# THE EFFECT OF BIG-FIVE NURSING TEAMWORK TRAINING ON MISSED NURSING CARE

**[1]MANAR AHMED EL BADAWY ABD EL RAHEM, [2]MAGDA AMIN EL MOLLA, [3]FATMA AHMED ABED**

Assistant lecturer, Professor, Professor: Nursing Administration department-Faculty of nursing- Cairo University
E-mail: [1]nansy_yasla@yahoo.com, [2]magda_elmolla@yahoo.com, [3]fatma_abed66@yahoo.com

**Abstract** –
**Background**: Missed nursing care is universally used as an indicator of quality nursing care, however, little is known about mitigating effects of teamwork on these events. The need for strong teamwork has been emphasized because ineffective teamwork has been recognized as a major attribute to declined patient safety. Aim: Was to evaluate the effect of nursing teamwork training program on missed nursing care. Design: A quasi experimental (one group pretest-posttest) design was utilized. Setting: Was in 3 medical intensive care units at the New El Kasr Al Aini Teaching Hospital, Egypt. Subjects: Were 48 nursing staff worked at the selected units. Tools: Data were collected by the Modified Nursing Teamwork Observational Checklist and Missed Nursing Care Observational Checklist. Results: There were statistically significant differences among the majority of study participant's observed nursing teamwork dimensions (t= 2.74, p=.007) and missed nursing care dimensions (t= 4.88, p=.0001) pre and post-program implementation in addition to the negative correlation (r = -0.21, p = 0.06) between nursing teamwork and missed nursing care total dimensions post-program implementation. Conclusion: Hypotheses of positive effect of nursing teamwork training on missed nursing care were supported. Recommendations: Regular and frequent short term teamwork training as well as training on the identified areas of missed nursing care is important to be introduced in addition to the sustainable efforts in such as continuous evaluation are required to ensure nursing attitudes, knowledge and skills' change in relation to teamwork and quality of nursing care.

**Key words -** Big-five, Missed Nursing Care, Nursing Teamwork, Training.

## I. INTRODUCTION

In the context of nursing, one aspect of quality nursing care evaluation is the amount of necessary nursing care elements that being missed or delayed by nurses [1]. Missed nursing care MNC is a relatively new concept and it has not been fully explored in all parts of the world [2]. Importantly, MNC needs to be examined within a theoretical context because nursing care process is openly recognized as a universal factor in patient safety [3].
There is a moral duty to study circumstances which influence patient outcomes. Specifically, acts of medical care errors, or omissions, must be studied to improve patient health and refine hospital's policies. When care elements are missed by staff nurses, patients will be deprived from receiving quality care, thus patient safety and patient outcomes will be declined, so health care-associated complications may be resulted from the declining of appropriate patient care elements [9].

"Reference [5] pointed to the need to invest in methods of enhancing teamwork in the acute care settings". Teamwork however has been reported as one component preventing MNC and was shown to be an important factor in the differentiation of MNC in hospitals having similar nursing staff levels, skill mix and material resources [6].
Previous studies have uncovered the levels of teamwork by observing team behaviors or by using teamwork surveys, while observational studies of teamwork are generally resource-intensive [7].The implementation of the nursing teamwork NTW training program improved the nurses' quality of care in terms of decreasing the incidence of missed nursing care where investigators have confirmed a significant relationship between the qualities of care and omitted nursing care [8].

In Egypt, [9] conducted study to determine the correlates of missed nursing care in selected medical intensive care units MICUs, and found that the highest reported missed nursing care elements were regarding to patient education, followed by patient assessment and rights & privacy. Furthermore, the most reported factors associated with MNC were related to reduction of unit nursing team working level.

Looking specifically at NTW within nursing working on an given acute care patient unit, as opposed to healthcare staff members who work on all patient units (physicians, physical therapists, pharmacists, etc), limited studies of the impact of teamwork on the process of nursing care were found [10].

## II. RESEARCH HYPOTHESES

**2 hypotheses were postulated as follows:**
H1: Nursing teamwork will gain greater score after nursing teamwork training program implementation.
H2: Missed nursing care scores will be decreased after

nursing teamwork training program implementation.

## III. CONCEPTUAL FRAMEWORKS

The conceptual frameworks of this study were based on the Missed Nursing Care Model developed by [5] which postulated that the level of nursing teamwork can predict missed nursing care. In addition, the Salas theory or the ‘‘Big Five’’ Framework of Teamwork developed by [11] was selected because it could be used for assessing teamwork behaviors and offered a practical explanation of teamwork dynamics.

