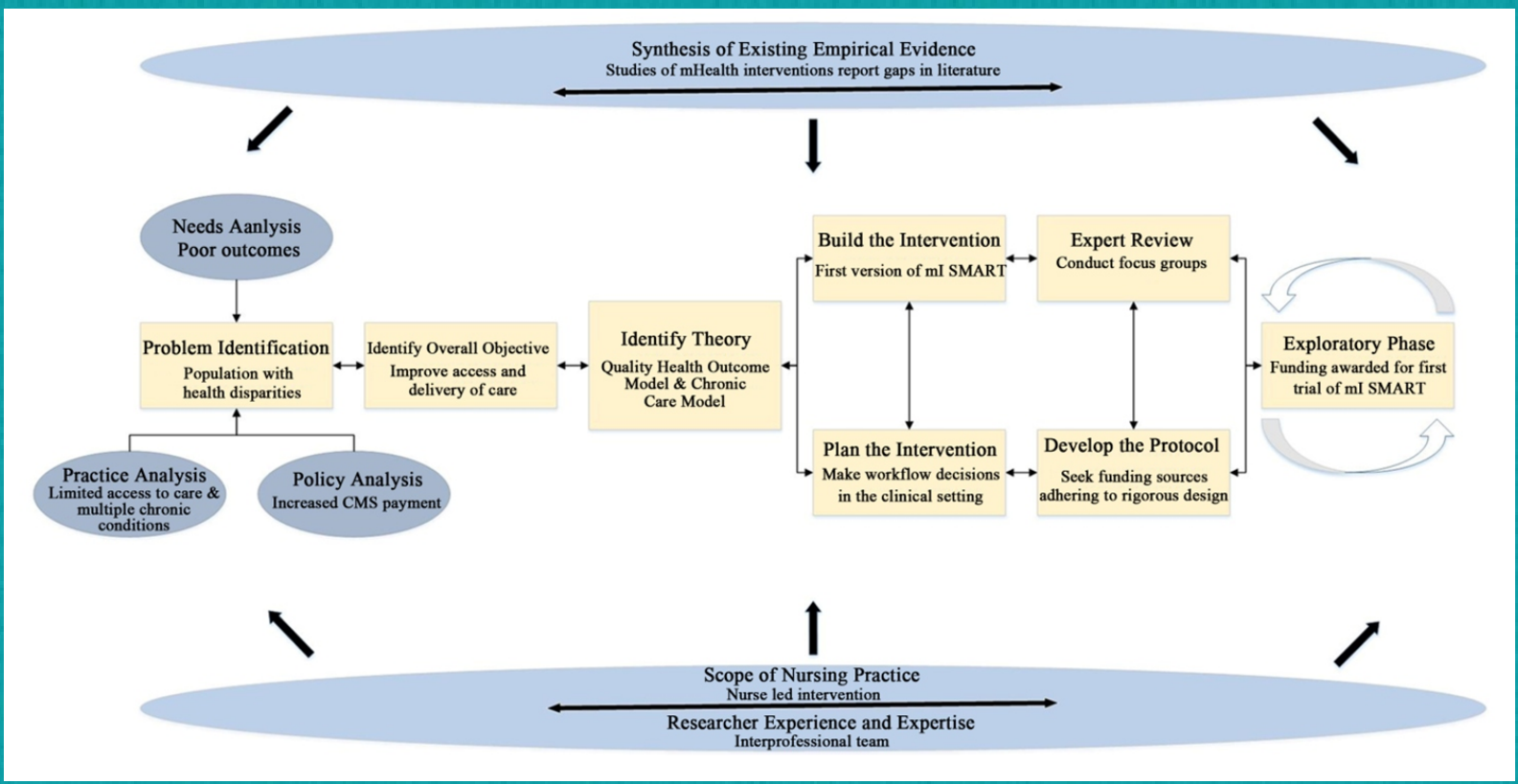
ISSN: 2162-5336 Vol. 6, No. 4, April 2016

Scientific Research Publishing

Open Journal of Nursing



ISSN: 2162-5336

www.scirp.org/journal/ojn

Journal Editorial Board

ISSN 2162-5336 (print) ISSN 2162-5344 (online)

http://www.scirp.org/journal/ojn

Editor-in-Chief

Open Journal of Nursing, 2016, 6, 267-352
Published Online April 2016 in SciRes. http://www.scirp.org/journal/ojn

Table of Contents

Volume 6 Number 4 April 2016

The figure on the front cover is from the article published in Open Journal of Nursing, 2016, Vol. 6, No. 4, pp. 303-308 by Jennifer A. Mallow, Laurie A. Theeke, Rebecca Walls, Elliott Theeke and Brian K. Mallow.

Open Journal of Nursing (OJN)

Journal Information

SUBSCRIPTIONS

The *Open Journal of Nursing* (Online at Scientific Research Publishing, www.SciRP.org) is published monthly by Scientific Research Publishing, Inc., USA.

Subscription rates:

Print: $79 per issue.
To subscribe, please contact Journals Subscriptions Department, E-mail: sub@scirp.org

SERVICES

Advertisements
Advertisement Sales Department, E-mail: service@scirp.org

Reprints (minimum quantity 100 copies)
Reprints Co-ordinator, Scientific Research Publishing, Inc., USA.
E-mail: sub@scirp.org

COPYRIGHT

PRODUCTION INFORMATION

For manuscripts that have been accepted for publication, please contact:
E-mail: ojn@scirp.org

Open Journal of Nursing, 2016, 6, 267-273
Published Online April 2016 in SciRes. http://www.scirp.org/journal/ojn
http://dx.doi.org/10.4236/ojn.2016.64027

The Influence of Sound Awareness on the Level of Sound Generated during Nursing Activity in a Pseudo-Ward

Tomoko Shimoda[1], Maria Asai[2], Rei Yoshida[3], Ririko Aoki[4], Rika Yano[1]

[1]Faculty of Health Sciences, Hokkaido University, Sapporo, Japan
[2]Former Department of Health Sciences, School of Medicine, Hokkaido University, Sapporo, Japan
[3]Sapporo Minami-Sanjo Hospital, Sapporo, Japan
[4]MEGMILK SNOW BRAND Co., Ltd., Tokyo, Japan
Email: tshimoda@hs.hokudai.ac.jp

Received 22 February 2016; accepted 16 April 2016; published 19 April 2016

Abstract

Sound generated in a ward can be classified into 1) generated by medical staff, 2) generated by patients and their visitors, and 3) others, such as from in-hospital broadcasting microphones and nurse calls. Among these sounds, the incidence from medical staff, in particular, is reportedly high. The study objective is to investigate whether sound awareness is effective in regulating the sound environment even in a busy situation, such as in a real clinical setting, and to examine the extent to which sound awareness affects sound level. Nursing students were asked to perform a series of nursing activities in a pseudo-ward, and the changes in the sound level generated during the nursing activities with or without time and sound awareness were examined. Under varying experimental conditions, the sound and time levels associated with the nursing activities were measured in the following order: condition 1, without sound or time awareness; condition 2, with time awareness but without sound awareness; and condition 3, with both sound and time awareness. The time to perform nursing activities was longer with sound awareness. However, when aware of time only, the sound level from nursing activities rose by 2.3 dB, whereas when aware of both time and sound, the sound level dropped by 3.0 dB. With both time and sound awareness, there is a distinct drop in the sound level from nursing activities, such as wagon handling, handling of items (trays, bowls), working at the sink, and opening and closing the microwave oven door. These results suggest that even in a pseudo-clinical setting it is possible to regulate the environmental sound through the environmental sound awareness of the medical staff, resulting in a drop in the sound level generated while performing nursing activities.

Keywords

Environmental Adjustment, Pseudo-Ward, Time, Sound Awareness, Nursing Activity

How to cite this paper: Shimoda, T., Asai, M., Yoshida, R., Aoki, R. and Yano, R. (2016) The Influence of Sound Awareness on the Level of Sound Generated during Nursing Activity in a Pseudo-Ward. *Open Journal of Nursing*, **6**, 267-273.
http://dx.doi.org/10.4236/ojn.2016.64027

1. Introduction

Within a hospital ward, various sounds are generated. According to the World Health Organization guidelines on sound, the normal level in a ward room should be lower than 30 dB and, in rooms where patients undergo treatment or examination, the level should be lower than 35 dB [1]. It is desirable for the patient's room to be a quiet environment; however, in medical settings, since various sounds are generated from the medical devices that are in use, regardless of the time of the day, it is difficult to comply with both of these guidelines [2]. In studies on Japanese hospitals, a sound level below 55 dB should be maintained within a ward [3]. Yet, there are instances of wards in overseas hospitals where sound levels above 50 dB have been reported [4] [5]. The upper limit of noise in rooms where patients undergo treatment or examination should be lower than the normal level. The medical staff within the study area will cause ambient noise levels to rise; to what degree is difficult to determine because rank correlation also suggests that the presence of patients and relatives, especially at visiting time, will cause ambient noise levels to rise as well.

