with the problem of nurse shortage are not satisfied with their jobs underpinning the need to address the problem of nursing shortage to ensure job satisfaction [11,12]. On the same note, "intention to leave" has been demonstrated to increase with the nursing shortage. Nurses working in the hospitals with a shortage of nursing staff report to be over-burdened and experience burnout due to a significantly huge workload. Cases of nurses leaving their jobs in Saudi Arabia are on the rise and this trend has been associated with a huge workload assigned to them. Efforts to cover for nurse shortage of hospitals are managed by assigning nurses both night and day shifts, which further exacerbate the nursing outcomes [13].

There is increasing evidence demonstrating the relationship between nurse staffing and quality of patient care. The limited nursing workforce in hospitals has also been associated with poor management of chronically ill patients whose conditions continue to rapidly advance as a result of poor care [14]. Patient safety is another growing concern resulting from the problem of nursing shortage [15]. Overstretching the available nursing workforce has been associated with deteriorating perceived quality of nursing care and patient safety. In addition, the nursing shortage in hospitals is a major cause of reduced quality of nursing services and patient safety due to overworking of available nurses [16]. Adverse patient outcome is a common problem associated with the shortage of nursing workforce. Shortage of nursing workforce translates into work overload among the few available nursing staff. Cases of life-threatening complications have been reported to occur during hospitalization in the face of limited nursing staff. Some of the common adverse outcomes reported in hospitals include medication errors, nosocomial infections (hospital-acquired infections), pressure ulcer and patient falls [17]. These adverse outcomes frequent in hospitals with limited nursing staff since patient receive negligible attention from the overworked nursing staff.

Various short-term strategies for averting the problem of nursing shortage exist. For instance, hospital managers can focus on the review of hospital policies regarding productivity. There are two major short-term strategies for covering the gap brought about by nursing shortage including implementation of overtime and floating policies. Overtime enhances productivity despite nursing shortage, as nurses will work longer than normal working hours to cover for the work that could have been done by extra nurses [18]. On the other hand, floating allow the nurses to move to other points of duties where there is more demand. This strategy has been shown to reduce workload in department/sections with more work to be done [19].

In Saudi Arabia, nurses are forced to work overtime due to the limited workforce, which is a potential cause of job dissatisfaction among nurses in Saudi Arabia [20]. However, overtime may present some advantages such as increasing flexibility of the employees, increasing productivity with a limited workforce, and increased earnings [21]. On the other hand, the disadvantages of overtime in the nursing profession include inefficiency of employees during normal working hours, and fatigue among employees, which may occasionally increase absenteeism. A nurse floating to another unit where he/she is not permanently assigned is extremely challenging. Working in the new unit may affect nursing competency and hence the quality of care. Another negative aspect of floating is that it accelerates dissatisfaction among registered nurses, which may eventually result in a high rate of nurse turnover. Furthermore, floating may potentially cause anxiety, draining, overwhelming, and stress among nurses. However, despite this drawback of floating, it remains an important resource in hospitals experiencing staff shortage [22].

Saudi Arabia is one of the countries experiencing profound nurse shortage resulting in the implementation of overtime and floating policies in the majority of both private and public hospitals [23]. Nursing shortages are a major challenge weighing heavily on the healthcare systems in Saudi Arabia [12]. Therefore, the present study was conducted to determine the relationships between overtime and floating as short-term solutions and nursing outcomes, nurse-perceived quality of care and patient safety among registered nurses in Saudi Arabia.

2. Aim of the Study

The aim of the study was to determine the relationships between overtime and floating as short-term solutions and nursing outcomes, nurse-perceived quality of care and patient safety among registered nurses in Saudi Arabia.

3. Subjects and Methods

A cross-sectional study was conducted at a tertiary care hospital King Abdullah Medical City (KAMC) located in Makkah, Saudi Arabia for two months, from July 20, 2020 to August 20, 2020. The study was approved by the Institutional Review Board (IRB). The study included two types of data in the study: primary data and secondary data. The primary data explored nurses' perceptions of the outcomes of overtime shifts and floating, and reasons for working or not working overtime or floating shifts. This aspect was vital in understanding how overtime and floating affect nurse job satisfaction, intension to leave as well as nursing perceived quality of care and nurse-perceived patient safety outcomes. The secondary data involved analysing of nursing overtime and floating data such as shift schedules, total overtime hours and floating schedules and how it related to patient outcomes.