## IV. SUBJECT AND METHODS

A. Research design

A quasi experimental (one group pretest-posttest) design was utilized.

B. Setting

The study was conducted in 3 randomly selected medical intensive care units MICUs at the New El Kasr Al Aini Teaching Hospital, which is affiliated to Cairo University Hospital, Egypt. The selected MICUs have the total capacity of 20 beds and provide paid medical care services.

C. Subject

• 48 nursing staff (nurses leaders like head nurses, & on-charge nurses, staff nurse responsible for unit custody and staff nurses responsible for direct patient care) out of 57 nursing staff were included because they: worked at the 3 selected MICUs, accepted to participate in the study, didn’t attend any similar or related programs (e.g. teamwork skills, leadership skills, clinical supervision, communication skills, patient safety, and quality management and infection control) during the study period, attended and finished the current study training program, weren’t on leaves and weren’t worked on a casual basis during the study period, and continued all phases of study assessment (e.g. pre, and post-program implementation).

• To evaluate specifically the elements of MNC, a 38 staff nurses out of 47 staff nurses where selected because they: took daily patient assignment, provided direct patient care, and had at least one year experience in their worked units.

D. Tools of Data Collection:

The required data were collected through the following tools:

· Modified NTW Observational Checklist: it was adopted by the investigator to assess NTW behavior of the nursing staff using The Nursing Teamwork Survey (NTWS) which developed by [5], and following the teamwork framework of [11]. The checklist consisted of 2 parts as follows:

1st part: The personal data of the participants which contained (6) items as the gender, age, level of nursing education, years of nursing experience in current unit, type of staffing pattern and nursing staff’s position.

2nd part: NTW components which contained 47 items within the (5) core components of teamwork as: the team leadership, team orientation which represents negative items, mutual performance monitoring, backup behavior and adaptability; (3) coordinating mechanisms of teamwork as: the mutual trust, shared mental models and closed loop communication. The scoring system of three points Likert scaling type as (1) not observed, (2) not done and (3) done was used.

· MNC Observational Checklist: was developed by [9] to assess MNC elements by staff nurses who provide direct patient care. The Checklist contained 54 items along 7 dimensions as: the patient assessment, monitoring of patients’ medical devices and equipment’s safety, various nursing interventions, medication administration, nursing documentation, patient education and patients' rights and privacy. The scoring system of three points Likert scaling type as (1) not applicable (2) not missed (3) missed was used.

E. Tool Validity and Reliability

Content validity was established by 7 panels of experts in nursing administration at the Faculty of Nursing-Cairo University, they were asked to examine the modified data collection tool for their content coverage, clarity, wording, length, format, and overall appearance. Also the nursing teamwork program was developed after reviewing the related literatures and collecting the pre-program nursing teamwork observational data and submitted firstly to those experts then translated into Arabic language and resubmitted to an Arabic linguistic expert to assess its translation and grammar mistakes.

The internal consistency previously measured by [9] for the developed MNC Observational Checklist using Cronbach’s alpha was (0.95) and was (0.799) for the modified NTW Observational Checklist.

F. Pilot study

A pilot study was carried out on (n=6) 10 % of the total sample from all categories of nursing staff before starting pre-program assessment phase to ensure the applicability of the modified NTW Observational Checklist‘s content and the time needed to conduct the study.

G. Procedure

Prior to data collection, an official permission was obtained from The vice Dean of Higher studies and Research at the Faculty of Nursing –Cairo University regarded to the director of New Kasr El Aini Teaching Hospital and its nursing Director to conduct the study. The researcher has visited the 3 selected MICUs to explain purpose, nature and significance of the study in addition to the ethical considerations and the methods of data collection to the head nurses of the 3 selected MICUs to obtain their acceptance, seek their cooperation and obtain the all eligible nursing staff

monthly working schedule for facilitating the presence of the researcher and observation process. Then each nursing staff was given a code number to be used through all the study phases and the research was conducted on 4 phases as follows:

· first Phase (Assessment Phase Of MNC): Was done by observing staff nurses' elements of MNC three times with the total number of (114) observations through different working shifts in equally and randomly rotated manner by using MNC Observational Checklist during the time of patient care and at the end of each shift without being known to them or giving them any comments about their actual performance. The investigator has used several methods to get the precise data including: direct observation of the nursing performance, asking the patients about elements of nursing care for example (ex. if the patient took his scheduled medication, etc.) in addition to reviewing the patient's medical and nursing files to determine missed related documentations. Each observation was done within 30 – 35 minutes and all data were collected in one month started at 8/3/2017.