Sound generated in a ward can be classified into 1) sound generated by medical staff, 2) sound generated by patients and their visitors, and 3) other sound, such as from in-hospital broadcasting microphones and nurse calls. Among these different sounds, there is a positive correlation between the noise level and the number of medical staff [4]. Moreover, based on studies regarding sound generated during nursing activities in a ward, the average sound level has been reported at 42.28 dB, with levels rising most frequently above 70 dB during the day time (8:00 - 14:00) due to such activities [5]. Therefore, it is necessary for nurses to attempt to decrease the level of noise in a hospital environment; even in a busy and time-pressed clinical situation, if the sound level varies depending on the sound awareness of medical staff, we believe it likely that environmental sound levels can be regulated by encouraging sound awareness among medical staff.

The study objective was to elucidate the influence of sound awareness on sound level generated during nursing activities in a pseudo-ward. If it can be verified that the sound level is affected by sound awareness, we believe that the findings can be applied to medical staff sound awareness reforms and regulation of environmental sound levels.

2. Materials and Methods

2.1. Participants

The study period was August through November 2013. A total of 24 individuals who gave informed consent were selected from 180 sophomore-to-senior-level Japanese university students majoring in nursing and conversant in basic living assistance nursing technology.

2.2. Design

1) Experimental environment (**Figure 1**)
2) Activity setting

With reference to probable factors in ward noise that originate from medical staff as indicated in previous studies, the 6 categories of sound given below were measured:

(1) sound due to the handling of wagons,
(2) sound due to the handling of items (trays, bowls),
(3) sound due to activities at the sink,
(4) sound due to the use of microwave ovens,
(5) sound due to the handling of fences (curtains),
(6) sound due to the creating of nursing records.

A series of activities (activity A) involving these sounds in a ward environment was also determined (**Table 1**).

3) Experimental setting

The sound generated from each nursing activity was measured as the participants performed activity A under the following conditions in the given order:

Condition 1: without sound or time awareness (sound and time unaware),
Condition 2: with time awareness but without sound awareness (time aware),
Condition 3: with both sound and time awareness (sound and time aware).

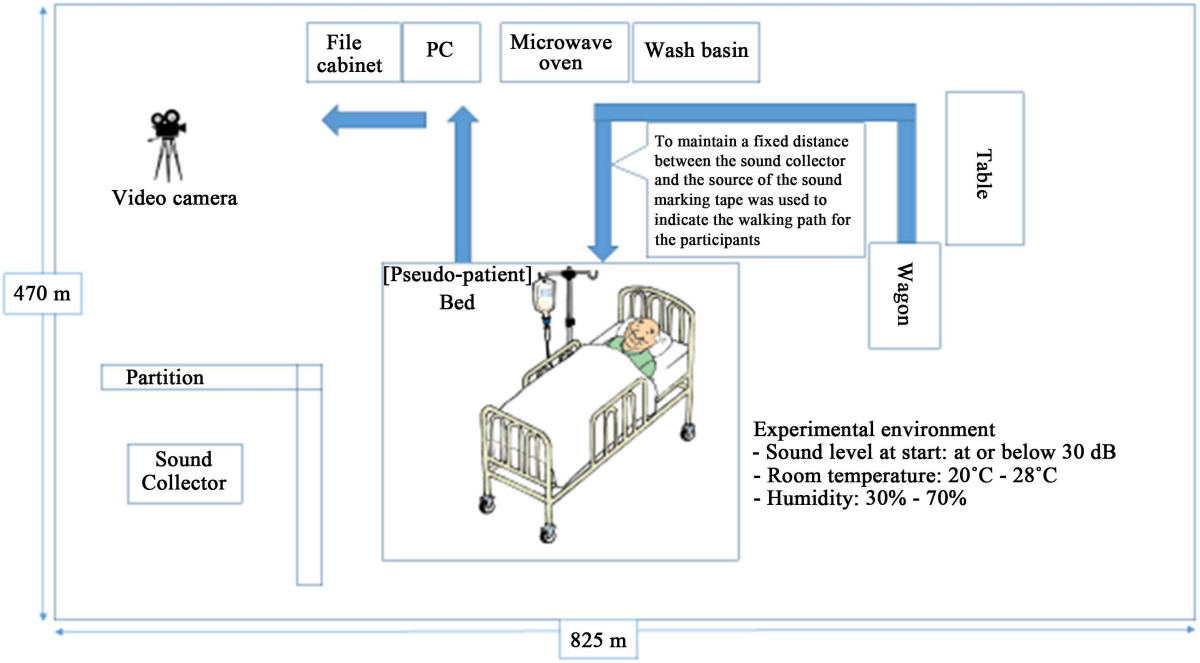


Figure 1. Experimental environment.

2.3. Data Collection

1) Sound generated due to nursing activity

The sound measurements were undertaken for nursing activities (**Table 1**) that generate sound. The sound level was measured using a sound level meter SL-1370 (measurement range 30 - 130 dB, measurement accuracy (me dB, AS ONE Co., JAPAN), and measurements were taken at 0.5-second intervals using RS-232 analysis software (AS ONE Co., JAPAN).

2) Time needed in nursing activity

This was measured from video recordings using a digital video camera (HDC-SD9, Panasonic, JAPAN).

3) Awareness

The self-administered questionnaire focused on confirming participants' awareness of sound and time in relation to activity A; they were asked questions about the absence/presence of sound and time awareness that they experienced in the pseudo-ward.

2.4. Experimental Procedure

This experiment comprised two steps:

1) For each of the three experimental conditions [condition 1 (sound and time unaware), condition 2 (time aware), condition 3 (sound and time aware)], sound generated due to nursing activities was measured. The time required for each nursing activity was also measured.
2) To simulate a time-pressed clinical situation for experimental conditions 2 and 3, assuming nurse calls in approximately 10-second intervals, sound alerts were generated to stimulate sound awareness.

2.5. Statistical Analyses

To confirm that a specific measurement corresponds to a particular nursing activity, the video recordings were analyzed by several persons. For intermittent sounds, such as those due to the handling of items (trays, bowls), use of microwave ovens, handling bed guards, and keyboard typing, the maximum and minimum values were calculated, whereas for continuous sounds, such as those due to activities concerning wagons and sinks, the average was also calculated along with the minimum and maximum values. All data obtained were presented using average and standard deviation measures. In the statistical analysis, one-way analysis of variance was

Table 1. Target activities for measurement of sound level from nursing activities.

Sound generated from nursing activities	Target nursing activity for measurement
Sound generated due to wagon handling	Nursing activity (1) wagon handling
Sound generated due to handling of items (trays)	Nursing activity (2) put a tray in the wagon
Sound generated due to handling of items (bowls)	Nursing activity (3) put a bowl in the wagon
Sound generated from using the sink	Nursing activity (4) open the faucet and pour water into a bowl
Sound generated from using the microwave oven	Nursing activity (5) open and close the microwave oven
Sound generated from handling the bed rails	Nursing activity (6) set and detach bed rails
Sound generated due to activities regarding recording nursing activities	Nursing activity (7) type at the PC Nursing activity (8) put away files

undertaken with time required and sound generated under the three experimental conditions. The average sound level generated during nursing activity under each of the experimental conditions was compared (using paired t-tests). The level of significance was established at $p < 0.05$.

2.6. Ethical Considerations

Consent was obtained from the participants through written communication regarding the study purpose and method. We explained to the participants beforehand that participation was free and voluntary, consent could be withdrawn at any point, and the results would be anonymously recorded and would not be used for any purpose other than research. We also explained to the participants that any personal data available were viewable to the concerned person only and would be discarded after the study's completion. Since the experiment's purpose was to study the effect of sound awareness on sound generated, the term "sound environment" was not used in the explanations. This study was approved by the facility's ethical review committee (approval no. 13 - 31).