Pertinent inclusion and exclusion criteria were established. Inclusion criteria included both inpatient and outpatient registered nurses who had worked for, at least, one year at KAMC either as part-time or full-time. Nurses who had worked for less than one year, nurse educators, nurse managers and clinical nurse specialists were excluded from the study. Snowball sampling, a type of convenience sampling, was used to select participants who were recommended by the nurses who responded to the recruitment email. All eligible nurses who agreeably responded were eligible for the study. The questionnaire

was sent to a total of 834 nurses who fulfilled the criteria, and 337 filled the questionnaire and sent it back. The sample size was obtained from the table created by "The Research Advisors", keeping the confidence interval as 95% and margin error as 5% [24].

Volunteer nursing managers distributed electronic questionnaires to all nurses who had worked for over one year at the hospital via emails. Willing volunteers reported directly to the researchers with any questions about the study which ensured their anonymity while avoiding any possible coercion from nursing managers or the institution. The survey questions used in the study were based on validated scales used in previous studies [21,25,26,27,28,29]. Only the demographics section of the questionnaire was created solely for this study. The questions covered (a) emerging finding, variations, hunches, and trends, (b) ensure accurate findings and (c) achieve data saturation. Along with the survey were an information and consent form, and if the participant was agreed he/she would have proceeded with the survey. The participants were allowed one week to fill and send back the surveys. The usage of digital questionnaires was preferred to face to face interviews to ensure that the participants were not afraid to express their thoughts on overtime and floating, as well as, it was justifiable in the days of COVID-19 pandemic.

Independent study variables included overtime and floating while dependent study variables included nursing outcomes (job satisfaction, intention to leave), nursing perceived quality of care and patient safety outcomes (medication error, patient falls, pressure ulcers). *Overtime* was defined as the number of hours worked beyond the contracted or scheduled hours [16]. *Floating* was defined as the practice of moving nurses from one patient care area or department to provide services in another one. *Forced floating* referred to the mandated act that requires nurses to float in units that are understaffed even if the nurses believe that they might be unable to provide safe care to unfamiliar patient populations [30]. *Work shift or shift* referred to the staffing arrangement of employees where some may work during the morning, the evening, and the night [16]. *Job satisfaction* was defined as the overall feeling one has towards their job and their evaluations of their work [31]. Job satisfaction was measured by using a question that inquired about satisfaction with current job. The questions used to determine nurses' jobs satisfaction were created from the Practice Environment Scale of the Nursing Work Index (PES-NWI) that was used by [28,32]. *Turnover intent or intention to leave* referred to the desire to leave the current workplace for any reason [33]. The question about intention to leave was created from the validated PES-NWI [28]. To measure nurse-perceived quality of care, nurses were asked a question about perceptions of the quality of care in their units. The questions were based on the validated International Hospital Outcomes Study questionnaire that was tested by [27]. The perceived patient safety question in the survey extracted from the Hospital Survey on Patient Safety Culture (HSPSC) that was created by the Agency for Healthcare Research and Quality (AHRQ). *Pressure ulcer* was defined as the area of tissue necrosis caused by unrelieved pressure especially on bony prominence [34]. *Patient's fall* referred to an unintentional descent of a patient to lower height which does not occur due to intrinsic event or a hazard [35]. Similarly, *medications errors* referred to failure of a planned action to complete as intended [36].

The study participants' demographics were measured using self-developed questions about age, years of experience levels of nursing education and current professional designation. Questions about acuity (amount of skilled nursing care required) and dependency (amount of support required for activities of daily living) were asked. The validated International Hospital Outcomes Study questionnaire that was tested by Bruyneel et al. [27] was used to measure the nurses' workload.