· Second Phase (Assessment Phase of NTW): Was done by observing nursing staff's teamwork behavior of the using the NTW Observational Checklist for through different working shifts during the time of patient care and time of interaction without being known to them or giving them any comments about their actual performance to obtain base line data before designing and starting the program. One observation for each nursing staff was done and the total number of the observations was (48) observations. The investigator has observed the nursing staff's interaction with each of them and with their unit's patients, nursing staff's general appearance and attitude toward each of them, nursing staff's way of following doctor's orders, nursing staff's interaction during the emergency situations and time of absenteeism, shortage and high workload in addition to different ways of communication. Each observation was done within 45-60 minutes and all data were collected in one month started at 8/5/2017.

· Third phase (Program Design): The investigator has developed the Nursing Teamwork Program after reviewing the related teamwork literatures which guided by the Big Five Teamwork Framework in addition to the results obtained from assessment phase of nursing staff teamwork in English language and then translated it into Arabic one. Accordingly, the program's aim, general and specific objectives, content, methods of coordination, places of training, the way of grouping the trainee, methods of teaching, teaching aids, time plan as well as the additional benefits of attendance were specified by the investigator.

The program aimed to build up nursing staff's NTW effectiveness in which emphasis of the program was placed on defining team skills, demonstrating the activities and strategies team members could use to gain proficiency in teamwork, and identification of strategies that can be used to overcome common barriers to achieve desired outcomes. Specialty case scenarios, staff role-playing scenarios based on teamwork problems and video vignettes were used to further reinforce the learning.

· fourth phase (Program Implementation): The program was conducted within 11 lectures along 11 consecutive weeks whereas every lecture is repeated in 3 scheduled sessions within 3 days per week.

Each session was conducted at the continuous education classrooms or on-site the intensive care unit's available or empty rooms within 45-60 minutes and the program started from 10/10/2017 and ended at 28/12/2017.

N.B: The investigator has asked the study participants to complete The Personal Data Sheet and sing at the informed consent sheet for the participation with the program and the study at the beginning of their first session.

· Fifth phase (Evaluation of NTW and MNC): After implementation of the program, the researcher has evaluated the effect of nursing teamwork training program on the NTW level using the Modified NTW Observational Checklist and MNC elements using MNC Observational Checklist. While both observations were conducted at the same time, each observation was done within 20 minutes and all data were collected within 3 weeks started at 29/12/2017.

H. Ethical Consideration

An official approval of the research ethical committee at Faculty of Nursing Cairo - University was obtained to carry out the study. Verbal consents were obtained from head nurses of those units before collecting the pilot and study initial data. All Participants informed that participation in the study was voluntary and based on their acceptance to give the informed consent stating the possibility to withdraw at any time and confidentiality of the information would not be accessed by any other part and participation was with no risk.

## V. RESULTS AND DATA ANALYSIS

The data collected from the observational tools were coded and entered into (SPSS), Version 20.0, for analysis. Data were analyzed during different periods of assessment (pre and post-program implementation). Mean percentage scores of missed scale of the MNC Observational Checklist and the done scale of Modified NTW Observational Checklist were used in all tables. The significance level of all statistical analysis was at $< 0.05$ (P-value).

Table [1] shows the distribution of study participants according to their worked units. It illustrated that (81.2%) of the study participants were females, (27.1%) of their age was between 20 – 25 years old, (35.4%) of them had nursing experience in the current units ranged from 1– 5 years, (81.2%) of them were working full time shifts. As well, (6.2%) of study participants were head nurses, (8.3%) were on-charge nurses who all (14.5%) hold bachelor's degree in nursing. In addition, (6.2%) of the study participants were staff nurses responsible for the unit's custody and were working morning shift as well as the head nurses and on-charge nurses (20.8%). Furthermore, (79.3%) of the study participants were staff nurses responsible for direct patient care as well as (48%) of them were staff nurses responsible for direct patient care as well as staff nurses responsible for the unit's custody and hold diploma's degree in nursing, followed by (37.5%) of the study participants were nurses responsible for direct patient care and hold associate's degree in nursing. Finally, (39.6%) of the study participants were staff nurses responsible for direct patient care and working long day and night shift in equal bases.