3. Results

Among the 24 participants (all female, aged 20 - 22 years) who agreed to participate in the study, data from five participants were excluded because of equipment failures; therefore, data from 19 participants were analyzed.

3.1. Experimental Environment

Prior to commencing the experiments, the sound level in the experimental room was 39.6 ± 1.9 dB, the room temperature was 23.9˚C ± 2.0˚C, and the humidity was 45.2% ± 11.6%.

3.2. Time Required

Regarding the time required under each experimental condition, as shown in **Figure 2**, for condition 1 (sound and time unaware), it was 145 ± 17 s; for condition 2 (time aware), it was 113 ± 18 s; and, for condition 3 (sound and time aware), it was 123 ± 22 s. Thus, there was a significant reduction ($p < 0.01$) in the pseudo-ward conditions under condition 2 and 3 compared to condition 1 when participants were not aware of sound or time.

3.3. Comparison of Sound Level under Each Experimental Condition

As shown in **Figure 3**, regarding the average sound level for each experimental condition, when condition 1 (52.2 ± 1.8 dB) was compared with condition 2 (54.5 ± 2.7 dB), there was a significant increase of 2.3 dB for condition 2 ($p < 0.01$), whereas when condition 2 (54.5 ± 2.7 dB) was compared with condition 3 (51.5 ± 2.0), a significant decrease of 3.0 dB ($p < 0.01$) for condition 3 was observed.

3.4. Comparison of Sound Generated from Nursing Activities under Each Experimental Condition (Table 2)

For experimental conditions 1 and 2, the sound level for all activities under condition 2 was higher, but no

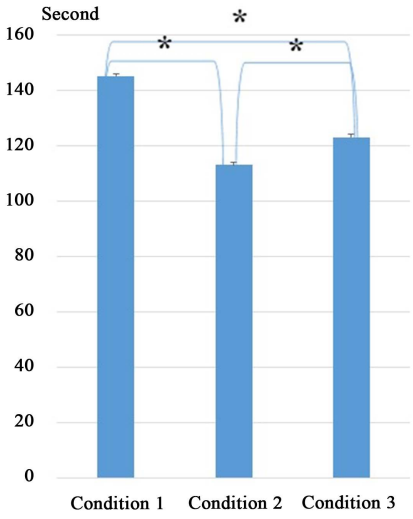


Figure 2. The time required under each experimental condition, Tukey Kramer $^{*}p < 0.01$.

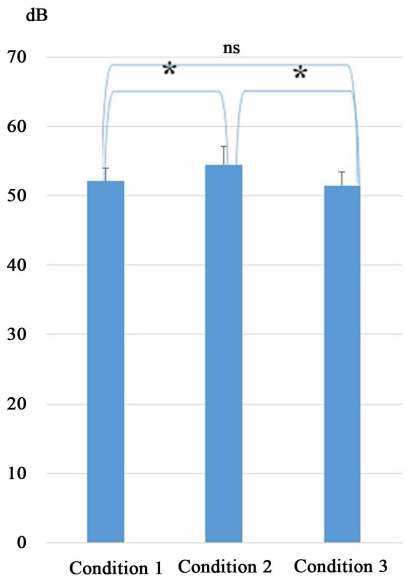


Figure 3. The average sound level for each experimental condition, Tukey Kramer $^{*}p < 0.01$.

Table 2. Variation of the average sound level from each nursing activity under each experimental condition N = 19.

Nursing activity	Average sound level generated from each activity			Significant difference	
	Condition 1 (Sound and time unaware)	Condition 2 (Time aware)	Condition 3 (Sound and time aware)	Condition 1 vs. 2	Condition 2 vs. 3
(1) Wagon	49.0	51.4	50.1	n.s.	$p = 0.0002$
(2) Tray	54.0	58.1	52.8	n.s.	$p = 0.0014$
(3) Bowl	58.3	60.5	56.0	n.s.	$p = 0.0002$
(4) Sink	51.4	54.1	51.7	n.s.	$p = 0.0003$
(5) Microwave oven	62.5	64.9	61.0	n.s.	$p = 0.0005$
(6) Bed guards	55.0	56.6	53.3	n.s.	n.s.
(7) Typing	46.1	47.1	46.1	n.s.	n.s.
(8) Filing	48.0	50.0	48.0	n.s.	n.s.

statistically significant difference was observed. When the sound level was compared between condition 2 and condition 3, the changes in sound level for all nursing activities were lower for condition 3. In particular, for wagon handling, items (trays, bowls) handling, work at the sink, and using the microwave oven, the sound level was significantly lower ($p < 0.01$) for condition 3 compared to condition 2.

3.5. Presence/Absence of Time and Sound Awareness

Responses were obtained from all participants targeted for analysis (response rate 100%, valid response rate 100%).

Regarding measurements under condition 2, in response to the question "Were you aware of the time?" 10 participants (53%) responded that they were very aware, while nine participants (47%) responded that they were somewhat aware.

Under condition 3, regarding "Were you aware of the sound?" all participants responded that they were aware.

4. Discussion

4.1. Experimental Environment Setting

The environmental sound level was maintained below 41.4 dB, closely similar to the general ward environment used in a previous study [3]. Since under condition 3 all participants were both time and sound aware, we believe that we were able to simulate a busy and time-pressed experimental environment. The temperature and humidity of the experimental room were maintained at the same level as in a general ward.

4.2. The Effect of Time and Sound Awareness on the Sound Level Generated in Nursing Activities

In studies with the ICU and emergency wards, reviewing the alarm settings and sound level in medical instruments can lead to a better sound environment resulting in improved sleep quality of patients [6] or reduction in noise level [7]. In a study describing staff consideration and alarm sound adjustments as likely key elements in improving the sound environment around patients, it has also been observed that speaking in a softer voice resulted in a difference of 16.78 dB compared to a louder voice for sounds generated by medical staff, and with proper efforts to lower the sound level, a reduction of 9.33 dB was achieved [8].

In this study, the experiment results suggest that although time awareness clearly leads to shortening of the activity time, sound awareness can also result in a reduction in sound level even in a time-pressed situation. Regarding the sound level generated in nursing activities, the activities that resulted in reduced sound level due to sound awareness were wagon activity, tray activity, bowl activity, sink activity, and microwave oven activity. Although the recommended sound level in a ward is below 30 dB, the sound levels due to tray, bowl, and microwave oven use were high, exceeding 30 dB under condition 2 in the experiment. These three nursing activities were also the ones in which it was easier to reduce the sound level considerably by being sound aware.

For the sound involving trays between conditions 2 and 3, a difference of 5.4 dB was the largest among the activities observed, and we believe that this is an activity in which it is easier to reduce the sound level by being sound aware. Meanwhile, under condition 2, among the five activities in which the sound level could be lowered, wagon and sink activities recorded quite low sound levels. Although the sound level for these two cases does not exceed 30 dB, we believe that these are activities wherein sound awareness can still lead to a reduction in the sound level. In particular, in the case of the sink, techniques such as holding the bowl closer to the faucet can suppress the sound of the water flow. According to previous studies, a noise level of approximately 10 dB can be attributed to sources, such as water flowing in lavatory sinks that patients consider unpleasant, and passing of wagons or catering cars during the daytime [9]. Therefore, we believe that based on the findings from our experimental data, ample room exists to devise sound reduction interventions.

Additionally, although the sound levels due to the handling of bed rails and nursing activity recording (typing and filing) were lower for condition 3 compared to condition 2, the difference was not statistically significant. These findings suggest that in these three activities, it is difficult to reduce the sound level even with awareness for sound environment adjustment.

The nursing activities selected in this study are routinely conducted in a ward, and are very likely to be per-

formed concurrently by several medical staff. Because of this, even if there is no statistically significant difference due to a particular activity alone, when the activities overlap, the sound level is amplified, and events persist throughout the day, which can significantly affect the sound environment in a ward.

These results suggest that in cases of clinical settings where high sound levels are common due to activities performed in time-pressed situations, the sound awareness of the medical staff can lead to a reduction in the sound level generated from nursing activities.

5. Conclusions

1) Regarding the performance of a series of nursing activities in a pseudo-ward, being sound aware can reduce the sound level by approximately 3 dB compared to the sound unaware case.
2) In a pseudo-ward setting, being sound aware means that the sound level can be reduced in five stand-alone nursing activities, such as wagon handling, item (trays and bowls) handling, using the sink, and using the microwave oven.