The data were analysed inductively, and conclusions were formed freely, and not forced in preconceived categories. All the data used in the study were stored in an encrypted hard drive with no access except for the researcher to ensure confidentiality. The data was handled in excel spreadsheet. Data were non-normally distributed and Scatter plots were also generated. T-test was used to find the relation of floating and overtime with sample characteristics (gender, age, nationality, marital status, professional classification and educational qualification). The correlation of floating and overtime to outcomes (pressure ulcer, fall and medication error) was determined. Unit level data as well hospital data was analysed using a multilevel model regression analysis. Quantitative data were collected using Microsoft Excel spreadsheets that were used to organise the data. Spreadsheets were preferred due to the simplicity of using the software and easy of transferring data from the hospital records. The use of aggregated data rendered the process of seeking individuals consent unnecessary. However, the hospital units named due to the patients' characteristics variations related e.g. medical versus surgical versus critical care. The data was collected from the hospital's database as well as unit levels. The selected units corresponded to the participants who were surveyed in the qualitative section. The hospital data sets were of two types. One was human resources data and other was unit base quality data. The human resources data collected was overtime worked hours, floating staff and sick leave durations that were stored by the payroll department. A pressure ulcer, medication errors, patient fall rate and other patient outcome data were collected from the unit records, quality, and pharmacy departments. The data was organised by month and by the unit in a Microsoft Excel spreadsheet. SPSS Statistics (Mann -Whitney) was used to find the correlation and relation of overtime and floating with departments and outcomes. To find the relation of overtime with departments and outcomes, a cut point (300) was taken to compare between 2 groups of departments (< 300 and >300). Similarly, to find the relation of floating with departments and outcomes, a cut point (15) was taken to compare between 2 groups of departments (< 15 and >15). Using quantitative data from the past one year offered a major advantage. The large data set provided an overview of a long period instead of a snapshot of a single period. For each variable, the descriptive data statistics were calculated at the outset as the data was analysed for any missing values. Data from the payroll department (nursing overtime hours and nurse floating hours) were analysed and produced as overall

means, medians, standard deviations, minimum and maximum values. The medical error rates needed to be changed according to the chosen patient safety outcomes data and were calculated quarterly. The continuous variables relationship was calculated using multilevel mixed-effects linear regression.

4. Results

A total of 337 participants were included in the study having equal number of males and females. Majority of the participants were from 41-50 years of age group (60.5%), followed by ≥30 years of age group. Majority of participants were non-Saudi nationals (90.5%) while vast majority were married (73.9%). Demographic profile of the participants is referenced in Table 1. More than half of the participants (50.1%) had to do mandatory overtime and/or time-back in the present month. However, only 37.7% did voluntary overtime and or time-back in the present month. Comparing with the last month, 33.5% participants had to do the increased amount of overtime and or time-back done in the present month. In the last month, shifts of 39.2% participants were extended. About 62.6% participants reported that they were never floated to a unit that required different competencies than their primary unit. Similarly, 26.4% participants had to work several times on another ward or unit rather than where they usually attached. More than three-fourth of the participants perceived that there was shortage of qualified nurses to deliver safe, dignified, compassionate care at organization where they worked. Description statistics for job satisfaction and intention to leave are referred to Table 2.

The participant reported poor salary (37.4%) as the top reason for leaving the job, followed by workload (35%), more time with family (25.8%), career advancement (18.4%), burnout (13.1%), physical demands of nursing (12.8%), lack of respect (11.6%), too much responsibility (10.7%), career change (8.9%), management practices (7.4%), health problems (6.8%), inability to safe, competent care (5.9%), conflict with management (4.5%) retirement (3.9%), and others (11.6%). More time with family and career advancement. Majority of the participants (43.9%) reported that very good nursing care was delivered to the patients on their unit. Study participants were asked about quality of care and patient safety, and majority of the participants (40.7%) reported overall grade on patient safety in their unit as excellent. Majority of the participants very rarely or never perceived adverse patients' events to occur in their units such as wrong medication or dose, pressure ulcers and patient falls.