**Table [1]: percentage distributions of study participants according to their personal data (n=48).**

| Personal Data | Variables | No. | % |
|---|---|---|---|
| Unit code | Chest ICU (7A) | 18 | 37.5 |
| | Neurology ICU (7B) | 14 | 29.2 |
| | Hepatology ICU (6B) | 16 | 33.3 |
| Gender | Female | 39 | 81.2 |
| | male | 9 | 18.8 |
| Age | Less than 20 years | 1 | 2.1 |
| | 20 – 25 years | 13 | 27.1 |
| | 26 – 30 years | 7 | 14.6 |
| | 31– 35 years | 5 | 10.4 |
| | 36 – 40 years | 12 | 25.0 |
| | More than 40 years | 10 | 20.8 |
| | Mean= 32 SD= 7.9 | | |
| Years of nursing experience in current unit | 1– 5 years | 17 | 35.4 |
| | 6 – 10 years | 7 | 14.6 |
| | 11 –15 years | 5 | 10.4 |
| | 16 – 20 years | 3 | 6.2 |
| | More than 20 years | 16 | 33.3 |
| | Mean=11.87 SD=8.6 | | |
| Type of staffing pattern | Full time shifts | 39 | 81.2 |
| | Part time shifts | 9 | 18.8 |
| Nursing staff's position | Head nurse | 3 | 6.2 |
| | On-charge nurse | 4 | 8.3 |
| | Staff nurse responsible for the unit's custody | 3 | 6.2 |
| | Staff nurse responsible for direct patient care | 38 | 79.3 |
| Level of nursing education | Bachelor's degree in nursing | 7 | 14.5 |
| | Associate's degree in nursing | 18 | 37.5 |
| | Diploma's degree in nursing | 23 | 48 |
| Worked shift | long day shift | 19 | 39.6 |
| | night shift | 19 | 39.6 |
| | morning shift | 10 | 20.8 |

**Table [2]: Differences among the observed nursing team work dimensions by the study participants pre and post-program implementation (n = 48).**

| Teamwork dimensions | Pre | | Post | | t-value | p-value |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | | |
| Team leadership | 63.99 | 39.54 | 81.25 | 23.97 | 2.59 | .011* |
| Team orientation | 32.85 | 25.14 | 21.58 | 11.34 | 2.83 | .006* |
| Mutual performance monitoring | 41.84 | 30.39 | 68.23 | 18.41 | 5.15 | .0001* |
| Backup behavior | 35.00 | 16.89 | 68.23 | 13.92 | 10.52 | .0001* |
| Adaptability | 65.24 | 20.06 | 80.21 | 24.71 | 3.10 | .003* |

| | | | | | | |
|---|---|---|---|---|---|---|
| Mutual trust | 63.47 | 41.20 | 73.40 | 20.97 | 1.49 | .140 |
| Shared mental model | 58.68 | 37.82 | 86.11 | 18.17 | 4.53 | .0001* |
| Closed loop communication | 61.70 | 37.86 | 72.41 | 15.35 | 1.82 | .073 |
| Total | 50.58 | 26.94 | 62.14 | 11.39 | 2.74 | .007* |

**Table [3]: differences between the observed missed nursing care dimensions by the study participants pre and post-program implementation (n = 114).**

| Missed nursing care dimensions | Pre | | Post | | t-value | p-value |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | | |
| Patient Assessment | 33.85 | 35.10 | 20.76 | 23.41 | 3.31 | 0.001* |
| Monitoring of patients' medical devices and equipment's safety | 28.69 | 17.23 | 17.28 | 16.33 | 5.14 | .0001* |
| Various Nursing intervention | 31.41 | 24.74 | 18.30 | 13.43 | 4.97 | .0001* |
| Medication administration | 42.11 | 33.64 | 25.44 | 36.58 | 3.58 | .0001* |
| Nursing Documentation | 9.71 | 16.53 | 5.37 | 12.55 | 2.23 | .027* |
| Patient education | 64.41 | 48.29 | 10.96 | 20.78 | 10.16 | .0001* |
| Patient's rights and Privacy | 40.06 | 27.67 | 14.18 | 21.98 | 7.82 | .0001* |
| Total | 27.66 | 18.52 | 17.42 | 12.64 | 4.88 | .0001* |

Table [2] illustrates that, there is statistically significant difference among majority of study participant's observed NTW dimensions pre and post-program implementation (t= 2.74, p=.007). Where, majority of observed dimensions have got higher mean score compared to preprogram implementation except for the team orientation dimension which has got the lowest mean score ( $\chi$ = 32.85, SD = ± 25.14) preprogram implementation and gained respectively lower mean score ( $\chi$ = 21.58, SD = ± 11.34) post-program implementation.