Limitations and Scope for Future Research

As the experiments were conducted in a pseudo-ward, the simulated conditions may be different from real ward conditions where a mix of several sound sources exists. This paper mainly focused on the sound awareness of nurses. However, sound was not merely generated by nurses and the sound generated in a ward can be classified into 1) sound generated by medical staff, 2) sound generated by patients and their visitors, and 3) other sound, such as from in-hospital broadcasting microphones and nurse calls. This study was conducted in order to obtain basic data about the sound environment. Future studies must take into consideration the occurrence of other sounds in a real ward environment.

References

[1] Berglund, B., Lindvall, T. and Schwela, D.H. (1999) Guidelines for Community Noise Geneva: World Health Organization. http://whqlibdoc.who.int/hq/1999/a68672.pdf

[2] Darbyshire, J.L. and Young, J.D. (2013) An Investigation of Sound Levels on Intensive Care Units with Reference to the WHO Guidelines. *Critical Care*, **17**, R187. http://dx.doi.org/10.1186/cc12870

[3] Yonenaga, T., *et al*. (1998) Comfort of Environmental Conditions in Dental Hospitals Evaluated by the Relation between a Questionnaire Survey of Patients and Environmental Measurements. *Journal of Dental Health*, **48**, 325-334.

[4] Christensen M. (2005) Noise Levels in a General Surgical Ward: A Descriptive Study. *Journal of Clinical Nursing*, **14**, 156-164. http://dx.doi.org/10.1111/j.1365-2702.2004.01040.x

[5] McLaren, E. and Maxwell-Armstrong, C. (2008) Noise Pollution on an Acute Surgical Ward. *The Annals of the Royal College of Surgeons of England*, **90**, 136-139. http://dx.doi.org/10.1308/003588408X261582

[6] Hu, R., Hegadoren, K.M., Wang, X. and Jiang, X. (2015) An Investigation of Light and Sound Levels on Intensive Care Units in China. *Australian Critical Care* (in Press). http://dx.doi.org/10.1016/j.aucc.2015.08.001

[7] Way, R.B., Beer, S.A. and Wilson, S.J. (2014) What's That Noise? Bedside Monitoring in the Emergency Department. *International Emergency Nursing*, **22**, 197-201. http://dx.doi.org/10.1016/j.ienj.2014.01.001

[8] Tegnestedt, C., *et al*. (2013) Levels and Sources of Sound in the Intensive Care Unit: An Observational Study of Three Room Types. *Acta Anaesthesiologica Scandinavica*, **57**, 1041-1050. http://dx.doi.org/10.1111/aas.12138

[9] Kawasaki, M., *et al*. (2009) Noise Level and Night Annoyance in a Neurosurgical and Casualty Ward. *Yamanashi Nursing Journal*, **7**, 5-11.

Open Journal of Nursing, 2016, 6, 274-281
Published Online April 2016 in SciRes. http://www.scirp.org/journal/ojn
http://dx.doi.org/10.4236/ojn.2016.64028

Knowledge and Attitudes of Nurses Working at King Abdulaziz University Hospital toward Cancer Pain Management

Rolina K. Al-Wassia

Department of Radiology, King Abdulaziz University Hospital, Jeddah, Saudi Arabia
Email: ralwassia@kau.edu.sa

Received 16 March 2016; accepted 16 April 2016; published 19 April 2016

Abstract

Objective: This survey aims to identify the levels of knowledge and attitudes among nurses regarding cancer pain management. Methods: This cross-sectional survey was undertaken at King Abdulaziz University Hospital, Jeddah, between September 4 and September 27, 2015. The survey instrument was a pre-set questionnaire comprising 39 closed-ended format questions. Participants were asked questions to assess their knowledge and attitudes about cancer pain management and adherence to frequent misconceptions regarding opioid therapy. The chi-square test was used to compare differences between variables. Results: One hundred twenty-eight questionnaires were completed and analyzed. A mean sample score of 41.3% was achieved on pain-related knowledge questions. The average score on all 39 questions was 16.1 ± 4.6 (range, 0 - 24). Nurses on the male medical ward were most knowledgeable compared with those on other wards ($p < 0.001$). They were also most likely to score highest on questions that assessed knowledge of pain management ($p < 0.001$). Conversely, nurses on the female surgical ward were most likely to score highest on issues related to pain assessment ($p < 0.001$) and experience in managing breakthrough cancer pain ($p < 0.001$). Likewise, nurses on the male surgical and female medical wards appeared to be more knowledgeable on issues related to patient compliance ($p = 0.002$). Conclusion: Optimization of inpatient supportive procedures should be a specific task at King Abdulaziz University Hospital until an oncology unit with nurses specialized in cancer care is established.

Keywords

Attitude, Breakthrough Cancer Pain, Cancer, Knowledge, Nurse, Pain Management

1. Introduction

Over the last decade, the number of cancer patients diagnosed and treated at King Abdulaziz University Hospital

How to cite this paper: Al-Wassia, R.K. (2016) Knowledge and Attitudes of Nurses Working at King Abdulaziz University Hospital toward Cancer Pain Management. *Open Journal of Nursing*, **6**, 274-281. http://dx.doi.org/10.4236/ojn.2016.64028

(KAUH) has increased steadily [1]-[6]. Cancer patients are frequently admitted to our hospital due to acute conditions, including pain, shortness of breath, bleeding, and headache or other refractory symptoms related to the tumor location. The emergency department admits these patients to the related medical, surgical, and gynecological wards since the hospital lacks a dedicated oncology unit with specialized oncology nurses to manage cancer cases.

Cancer patients develop many health and psychological issues that have to be addressed by a specialized team. Unfortunately, cancer pain is still considered one of the most feared consequences in cancer patients. It has a profound impact on every aspect of quality of life and, therefore, is considered the leading cause of suffering in cancer patients [7] [8].

Persistent pain is also a cause of distress for the patient's relatives, who usually feel that the medical staff should be able to control the pain even if the cancer itself cannot be controlled. When the pain is not controlled, relatives are frustrated, and their resentment is usually a source of job dissatisfaction for the medical staff [9].

In a meta-analysis conducted in 2007 by the European Society of Medical Oncology [10], it was shown that the pooled prevalence of cancer pain was >50% in all cancer types, with the highest prevalence in head/neck cancer patients (70%). In a recent systematic study that reviewed the barriers hindering adequate cancer pain management, Oldenmenger [11] showed that the most frequently mentioned barriers for both patients and professionals were knowledge deficits, inadequate pain assessment, and misconceptions regarding pain.

In spite of the fact that pain relief is achievable in more than 90% of cancer cases according to the World Health Organization's Cancer Pain Management guidelines [12] [13], inadequate pain relief in practice is well documented worldwide [14] [15]. The lack of knowledge regarding pain management by healthcare professionals—both practicing physicians and nurses—has emerged as one of the most significant problems related to effective pain management worldwide. This lack of knowledge can hinder the trust of cancer patients expecting a high level of communication and pain symptom control from their healthcare providers [16].

The purpose of this groundbreaking survey at KAUH was to identify the level of knowledge and attitudes among nurses regarding the management of cancer pain.

2. Materials and Methods

2.1. Design and Participants

This cross-sectional survey was undertaken at KAUH, Jeddah, Saudi Arabia, between September 4 and September 27, 2015 (A total of 207 nurses working at the emergency, male medical, female medical, male surgical, female surgical, or gynecology wards of KAUH were invited to participate in this survey). Of these, 128 filled in and returned the questionnaires, representing an overall response rate of 61%. With regard to sample size the subjects included in the study are all the nurses working in the male surgical, female surgical, male medical, female medical, Gynecology wards and emergency department. All nurses at the pediatric and obstetric wards were excluded from this study, because nurses working in these wards do not care of cancer patients. Informed consent was sought from all participants prior to recruitment. The Research Ethics Committee at King Abdulaziz University approved this study.

2.2. Survey Instrument

The "Knowledge and Attitudes Survey Regarding Pain" tool developed by Ferrell and Bennet (B. & M., 2014) was administered in this study. The instrument was developed in 1978 and has been developed over the course of time. The content of the tool was derived from current standards of pain management as defined by the World Health Organization, the American Pain Society, and the National Comprehensive Cancer Network Pain Guidelines. Construct validity was established by comparing nurses' scores at different levels of expertise, including students, fresh and former graduates, oncology nurses and senior pain experts. For the English version of the instrument, test-retest reliability was >0.80 and the alpha was >0.7.