Table 1. Demographic characteristics of the participants

Variables	N%	Variables	N%
Gender		**Primary Nursing role**	
Male	117 (34.7%)	Staff Nurse (SN I, II, III)	301 (89.3%)
Female	220 (65.3%)	Nurse manager, Head nurse, Clinical service manager	17 (5%)
Age		Nurse educator	3 (0.9%)
≥ 30 years	107 (31.7%)	Others	16 (4.7%)
31 – 40 years	204 (60.5%)	**Primary area of nursing practice**	
41 – 50 years	17 (5%)	Ambulatory care	20 (6.0%)
Above years	9 (2.8%)	Critical Care, Intensive Care	133 (39.4%)
Nationality		Emergency	1 (0.3%)
Saudi	32 (9.4%)	Medical	13 (3.9%)
Non-Saudi	305 (90.5%)	Medical-Surgical	29 (8.7%)
Marital status		Surgical	15 (4.5%)
Single	83 (24.6%)	Oncology	66(19.7%)
Married	249 (73.9%)	Operating Room, Recovery	18(5.4%)
Widowed	0	Women's Health and Pediatrics	1(0.3%)
Divorced	5 (1.5%)	Other (please specify)	41(12.2%)
Countries of education received		**Working unit**	
Saudi Arabia	32 (9.5%)	Cardiac Ward	12(3.6%)
Egypt	73 (21.7%)	Cardiac Surgery Ward	16(4.8%)
Jordan	15 (4.5%)	Cardiac Care Unit	19(5.7%)
Philippines	82 (24.3%)	Cardiac Surgery Intensive Care Unit	6(1.8%)
India	106 (31.5%)	Neuroscience Ward	20(6.0%)
Pakistan	24 (7.1%)	Neuroscience Intensive Care Unit	35 (10.1%)
Others	5 (1.5%)	Oncology	49 (14.3%)
Professional classification		Hematology	21 (6.0%)
Nurse specialist	199 (59.0%)	Oncology Jeddah	12(3.6%)
Nurse Technician	131 (38.9%)	Medical	16(4.8%)
Others	7 (2.1%)	Specialized Surgical Unit	15(4.5%)
Educational qualification		Surgical extension	11(3.3%)
Diploma in Nursing	8 (2.4%)	Main Intensive Care Unit	58(17.3%)
High-Diploma in Nursing	35 (10.4%)	Emergency	2(0.6%)
Bachelor's degree in nursing	268 (79.5%)	Ambulatory Care	12(3.6%)
Master's degree in nursing	22 (6.5%)	Other (please specify)	33 (10.1%)
Others	4 (1.2%)		

Table 2. Description statistics for job satisfaction and intention to leave

Job satisfaction						
Item	Very dissatisfied	Moderately dissatisfied	Slightly dissatisfied	Slightly satisfied	Moderately satisfied	Very satisfied
How satisfied are you with your current job?	63 (18.7%)	152 (45.1%)	70 (20.8%)	19 (5.6%)	17 (5%)	16 (4.7%)
How satisfied are you with being a nurse, without taking into consideration your current job?	146 (43.3%)	134 (39.8%)	37 (11%)	7 (2.1%)	7 (2.1%)	6 (1.8%)
Intention to leave						
Item	Very unlikely	Somewhat unlikely	Somewhat likely	Vey likely		
In the next year, how likely is it that you will leave your current job??	59 (17.5%)	148 (43.9%)	57 (16.9%)	73 (21.7%)		

Table 3. Study outcomes among nationality

Item	Non-Saudi (n = 3030)	Saudi (n = 31)	P - value
Job satisfaction			
Mean ± SD	2.13 ± .91	2.67 ± 1.11	**.008**
Median (IQR)	2 (1.5 – 2.5)	2.5 (1.7 – 3.5)	
Intention to leave			
Mean ± SD	2.41 ± .99	2.62 ± 1.08	.345
Median (IQR)	2 (2 – 3)	2 (2 – 4)	
Quality of care			
Mean ± SD	1.94 ± .84	2.43 ± .98	.006
Median (IQR)	2 (1 – 2.5)	2.5 (1.5 – 3)	
Patient safety			
Patient received wrong medication time or dose			
Every day	2 (0.7%)	0 (0%)	
A few times a week	6 (2%)	1 (3.2%)	
Once a week	0 (0%)	1 (3.2%)	**.012**
A few times a month	12 (4%)	24 (77.4%)	
Very rarely/ Never	268 (88.4%)	29 (93.5%)	
Patient developed pressure ulcers after admission			
Every day	0 (0%)	2 (6.5%)	
A few times a week	2 (0.7%)	2 (6.5%)	
Once a week	2 (0.7%)	2 (6.5%)	**.000**
A few times a month	76 (25.1%)	9 (29%)	
Very rarely/ Never	205 (67.1%)	14 (45.2%)	
Patient falls with injury			
Every day	1 (0.3%)	0 (0%)	
A few times a week	0 (0%)	1 (3.2%)	
Once a week	0 (0%)	1 (3.2%)	**.000**
A few times a month	21 (6.9%)	4 (12.9%)	
Very rarely/ Never	286 (94.4%)	23 (74.2%)	