Table [3] illustrates that, there is statistically significant difference among all study participant's observed MNC dimensions pre and post-program implementation (t= 4.88, p=.0001). Where, all observed MNC dimensions have got lower mean score compared to preprogram implementation.

Table [4] illustrates that, there is negative correlation (r = -0.21, p = 0.06) between NTW and MNC total dimensions post-program implementation. Where, there is significant negative correlation between majority of observed NTW dimensions and MNC total dimensions, except for the significant positive correlation between team orientation dimensions (r = 0.44, p = 0.00) and MNC total dimensions.

## DISCUSSION

The results of the study indicated that, the implementation of nursing teamwork training program has a positive effect on increasing teamwork and decreasing missed nursing as compared pre and post-program implementation. Generally, decreased missed nursing care level was correlated with increased NTW level.

Nursing staff were interested with the subject of teamwork during the training course as well as the program has presented a newly heard concepts made them very attentive and wanted to change their traditional behavior to improve the quality of nursing care and enhance any at stake communication as possible as they could. "Reference [10] stated that nursing staff reported a higher level of satisfaction with teamwork and an increase of teamwork knowledge after the implementation of teamwork training for them".

These results were congruent with study of [12] that showed that only 24.7% of the nursing staff reported good teamwork. In contrasted view, "Reference [13] illustrated that staff nurses in the ICUs at South Valley University Hospitals generally reported high perception of teamwork among them".

Looking specifically to team orientation dimension which represents a negative items and preferably to be not done by nursing staff, the study revealed that nursing staff were most of time took other's behavior into account during interaction and believed in the importance to get ride from "ours" work overload instead of focusing on "mine" load. The Egyptian nature of Egyptians might be having a role for providing rapid interventions in solving problems and separation between the conflict parties. But on other side, their nature of ignoring their related mistakes and annoying behaviors made them to some extent less team oriented.

The investigator has viewed nurses leaders before the program hold consistent traditional behavior across all studied units by alerting and warning other staff to be more focused on their cases only where the common theme of "everyone should be present at own cases and never interfere with other staff work or cases" was present which in turn created an atmosphere of "no working together or

cross-monitoring each of us". After the program, all nursing staff has efficiently assisted each of them and became more adaptable, efficient and flexible.

Other observed events after the program, that nursing staff, at the beginning of the shift, have actively assessed all unit level elements to maintain awareness in order to support team functioning. Like asking about status of patients (e.g. number, general status, transferred patients, patients who have been resuscitated at the previous shift, if their relatives accompanied the patients, etc.); status of the staff themselves (e.g.

number, the workload, assigned unit and managerial duties, who was absent, who was fatigue and stressed, who would be help from other unit, etc.); status of the working environment (e.g. new devices were available, the place of medication and supplies, the availability of the administrative information, etc.). Nursing staff's situational awareness enabled them to be engaged in mutual performance monitoring and more backed up at the moments of rapid environmental change (Salas, Sims & Burke, 2005).

Implementation of the nursing teamwork training program decreased the incidence of MNC. These results were congruent with study of [10] who reported an increase in mean teamwork scores, a significant decrease in missed care, an increase in teamwork satisfaction and a higher level of teamwork knowledge in comparison to the control group who had no training.

"Reference [9] concluded in that all of studied units have an incidence of MNC through a variety of all dimensions". "Reference [13] revealed that (32.8%) of their studied nurses reported high missed care. Where the highest area of MNC was that of patient education (51.7%)".

The investigator has viewed that all nurses who were responsible for providing direct patient care were holding diploma's and associate's degree in nursing and they in some extent lacked the integrative and comprehensive knowledge related to their patients diagnosis and treatment plans while they depend more on their gained experience from their clinical exposure not from the long extensive education. Nursing leaders after the program became more mutually cooperative and were observed through patient education moments, because all nurses leaders were holding bachelor's degree in nursing where they most of time answered the patient questioning and provided them the nesscsery information regarding to their illness and treatment in front of their assigned staff nurses.