The survey instrument was a pre-set questionnaire comprising 39 closed-ended format questions. The wording of survey questions was refined through a pilot study. Participants were asked questions to assess their knowledge and attitudes about cancer pain management and adherence to frequent misconceptions regarding opioid therapy reported in previous studies [10] [16] [17]. The items were selected to indicate misconceptions that may preclude optimal pain management in our setting. Topics for these items were divided into four main categories: pain management (questions 5 - 12,15, 17, 19 - 22, 24 - 26, 29, 36, and 37); pain assessment (ques-

tions 1 - 4, 13, 16, 18, 30 - 32, 36, and 37); and nurses' experience in characterizing and treating breakthrough cancer pain (questions 23, 28, 33, 34, 36, and 37); and patient compliance (questions 14, 27, and 35). Each correct answer was given a score of 1 and each wrong one a score of 0. Mean scores were compared between nurses working at all the surveyed wards. Items that had desired responses of ≥80% were regarded satisfactory and interpreted to indicate small to no substantial knowledge gaps, whereas those that achieved desired response rates <50% were considered unsatisfactory.

2.3. Data Analysis

This study was analyzed using the Statistical Package for the Social Sciences (IBM, New York, US), version 22. Descriptive statistics were used to define the characteristics of the study variables through counts and percentages for categorical and nominal variables while continuous variables are presented as means and standard deviations. The chi-square test was used to compare differences between variables. Differences were considered statistically significant at a p-value of <0.05.

3. Results

A total of 128 questionnaires were completed and analyzed: 38 from nurses on the emergency ward, 30 from the male medical ward, 29 from the female medical ward, 24 from the male surgical ward, 5 from the female surgical ward, and 7 from the gynecology ward. The respective response rates were as follows: emergency ward, 44.0%; male medical ward, 61.2%; female medical ward, 59.2%; male surgical ward, 60.0%; female surgical ward, 18.5%, and gynecology ward, 58.3%.

In general, performance on the pain-related knowledge questions was slightly below average, with a mean sample score of 41.3%. The average score on all 39 questions was 16.1 ± 4.6 (range, 0 - 24). A comparison of mean scores revealed that highest scores were achieved on issues related to nursing management of pain in cancer patients (mean, 9.8 ± 2.6). Conversely, patient compliance issues attained the lowest scores (mean, 0.9 ± 0.6; **Table 1**). Furthermore, nurses had insufficient experience in characterizing and treating breakthrough cancer pain.

A breakdown of correct responses to all 39 questions is shown on **Table 2**. Nurses performed best on questions 7, 15, 21, 23, 26 and 30, with 91.1% (n = 112) responding correctly to question 21 (**Figure 1**). They performed poorly in 23 of the questions, with the poorest responses (n = 1; 0.9%) documented for question 36B (**Figure 2**).

Further analysis revealed that nurses on the male medical ward were most knowledgeable compared with those on all other surveyed wards ($p < 0.001$; **Table 3**). They were also most likely to score highest on questions that assessed pain management ($p < 0.001$). Nurses on the female surgical ward were most likely to score highest on questions that concerned pain assessment and experience in characterizing and treating breakthrough cancer pain ($p < 0.001$). Nurses on the male surgical and female medical wards appeared to be more knowledgeable on issues related to patient compliance ($p = 0.002$).

4. Discussion

The way nurses perceive pain in cancer patients is important for the optimal management of pain; therefore, knowledge deficits and improper attitudes may hinder their appropriate responses to patients' pain relief needs.

Table 1. Comparison of mean scores of different knowledge questions by category.

Variables	Range	Mean (SD)
Pain management	0 - 15	9.8 (2.6)
Pain assessment	0 - 10	4.6 (2.1)
Nurses experience in characterizing and treating BTCP	0 - 6	3.6 (1.5)
Patient compliance	0 - 2	0.9 (0.6)

Abbreviations: BTCP, breakthrough cancer pain; SD, standard deviation.

Table 2. Proportion of correct responses by the nurses.

Questions	Frequency (percent)
1. Vital signs are always reliable indicators of the intensity of a patient's pain.	19 (15.2%)
2. Because their nervous system is underdeveloped, children under two years of age have decreased pain sensitivity and limited memory of painful experiences.	44 (36.7%)
3. Patients who can be distracted from pain usually do not have severe pain.	41 (33.3%)
4. Patients may sleep in spite of severe pain.	18 (14.4%)
5. Aspirin and other nonsteroidal anti-inflammatory agents are NOT effective analgesics for painful bone metastases.	30 (24.6%)
6. Respiratory depression rarely occurs in patients who have been receiving stable doses of opioids over a period of months.	73 (59.3%)
7. Combining analgesics that work by different mechanisms (e.g., combining an NSAID with an opioid) may result in better pain control with fewer side effects than using a single analgesic agent.	103 (82.4%)
8. The usual duration of analgesia of 1-2 mg morphine IV is 4 - 5 hours.	31 (25.0%)
9. Research shows that promethazine (Phenergan) and hydroxyzine (Vistaril) are reliable potentiators of opioid analgesics.	48 (40.3%)
10. Opioids should not be used in patients with a history of substance abuse.	19 (15.7%)
11. Elderly patients cannot tolerate opioids for pain relief.	50 (41.3%)
12. Patients should be encouraged to endure as much pain as possible before using an opioid.	40 (32.8%)
13. Children less than 11 years old cannot reliably report pain so clinicians should rely solely on the parent's assessment of the child's pain intensity.	42 (34.7%)
14. Patients' spiritual beliefs may lead them to think pain and suffering are necessary.	76 (61.8%)
15. After an initial dose of opioid analgesic is given, subsequent doses should be adjusted in accordance with the individual patient's response.	104 (85.2%)
16. Giving patients sterile water by injection (placebo) is a useful test to determine if the pain is real.	79 (64.8%)
17. Vicodin (hydrocodone 5 mg + acetaminophen 500 mg) PO is approximately equal to 5 - 10 mg of morphine PO.	56 (47.5%)
18. If the source of the patient's pain is unknown, opioids should not be used during the pain evaluation period, as this could mask the ability to correctly diagnose the cause of pain.	12 (9.8%)
19. Anticonvulsant drugs such as gabapentin (Neurontin) produce optimal pain relief after a single dose.	57 (47.5%)
20. Benzodiazepines are not effective pain relievers unless the pain is due to muscle spasm.	90 (75.0%)
21. Narcotic/opioid addiction is defined as a chronic neurobiologic disease, characterized by behaviors that include one or more of the following: impaired control over drug use, compulsive use, continued use despite harm, and craving.	112 (91.1%)
22. The recommended route of administration of opioid analgesics for patients with persistent cancer-related pain is:	21 (17.5%)
23. The recommended route administration of opioid analgesics for patients with brief, severe pain of sudden onset such as trauma or postoperative pain is:	97 (80.8%)
24. Which of the following analgesic medications is considered the drug of choice for the treatment of prolonged moderate to severe pain for cancer patients?	85 (70.8%)
25. Which of the following intravenous doses of morphine administered over a 4 hour period would be equivalent to 30 mg of oral morphine given 4 hours?	13 (10.9%)
26. Analgesics for post-operative pain should initially be given	98 (83.1%)
27. A patient with persistent cancer pain has been receiving daily opioid analgesics for 2 months. Yesterday the patient was receiving morphine 200 mg/hour intravenously. Today he has been receiving 250 mg/hour intravenously. The likelihood of the patient developing clinically significant respiratory depression in the absence of new comorbidity is	10 (8.4%)

Continued

28. The most likely reason a patient with pain would request increased doses of pain medication is:	86 (72.3%)
29. Which of the following is useful for treatment of cancer pain?	60 (50.0%)
30. The most accurate judge of the intensity of the patient's pain is	96 (81.4%)
31. Which of the following describes the best approach for cultural considerations in caring for patients in pain?	54 (46.2%)
32. How likely is it that patients who develop pain already have an alcohol and/or drug abuse problem?	25 (25.0%)
33. The time to peak effect for morphine given IV is	63 (53.8%)
34. The time to peak effect for morphine given orally is	29 (24.8%)
35. Following abrupt discontinuation of an opioid, physical dependence is manifested by the following:	23 (20.2%)
36A. On the patient's record you must mark his pain on the scale below. Circle the number that represents your assessment of Andrew's pain.	63 (55.8%)
36B. Your assessment, above, is made two hours after he received morphine 2 mg IV. Half hourly pain ratings following the injection ranged from 6 to 8 and he had no clinically significant respiratory depression, sedation, or other untoward side effects.	1 (0.9%)
37A. On the patient's record you must mark his pain on the scale below. Circle the number that represents your assessment of Robert's pain:	78 (70.3%)
37B. Your assessment, above, is made two hours after he received morphine 2 mg IV. Half hourly pain ratings following the injection ranged from 6 to 8 and he had no clinically significant respiratory depression, sedation, or other untoward side effects	16 (13.8%)