Table 4. The relation of overtime to study outcomes

Item	No	Yes	P- value
I had to do more mandatory overtime and or time-back in this month			
Job satisfaction			
Mean ± SD	2 ± .94	2.33 ± .92	**.000**
Median (IQR)	2 (1.5 – 2.5)	2 (1.5 – 3)	
Intention to leave			
Mean ± SD	2.49 ± 1.02	2.37 ± .98	.307
Median (IQR)	2 (2 – 3)	2 (2 – 3)	
Quality of care			
Mean ± SD	1.86 ± .73	2.1 ± .96	.073
Median (IQR)	2 (1 – 2)	2 (1.5 – 3)	
Patient safety			
Mean ± SD	4.8 ± .35	4.76 ± .5	.424
Median (IQR)	5 (4.6 – 5)	5 (4.6 – 5)	

Item	No	Yes	P- value
I have done more voluntary overtime and or time-back in this month			
Job satisfaction			
Mean ± SD	2.22 ± .98	2.1 ± .87	.317
Median (IQR)	2 (1.5 – 2.5)	2 (1.5 – 2.5)	
Intention to leave			
Mean ± SD	2.49 ± 1.03	2.34 ± .95	.239
Median (IQR)	2 (2 – 3)	2 (2 – 3)	
Quality of care			
Mean ± SD	2.02 ± .85	1.9 ± .88	.170
Median (IQR)	2 (1.5 – 2.5)	2 (1 – 2.5)	
Patient safety			
Mean ± SD	4.8 ± .36	4.75 ± .53	.544
Median (IQR)	5 (4.6 – 5)	5 (4.6 – 5)	
Comparing to the last month, the amount of overtime and or time-back done by me has been increased			
Job satisfaction			
Mean ± SD	2.15 ± .95	2.22 ± .92	.365
Median (IQR)	2 (1.5 – 2.5)	2 (1.5 – 2.5)	
Intention to leave			
Mean ± SD	2.51 ± .99	2.29 ± 1.01	**.041**
Median (IQR)	2 (2 – 3)	2 (2 – 2)	
Quality of care			
Mean ± SD	1.93 ± .85	2.08 ± .88	.101
Median (IQR)	2 (1 – 2.5)	2 (1.5 – 2.5)	
Patient safety			
Mean ± SD	4.79 ± .44	4.77 ± .42	.437
Median (IQR)	5 (4.6 – 5)	5 (4.66 – 5)	
In last month, often my shifts were extended (e.g. from days to evenings, evenings to nights, nights etc.)			
Job satisfaction			
Mean ± SD	2.08 ± .87	2.32 ± 1.02	**.044**
Median (IQR)	2 (1.5 – 2.5)	2 (1.5 – 3)	
Intention to leave			
Mean ± SD	2.45 ± 1.01	2.41 ± 1	.733
Median (IQR)	2 (2 – 3)	2 (2 – 3)	
Quality of care			
Mean ± SD	1.9 ±.77	2.05 ± .98	.604
Median (IQR)	2 (1.5 – 2.5)	2 (1 – 3)	
Patient safety			
Mean ± SD	4.81 ± .34	4.73± .53	.203
Median (IQR)	5 (4.6 – 5)	5 (4.66 – 5)	