"Reference [5] stated that more MNC was also significantly related to the following factors: trust, team orientation, backup, shared mental model, and team leadership". Conversely, [13] illustrated that there was statistically significant weak negative correlation between the trust domain of teamwork and the area of MNC related to response to patient needs (rights and responsibility). Meanwhile, no statistically significant correlation could be demonstrated between the total scores of NTW and MNC.

## CONCLUSION

The current study findings have supported the postulated hypotheses. Where, several items of NTW and MNC that observed by study participants as being not done before implementing the nursing teamwork training program were observed for being done after program implementation. The current study has explored the negative correlation between NTW and MNC total dimensions.

**Table [4]: Correlation between nursing teamwork and missed nursing care dimensions post-program implementation (n = 48 for nursing teamwork, n = 114 for missed nursing care).**

| *Dimensions* | *Patient Assessment* | | *Monitoring of patients' medical devices and equipment safety* | | *Various Nursing intervention* | | *Medication administration* | | *Nursing Documentation* | | *Patient education* | | *Patient's rights and Privacy* | | *Total* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | r | p | r | p | r | p | r | p | r | p | r | p | r | p | r | p |
| Team leadership | .45 | 0001* | -.58 | .0001* | -.32 | .005* | -0.02 | 0.85 | -0.23 | 0.05 | -0.87 | 0.00* | -0.25 | 0.03* | -0.36 | 0.00* |
| Team Orientation | .36 | .001* | .24 | .03* | .4 | .0001* | 0.60 | 0.00* | 0.40 | 0.00* | -0.25 | 0.06 | 0.17 | 0.14 | 0.44 | 0.00* |
| Mutual Performance Monitoring | .65 | .0001* | -.37 | .001* | -.03 | .74 | 0.07 | 0.55 | -0.02 | 0.83 | -0.68 | 0.00* | -0.09 | 0.46 | -0.08 | 0.47 |
| Backup Behavior | .68 | .0001* | -.24 | .03* | -.02 | .81 | -0.28 | 0.01* | 0.02 | 0.87 | -0.50 | 0.00* | -0.19 | 0.09 | -0.08 | 0.51 |
| Adaptability | -.28 | .01* | -.2 | .09 | -.11 | .36 | -0.11 | 0.35 | -0.17 | 0.17 | 0.04 | 0.77 | -0.29 | 0.02* | -0.20 | 0.11 |
| Mutual Trust | .38 | .001* | -.5 | .0001* | -.28 | .01* | 0.06 | 0.64 | -0.22 | 0.05 | -0.86 | 0.00* | -0.28 | 0.02* | -0.31 | 0.01* |
| Shared Mental Model | .60 | .0001* | -.51 | .0001* | -.4 | .0001* | 0.00 | 1.00 | -0.21 | 0.07 | -0.89 | 0.00* | -0.39 | 0.00* | -0.39 | 0.00* |
| Closed loop communication | .45 | .0001* | -.47 | .0001* | -.25 | .02* | 0.15 | 0.19 | -0.16 | 0.16 | -0.86 | 0.00* | -0.25 | 0.03* | -0.27 | 0.02* |
| Total | .53 | .0001* | -.45 | .0001* | -.19 | .09 | 0.15 | 0.20 | -0.10 | 0.37 | -0.84 | 0.00* | -0.24 | 0.04* | -0.21 | 0.06 |

## RECOMMENDATIONS

- Monitoring MNC should be on a daily basis.
- Regular and frequent short term teamwork training as well as training on the identified areas of MNC is important to be introduced within all nursing staff at intra and inter-departmental level.

- Sustainable efforts such as continuous evaluation are required to ensure nursing attitudes, knowledge and skills' change in relation to teamwork and quality of nursing care.
- The hospital administrators should create and develop system and culture that support effective NTW.
- Involving nursing curriculum with concepts such as MNC and NTW is important.
- Future research includes a diverse hospitals and nursing units with sufficient number of participants to detect differences in NTW and MNC with array of independent variables.

## LIMITATION OF THE STUDY

Finally, the current stud has several limitations worthy of further discussion:

- The significant number of participants' drop out after the initial data has been collected. So, the investigator has conducted the current study with small sample size but relied on large observational sample size.
- The working environment which the participants return to impacted whether or not the participants could apply what they learned. The hospital culture, management and reward systems do not support behavior change, and then the participants may not be able to apply what they have learned for longer time.

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