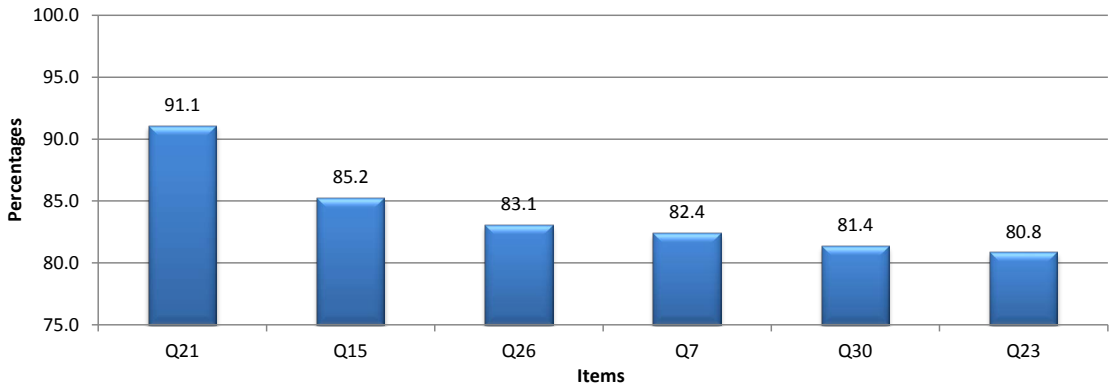


Figure 1. Knowledge and attitude items that had desired responses of 80% or more of the respondents.

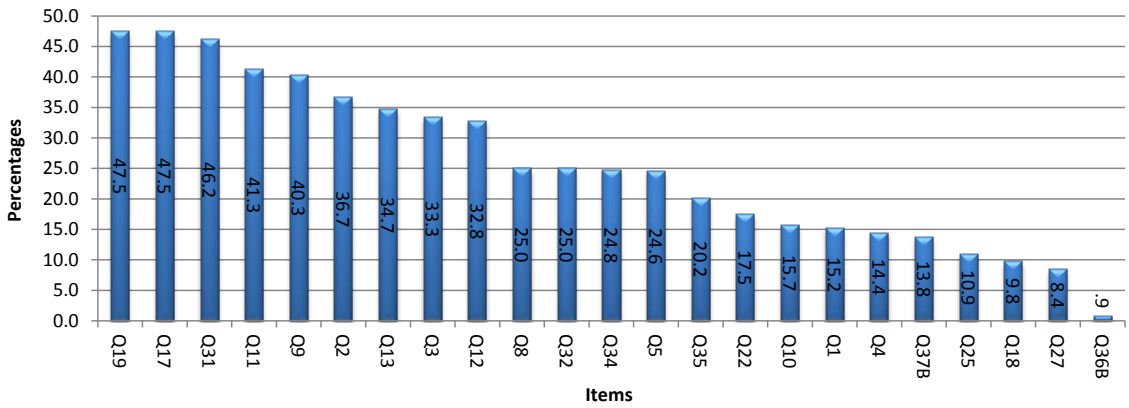


Figure 2. Knowledge and attitude items that had responses of 50% or less of the respondents.

Table 3. Comparison of nurses mean scores on knowledge and attitude questions[a].

Variables	Male surgical ward	Female surgical ward	Female medical ward	Gynecology ward	Male medical ward	ER	*p*-value
Pain knowledge	14.7 ± 5.6	19.4 ± 2.6	15.5 ± 3.7	10.0 ± 0.6	19.8 ± 2.2	15.2 ± 4.5	<0.001[b]
Pain management	9.2 ± 3.2	11.0 ± 1.6	9.0 ± 2.4	7.9 ± 0.7	11.5 ± 1.6	9.7 ± 2.9	<0.001[b]
Pain assessment	3.5 ± 1.7	7.0 ± 1.9	3.9 ± 1.5	0.9 ± 0.7	6.5 ± 1.4	4.7 ± 1.8	<0.001[b]
Nurses experience in characterizing and treating BTCP	2.4 ± 1.6	4.4 ± 0.9	3.8 ± 1.4	0.4 ± 0.5	4.3 ± 0.6	4.2 ± 0.8	<0.001[b]
Patient compliance	1.1 ± 0.3	1.0 ± 1.0	1.1 ± 0.6	0.9 ± 0.4	0.8 ± 0.6	0.6 ± 0.5	0.002[b]

Abbreviations: BTCP, breakthrough cancer pain; ER, emergency room; SD, standard deviation. [a]The data are presented as mean ± SD unless otherwise specified. [b]Significant using one-way ANOVA at $p < 0.05$.

Overall, this sample of nurses appeared to have insufficient knowledge and inappropriate attitudes about cancer pain management, as determined by their overall scores. Furthermore, when individual items were analyzed, we identified specific knowledge gaps in pain assessment and management, which are similar to those reported about nurses in other countries [18]-[20].

It is important that nurses are unequivocal about their beliefs and attitudes regarding cancer pain management before attempting to address the concerns of their patients. Unfortunately, gaps in cancer pain management and inadequate attitudes are not uncommon among nurses. Similar to our report, other authors [18]-[20] found that nurses had knowledge deficits and inappropriate attitudes about cancer pain management. In one survey that sought to examine nurses' knowledge and attitudes related to pain management among a sample of Australian acute care nurses [21], it was found that performance on the formal measure of pain-related knowledge was of moderate standard. However, contrary to our report, where we found a mean sample score of 41.3% on the pain-related knowledge questions, those authors found a correct rate of about 61.0%. Further, they found that pharmacological management was the domain that attained the least scores, with a correct rate of 51.0%. While we did not categorize our survey questions into pharmacological management or treatment domains, an analysis of individual items showed that nurses performed poorly on issues related to pain management and pharmacological treatment of pain in cancer patients.

In this study, nurses had poor experience in managing cancer pain. Several factors may explain this observation: (a) fear of patient addiction to opioid medications, (b) concern about the adverse effects of the medications, and (c) fear of tolerance to the drug. This finding has also been reported by other authors who, in addition, found that nurses faced difficulties in differentiating breakthrough cancer pain from insufficiently controlled background pain [22]. It is plausible that the difficulties encountered by our nurses may be due to their inability to identify breakthrough cancer pain as a subtype that occurs in spite of relatively optimally controlled background pain. However, a number of factors are reportedly involved in the undertreatment and management of breakthrough cancer pain, which may explain the differences observed between nurses in different regions. These include cultural, educational, logistic, health resource utilization, political, and religious factors [23] as well as those related to patients and to the healthcare staff [15]. A point of concern is the fact that only 55.8% of our nurses could correctly assess the severity of a patient's pain and only 0.9% could correctly determine the right action to take after assessing a patient two hours following intravenous morphine (2 mg).

Most studies pertaining to nurses' knowledge and attitudes toward cancer pain management focused on specific nurse populations and practice settings [18] [19] [21] [22] [24]. In this study, however, we included nurses working on different wards at an academic teaching center. While there is no clear explanation why nurses on specific wards appeared to be more knowledgeable than those on other wards, the differences observed between the nurses may be due to differences in routines. In addition, it is plausible that nurses on particular wards have little or no access to Continuing Medical Education activities specific to the management of cancer pain. In a previous study that assessed knowledge and attitudes toward pain management between oncology and nononcology nurses [25]-[27], the authors found that oncology nurses understood pain management principles than their nononcology counterparts. It was suggested that knowledge differences between the two groups were probably related to the educational preparation of oncology nurses to pain management courses, which were additional educational programs or post registration training courses [28] [29]. As a result, most oncology nurses

were better prepared to management pain and recognize the importance of individual pain management tasks, whether these were pharmacological or nonpharmacological. While some researchers [30] reported that nurses working on oncology wards were concerned about taking more courses on analgesia, other investigators [28] [29] [31] found that nurses were not confident about their knowledge of pain management since their basic training did adequately prepare them to care for cancer patients in pain.