Table 5. The relation of floating with study outcomes

Item	No	Yes	P- value
Have you ever been floated to a unit that requires different competencies than your primary unit			
Job satisfaction			
Mean ± SD	2.14 ± .95	2.23 ± .92	.259
Median (IQR)	2 (1.5 – 2.5)	2 (1.5 – 3)	
Intention to leave			
Mean ± SD	2.54 ± 1.03	2.27 ± .94	**.033**
Median (IQR)	2 (2 – 4)	2 (2 – 3)	
Quality of care			
Mean ± SD	1.97 ± .9	2 ± .8	.442
Median (IQR)	2 (1 – 2.5)	2 (1.5 – 2.5)	
Patient safety			
Mean ± SD	4.77 ± .47	4.8 ± .35	.871
Median (IQR)	5 (4.6 – 5)	5 (4.6 – 5)	
During last month, several times I had to work on another ward or unit rather than where I usually attached			
Job satisfaction			
Mean ± SD	2.13 ± .92	2.3 ± .99	.150
Median (IQR)	2 (1.5 – 2.5)	2 (1.5 – 3)	
Intention to leave			
Mean ± SD	2.49 ± 1.01	2.27 ± .96	.084
Median (IQR)	2 (2 – 3)	2 (2 – 3)	
Quality of care			
Mean ± SD	2 ± .9	1.9 ± .75	.717
Median (IQR)	2 (1 – 2.5)	2 (1.5 – 2)	
Patient safety			
Mean ± SD	4.77 ± .46	4.82 ± .35	.309
Median (IQR)	5 (4.6 – 5)	5 (4.6 – 5)	

Table 6. Correlation of overtime and floating with patients' outcomes

Variables		Overtime	Pressure ulcer	Fall	Medication error	Bed days
Correlation between overtime and patients' safety events						
Overtime	Correlation P-value	-	-.014 .967	-.064 .844	.447 .145	.188 .559
Pressure ulcer	Correlation P-value	-.014 .967	-	.194 .545	.198 .538	.234 .465
Fall	Correlation P-value	-.064 .844	.194 .545	-	.032 .921	.552 .063
Medication error	Correlation P-value	.447 .145	.198 .538	.032 .921	-	.340 .279

Variables		Float	Pressure ulcer	Fall	Medication error	Bed days
Correlation between floating and patients' safety events						
Float	Correlation P-value	-	-.064 .843	-.446 .147	.214 .504	-.351 .264
Pressure ulcer	Correlation P-value	-.064 .843	-	.194 .545	.198 .538	.234 .465
Fall	Correlation P-value	-.446 .147	.194 .545	-	.032 .921	.552 .063
Medication error	Correlation P-value	.214 .504	.198 .538	.032 .921	-	.340 .279
Bed days	Correlation P-value	-.351 .264	.234 .465	.552 .063	.340 .279	-

Majority of the study participants reported their patients' acuity level in the past month as moderately to very acute (68.8%). Majority of the study participants reported their patients' dependency level in the past month as moderately to very dependent (77.8%). Thirteen questions about workload were asked from the participants covering adequate patient surveillance, skin care, oral hygiene, pain management, comfort/talk with patients, educating patients and family, treatment and procedures, administering medications on time, preparing patients and family for discharge, adequate documentation of nursing care, developing or updating nursing care plans, planning care, and frequent changing of patient position. Majority of the participants reported the task as required and completed. The top required but left undone task was comfort/talk with patients. The participants reported that they were assigned 2-4 patients and 1-3 patients during day shifts and night shifts, respectively. No statistically significant association between males and females was found in terms of job satisfaction, intention to leave, quality of care and nursing outcomes in terms of wrong medication (time or dose), pressure ulcers after admission and patient falls with injury. The participants were divided into two age groups as ≤30 years and >30 years. No statistically significant association between the two age groups was found in terms of job satisfaction, intention to leave, quality of care, patient received wrong medication (time or dose), and patient falls with injury (p >0.05). However, there was statistically significant relation of age groups with development of pressure ulcers after admission.

Job satisfaction, quality of care, and patient safety had statistically significant association with nationality (p <0.05; Table 3). Quality of care and development of pressure ulcers were significantly associated with marital status and professional classification of the participants (p < 0.05). Educational level had statistically significant association with intention to leave (p = 0.017). The relation of overtime and floating with study outcomes is referred to Table 4 and Table 5, respectively. Correlation of overtime and floating with patients' outcomes has been referred to Table 6. There was statistically significant relationship of medication error (p = 0.033) and overtime

with departments. However, no statistically significant relationship of floating with departments and outcomes was found.

5. Discussion

The present study revealed that majority of the nurses was moderately dissatisfied with their jobs, and the top reasons to leave job were poor salary and workload. Majority of the nurses perceived that there was a shortage of qualified nurses to deliver safe, dignified, compassionate care in Saudi Arabia. However, majority of the nurses described that the quality of care delivered to the patients was very good and excellent along with excellent patient safety. Fortunately, majority of the required tasks were accomplished in nursing care. Age of the nurses significantly impacted the nursing care in terms of pressure ulcers development. Similarly, nationality (Saudi and non-Saudi) had significant impact on job satisfaction, quality of care and patient safety. Marital status and professional classification of nurses had significant impact on quality of care and pressure ulcer development. Interestingly, increased overtime and/or time-back and floating were associated with decreased intention to leave job.

Nursing shortage is a worldwide problem, affecting the nursing outcomes [37]. Nursing shortage negatively impacts the nursing care in terms of job dissatisfaction, intention to leave and burnout, affecting the patient outcomes such as poor patient care [13,38]. In the present study, majority of the nurses was moderately dissatisfied with their jobs, leading to intention to leave job. In addition, leaving required care undone and lack of support lead to nurses' demoralization resulting in job dissatisfaction [39]. Aljohani & Alomari and Batayneh et al., reported that increased job dissatisfaction, absenteeism increased, job commitment reduced, and work-related stress have resulted in increased burnout and intent of nurses to leave their current jobs [40,41]. Job satisfaction is noted as one of the most important predictors of nurses' intention to remain in the workplace. Aboshaiqah has

reported that female nurses face social pressure associated with the working environment leading to job dissatisfaction [9]. For instance, unappealing working conditions, restricted options for balancing family responsibilities and work results in job dissatisfaction. Bitanga has demonstrated that floating can create patient dissatisfaction and negative patient outcomes [30]. Al-Dossary et al., has reported poor pay and heavy workload as major causes of dissatisfaction among the 189 nurses examined in a Saudi Arabian university teaching hospital [42]. In a survey conducted across 12 European nations, Dall'Ora et al., has reported dissatisfaction with work shift schedule and intention to leave current jobs among hospital nurses [43]. Similarly, Stimpfel et al., noted that nurses working 10 hours or longer were two and a half times more likely to complain of burnout and job dissatisfaction and intended to leave their workplaces [44]. On the contrary, the present study interestingly revealed that the nurses who had to do mandatory overtime and/or time-back and those with extended shifts were satisfied with their job. This difference can be attributed to difference in working environment, occasion and workload at different places. In fact, the questionnaire was distributed after the holy month of Ramadan, and during this month the Saudi Government reduces working hours (decreasing from 8-hour shifts to 6-hour shifts), increasing the number of shifts for the working staff. Although the number of shifts increased; however, it was mandatory compensated by 100% cash. The present study revealed that the nurses with Saudi nationality were significantly more satisfied with their job as compared to non-Saudi nurses. Al-Haroon & Al-Qahtani conducted a cross-sectional study in major public hospitals in Saudi Arabia including 382 nurses in order to determine job satisfaction. They reported that the Saudi nationality, male gender and older nurses were more satisfied with their job. So, the present study favoured the previous findings in terms of nationality and job satisfaction. On the contrary, the present study did not show any significant relation of job satisfaction with age and gender [45].

Many factors are associated with intention of nurses to leave their job including climate and demographic characteristics. [46]. The present study, the participant nurses mentioned poor salary and workload as top reasons for intention of nurses to leave their job. Albougami et al., conducted a survey in Saudi Arabia including 318 staff nurses in order to determine the aspects resulting in intention of nurses to leave their job. They reported that the nurses who were unmarried, Indian or Filipino, deputed in medical or surgical units, and had low gross salary showed higher intention to leave their current job. However, no statistically significant relation was found between marital status and intention to leave job in the present study [20].