Although this study is the first attempt to assess nurses' knowledge and attitudes regarding cancer pain management at our institution, it should be interpreted in light of its limitations. The cross-sectional design of this survey and the lack of information about the influence of demographic variables preclude any inferences being drawn about the correlation between demographic characteristics and cancer pain knowledge. In addition, our study was based on a small, single-center sample of nurses at five wards of our institution. Thus, our findings cannot be extrapolated to other groups, such as nurses on the pediatric wards. Further research will be needed to investigate the influence of demographic variables on cancer pain management concept.

However, this survey is a preliminary step to help decision makers design workshops that address important areas in cancer pain management. A follow-up and second assessment will be necessary to evaluate the benefits gained from organizing such workshops and subsequently help the administration to create long-term programs that will help improve the care of cancer patients at our institution.

5. Conclusion

In conclusion, inpatient care is probably an unavoidable step in the cancer trajectory. Until the establishment of an oncology unit with nurses specialized in cancer care, optimization of inpatient supportive procedures should be a specific task at King Abdulaziz University Hospital. Alternatively, consideration should be given to develop training programs aimed at educating nurses on issues related to pain management, pain assessment, breakthrough cancer pain, and patient compliance.

References

[1] Al-Ahwal, M.S. (2006) HER-2 Positivity and Correlations with Other Histopathologic Features in Breast Cancer Patients—Hospital Based Study. *Journal of Pakistan Medical Association*, **56**, 65-68.

[2] Sait, K.H. (2011) Early Experience with the da Vinci Surgical System Robot in Gynecological Surgery at King Abdulaziz University Hospital. *International Journal of Women's Health*, **3**, 219-226. http://dx.doi.org/10.2147/IJWH.S23046

[3] Alabbas, F.F., Al-Otaibi, S.M., Pasha, M.H., Alghamdi, A.M., Al-Hindi, H.M., Al-Ahwal, M.S., *et al*. (2015) Impact of Physiological Symptoms and Complications of Colorectal Cancer on the Quality of Life of Patients at King Abdulaziz University Hospital. *Journal of Cancer Education*, 1-7. http://dx.doi.org/10.1007/s13187-015-0839-7

[4] Mosli, H.A. (1997) Prostate Cancer: Experience at King Abdulaziz University Hospital, Jeddah. *Annals of Saudi Medicine*, **17**, 590-594.

[5] Rouzi, A.A., Sahly, N.N., Sahly, N.F. and Alahwal, M.S. (2009) Cisplatinum and Docetaxel for Ovarian Cancer in Pregnancy. *Archives of Gynecology and Obstetrics*, **280**, 823-825. http://dx.doi.org/10.1007/s00404-009-0992-5

[6] Alamoudi, O.S. (2010) Lung Cancer at a University Hospital in Saudi Arabia: A Four-Year Prospective Study of Clinical, Pathological, Radiological, Bronchoscopic, and Biochemical Parameters. *Annals of Thoracic Medicine*, **5**, 30-36. http://dx.doi.org/10.4103/1817-1737.58957

[7] Grond, S., Zech, D., Diefenbach, C. and Bischoff, A. (1994) Prevalence and Pattern of Symptoms in Patients with Cancer Pain: A Prospective Evaluation of 1635 Cancer Patients Referred to a Pain Clinic. *Journal of Pain and Symptom Management*, **9**, 372-382. http://dx.doi.org/10.1016/0885-3924(94)90174-0

[8] Chapman, C.R. and Gavrin, J. (1999) Suffering: The Contributions of Persistent Pain. *The Lancet*, **353**, 2233-2237. http://dx.doi.org/10.1016/S0140-6736(99)01308-2

[9] LeBaron, V., Beck, S.L., Black, F. and Palat, G. (2014) Nurse Moral Distress and Cancer Pain Management: An Ethnography of Oncology Nurses in India. *Cancer Nursing*, **37**, 331-344. http://dx.doi.org/10.1097/ncc.0000000000000136

[10] van den Beuken-van Everdingen, M.H, de Rijke, J.M., Kessels, A.G., Schouten, H.C., van Kleef, M. and Patijn, J. (2007) Prevalence of Pain in Patients with Cancer: A Systematic Review of the Past 40 Years. *Annals of Oncology*, **18**, 1437-1449. http://dx.doi.org/10.1093/annonc/mdm056

[11] Oldenmenger, W.H., Sillevis Smitt, P.A., van Dooren, S., Stoter, G. and van der Rijt, C.C. (2009) A Systematic Review on Barriers Hindering Adequate Cancer Pain Management and Interventions to Reduce Them: A Critical Ap-

praisal. *European Journal of Cancer*, **45**, 1370-1380. http://dx.doi.org/10.1016/j.ejca.2009.01.007

[12] Schug, S.A., Zech, D. and Dorr, U, (1990) Cancer Pain Management According to WHO Analgesic Guidelines. *Journal of Pain and Symptom Management*, **5**, 27-32. http://dx.doi.org/10.1016/S0885-3924(05)80006-5

[13] McGrath, P.A. (1996) Development of the World Health Organization Guidelines on Cancer Pain Relief and Palliative Care in Children. *Journal of Pain and Symptom Management*, **12**, 87-92. http://dx.doi.org/10.1016/0885-3924(96)00099-1

[14] Cherny, N.I. (2000) The Management of Cancer Pain. *CA*: *A Cancer Journal for Clinicians*, **50**, 70-116; Quiz 117-120. http://dx.doi.org/10.3322/canjclin.50.2.70

[15] Gordon, D.B., Dahl, J.L., Miaskowski, C., McCarberg, B., Todd, K.H., Paice, J.A., *et al.* (2005) American Pain Society Recommendations for Improving the Quality of Acute and Cancer Pain Management: American Pain Society Quality of Care Task Force. *Archives of Internal Medicine*, **165**, 1574-1580. http://dx.doi.org/10.1001/archinte.165.14.1574

[16] Sapir, R., Catane, R., Kaufman, B., Isacson, R., Segal, A., Wein, S., Cherny, N.I., *et al.* (2000) Cancer Patient Expectations of and Communication with Oncologists and Oncology Nurses: The Experience of an Integrated Oncology and Palliative Care Service. *Support Care Cancer*, **8**, 458-463. http://dx.doi.org/10.1007/s005200000163

[17] Induru, R.R. and Lagman, R.L. (2011) Managing Cancer Pain: Frequently Asked Questions. *Cleveland Clinic Journal of Medicine*, **78**, 449-464. http://dx.doi.org/10.3949/ccjm.78a.10054

[18] Bernardi, M., Catania, G., Lambert, A., Tridello, G. and Luzzani, M. (2007) Knowledge and Attitudes about Cancer Pain Management: A National Survey of Italian Oncology Nurses. European Journal of Oncology Nursing, **11**, 272-279. http://dx.doi.org/10.1016/j.ejon.2006.09.003

[19] Yildirim, Y.K., Cicek, F. and Uyar, M. (2008) Knowledge and Attitudes of Turkish Oncology Nurses about Cancer Pain Management. *Pain Management Nursing*, **9**, 17-25. http://dx.doi.org/10.1016/j.pmn.2007.09.002

[20] Shahnazi, H., Saryazdi, H., Sharifirad, G., Hasanzadeh, A., Charkazi, A., Moodi, M., *et al.* (2012) The Survey of Nurse's Knowledge and Attitude toward Cancer Pain Management: Application of Health Belief Model. *Journal of Education and Health Promotion*, **1**, 15. http://dx.doi.org/10.4103/2277-9531.98573

[21] Fairbrother, G., Jastrzab, G., Kerr, S. and McInerney, M. (2003) Profiling the "Pain Aware" Nurse: Acute Care Nurses' Attitudes and Knowledge Concerning Adult Pain Management. *Australian Journal of Advanced Nursing*, **21**, 27-32.

[22] Soden, K., Ali, S., Alloway, L., Barclay, D., Perkins, P. and Barker, S. (2010) How Do Nurses Assess and Manage Breakthrough Pain in Specialist Palliative Care Inpatient Units? A Multicentre Study. *Palliative Medicine*, **24**, 294-298.