As mentioned earlier, short term strategies for nurse shortages have been associated with poor nurse outcomes. Almalki et al., reported that 40% of primary care nurses had the intention to leave their current workplaces due to poor work environment, heavy workloads, lack of autonomy, the performance of non-nursing work and poor job satisfaction [47]. Similarly, Almalki et al., reported unsuitable working hours, inadequate vacation time with nurses to be together with their families, inability to balance work with family life, poor staffing, inappropriate

working environments and inadequate pay as reasons for intention to leave [48]. Moreover, Aljohani & Alomari and Dewanto & Wardhani have reported that work environment factors such as overtime, irregular, and long working hours are among the leading causes of intent to leave job in Saudi Arabia. The present study revealed that the nurses with pre-graduate qualification were at higher intention of leaving job as compared to those with post-graduate qualification. Contrary to the previous studies, the present study revealed significant relation of overtime and floating with reduced intention to leave job among nurses in Saudi Arabia [40,49]. This difference can be attributed to the religious value of Makkak city for all Muslims who wish to live in this holy place. This spiritual attachment of Muslims to the city of Makkah perhaps creates healthy workplace environment, improving nursing leadership and physician-nurse relationship [50].

Job dissatisfaction affects the quality of care, as well as patient safety outcomes. Bitanga, and Lee & Scott have reported that floating and overtime related stress and burnout significantly affect work performance in nurses [30,51]. Aljohani & Alomari and Batayneh et al., have linked overtime with fatigue that affects several types of performance aspects, compromising the quality of care [40,41]. Almalki et al., have demonstrated that floating has been known to cause stress, anxiety, disruption of rhythm, feeling of frustration and dissatisfaction, resulting poor quality of care. Similarly, Aljohani & Alomari, Batayneh et al., Bitanga and Lee & Scott have reported floating negatively affects the quality of care leading to negative patient outcomes such as medical errors. In the present study, the participants with unmarried status, Saudi nationality and specialist nursing degree had significantly higher quality of care than others [30,40,41,47,51]. Contrary to the previous studies, the present study did not show negative relation of overtime and floating with quality of care. As most of the previous studies have reported poor quality of care delivered by the nurses with high workload, re-evaluation of the findings of the present study are warranted.

Overtime and floating reduce the load on allocated nurses who work in their normal schedule. However, Lee & Scott have reported that overtime and floating are associated with poor patient safety outcomes [51]. Similarly, Bitanga, Alturki, Aljohani & Alomari, and Batayneh et al., have also demonstrated negative impact of overtime and floating on nursing outcomes [30,40,41,52]. Mohanty et al., reported that floating; nursing shortage, high workload, and inexperienced staff were the leading causes of intravenous patient-controlled analgesia errors. The present study only reported a significant relation of overtime with medication errors [53]. It means that the departments where the nurses did overwork had higher risk of medication errors than that in the departments where nurses do not do overtime. The study did not show any significant relation of overtime with pressure ulcers, patient falls. Similarly, the present study revealed no significant relation of floating with patient outcomes i.e., medication errors, pressure ulcer and patient falls. The difference in medication errors in terms of overtime and floating can be attributed to the reason that float nurses are supervised by the charge nurse in order to improve patient safety.

6. Conclusion

Although the nurses perceive that there is shortage of nurses in Saudi Arabia; however, majority of them described that the quality of care they delivered to the patients was very good and excellent along with excellent patient safety. Unmarried Saudi nurses have potential to provide quality of care to the patient with satisfied patient safety, especially in the days of overtime and increased workload. The study contributes to the literature that unmarried nurses with Saudi nationality have potential provide quality of care to the patient with satisfied patient safety, especially in the days of overtime and increased workload. Saudi Arabia requires training Saudi nurses at large scale as nurses with Saudi nationality were found to be more satisfied with their job and they offered better quality of care to the patients. This task can be accomplished by sanctioning part of national budget for attracting new graduates to join the nursing profession and building new nursing institutions capable of graduating high qualified Saudi nurses. In addition, foreign scholarships can be offered for nursing department to boost healthcare profession. Handsome salaries may attract foreign nurses to serve in Saudi Arabia with enthusiasm. The present study also has some limitations. First limitation is its cross-sectional design and questionnaire-based data collection as the study may fall a victim to non-response bias, volunteer-bias and ascertainment bias. Second limitation of the present study is that is the single-cantered study as single-cantered study lack external validity. Further study may be needed to explore the working environment in the holy city Makkah that attracts nurses in order to overcome the nursing shortage in this especial region of the world.

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Conflicts of Interest

There are no conflicts of interest.

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