[23] Rustøen, T., Geerling, J.I., Pappa, T., Rundström, C., Weisse, I., Williams, S.C., Zavratnik, B., Kongsgaard, U.E. and Wengström, Y. (2013) A European Survey of Oncology Nurse Breakthrough Cancer Pain Practices. *European Journal of Oncology Nursing*, **17**, 95-100. http://dx.doi.org/10.1016/j.ejon.2012.05.005

[24] González-Escalada, J.R., Camba, A., Casas, A., Gascón, P., Herruzo, I., Núñez-Olarte, J.M., *et al.* (2011) Código de buena práctica para el control del dolor oncológico [Good Practice Code for the Management of cancer Pain]. *Revista de la Sociedad Española del Dolor*, **18**, 98-117. http://dx.doi.org/10.1016/s1134-248x(11)70011-8

[25] Owens, K. (2000) Effects of Nursing Education on Students' Pain Management Knowledge. *Nurse Educator*, **25**, 33-37. http://dx.doi.org/10.1097/00006223-200001000-00008

[26] Rushton, P., Eggett, D., Carolyn, W. and Sutherland, S. (2003) Knowledge and Attitudes about Cancer Pain Management: A Comparison of Oncology and Nononcology Nurses. *Oncology Nursing Forum*, **30**, 849-855. http://dx.doi.org/10.1188/03.ONF.849-855

[27] McMillan, S.C., Arn, P., Faan, M., Hagan, S.J. and Small, B.J. (2005) Training Pain Resource Nurses: Changes in Their Knowledge and Attitudes. *Oncology Nursing Forum*, **32**, 890-902. http://dx.doi.org/10.1188/05.ONF.835-842

[28] King, R. (2004) Nurses' Perceptions of Their Pharmacology Educational Needs. *Journal of Advanced Nursing*, **45**, 392-398. http://dx.doi.org/10.1046/j.1365-2648.2003.02922.x

[29] Plaisance, L. and Logan, C. (2006) Nursing Students' Knowledge and Attitudes Regarding Pain. *Pain Management Nursing*, **7**, 167-175. http://dx.doi.org/10.1016/j.pmn.2006.09.003

[30] El-Rahman, M.A., Al Kalaldeh, M.T. and Muhbes, F.J. (2013) Knowledge and Attitude towards Pain Management. A Comparison between Oncology and Non-Oncology Nurses in Jordan. *International Journal of Advanced Nursing Studies*, **2**, 95-100.

[31] Fothergill-Bourbonnais, F. and Wilson-Barnett, B. (1992) A Comparative Study of Intensive Therapy Unit and Hospice Nurses' Knowledge on Pain Management. *Journal of Advanced Nursing*, **17**, 362-372. http://dx.doi.org/10.1111/j.1365-2648.1992.tb01915.x

Open Journal of Nursing, 2016, 6, 282-293
Published Online April 2016 in SciRes. http://www.scirp.org/journal/ojn
http://dx.doi.org/10.4236/ojn.2016.64029

Effectiveness of Oral Health Education Program on Prevention of Periodontal Disease in Japanese Pregnant Women

Mayumi Noguchi[1,2], Akira Tagaya[3], Ayako Sakoda[1], Hitoshi Komatsuzawa[4,5], Natsumi Fujiwara[4,6], Motoyuki Sugai[4]

[1]Japanese Red Cross Hiroshima College of Nursing, Hatsukaichi, Japan
[2]Japanese Red Cross Toyota College of Nursing, Toyota, Japan (Current)
[3]Nagano College of Nursing, Komagane, Japan
[4]Department of Bacteriology, Hiroshima University Graduate School of Biomedical & Health Sciences, Hiroshima, Japan
[5]Department of Oral Microbiology, Kagoshima University Graduate School of Medical and Dental Sciences, Kagoshima, Japan (Current)
[6]Department of Oral Health Care Promotion, Tokushima University Graduate School of Biomedical Sciences, Tokushima, Japan (Current)
Email: noguchi@rctoyota.ac.jp

Received 6 March 2016; accepted 16 April 2016; published 19 April 2016

Abstract

The prevalence of periodontal disease among pregnant women increases with gestational age. Therefore, oral health education in the early stage of pregnancy should prevent periodontal disease and decrease the risk of an adverse pregnancy outcome such as preterm delivery and low birth weight. However, there has been no study on oral health care intervention for prevention of periodontal disease during pregnancy. The purpose of this study was to examine the efficiency of an oral health education program on periodontal disease among Japanese low-risk pregnant women. A total of 207 pregnant women before 20 weeks of gestation were recruited. The first 131 of them were assigned to the control group and the remaining 76 to the experimental group. The experiment participants received an oral health education program including the toothpick brushing method in their early stage of pregnancy. Improvement of the self-assessment score of periodontal symptoms was used as a binary outcome variable. A logistic regression analysis indicated that the intervention (OR = 3.83) and proficiency of the toothpick brushing method (OR = 24.93) were statistically significant predictors of the outcome in the late stage of pregnancy. The positive outcome appeared after practice of the toothpick method brushing for 20 or more weeks, and was associated with the decrease in the log-transformed proportion of the count of *Candida* species in salivary microbiota (p = 0.026).

How to cite this paper: Noguchi, M., Tagaya, A., Sakoda, A., Komatsuzawa, H., Fujiwara, N. and Sugai, M. (2016) Effectiveness of Oral Health Education Program on Prevention of Periodontal Disease in Japanese Pregnant Women. *Open Journal of Nursing*, **6**, 282-293. http://dx.doi.org/10.4236/ojn.2016.64029

Keywords

Periodontal Disease, Pregnancy, Oral Health, Educational Intervention, Toothpick Brushing Method

1. Introduction

Prevalence of gingival inflammation increases in pregnancy and the increased plasma levels of estrogen and progesterone are believed to be responsible for this poorer oral health status although its mechanism is not fully revealed [1]. Vogt *et al.* reported that the prevalence of periodontal disease (PD) increased with gestation age [2].

An oral health education program in the early stage of pregnancy will help pregnant women keep their oral health throughout their pregnancy. American College of Obstetricians and Gynecologists, Committee on Health Care for Underserved Women recommends oral health care during pregnancy [3]. However, many people wrongly believe that decreased dental health is unavoidable during pregnancy [4] and only a few women receive dental health checkup during pregnancy. It is necessary to provide them with oral health education to prevent PD. However, there has been no study on such an intervention for prevention of PD during pregnancy.

Moreover, it is very likely that PD is a risk factor for preterm birth and low birth weight (LBW) according to the case-control study by Offenbacher *et al.* [5] and the prospective study by Jeffcoat *et al.* [6]. Although it is not clear whether the treatment of PD during pregnancy is effective in preventing preterm birth or LBW [7]-[9], it is very likely that the risk of preterm birth and LBW can be lowered by prevention of PD.

The purpose of this study was to examine the effectiveness of an oral health education program on the self-assessed status of oral health related to PD.

2. Methods

2.1. Research Design

Our study was based on the assumption that the status of oral health related to PD is affected by oral health and other lifestyle behaviors and psychological status. A quasi-experimental research design was adopted to avoid contact between the experiment and control participants because the research was carried out at one hospital. The period of data collection was from September of 2007 to March of 2010. In the beginning the participants were placed in the control group and then later others were assigned to the experimental group.

2.2. Inclusion Criteria

We recruited healthy pregnant women before 20 weeks of singleton pregnancy without medical history of diabetes or hypertension.

2.3. Data Collection and Intervention

The questionnaire responses and oral microbial materials were collected by an author (M. N. or A. S.) and a dental hygienist when they met the participants three times during pregnancy. The experimental group participants received an educational program at the time of the first survey, and received a plaque checks four or more weeks after the first and second surveys.

The gestational age of the subjects was 8 - 19 weeks (hereafter designated as T1) for the first survey, 20 - 29 weeks (T2) for the second survey, and 30 - 38 weeks (T3) for the third survey, with four or more weeks intervals. There were a few exceptions allowing up to three weeks of deviation for the convenience of participants (**Table 1**).

2.4. Questionnaire

The following scales were used to assess the factors that would affect the state of oral health related to PD.

Table 1. Schedule of data collection and intervention. The intervention included an oral health education, toothpick-method brushing training, and plaque checks with assessment of OHI-S.

Activity	Gestational age	Data collected	Intervention
Baseline survey	8 - 19 weeks (=T1)	QD at T0 QD at T1 OB at T1	Show an educational video for prevention of PD and teach toothpick brushing method using a dental model
Plaque check #1	4 or more weeks after T1	OHI-S #1	Show stained plaque and correct brushing
Intermediate survey	20 - 29 weeks (=T2)	QD at T2 OB at T2	Consultation if necessary
Plaque check #2	4 or more weeks after T2	OHI-S #2	Show stained plaque and correct brushing
Final survey	30 - 38 weeks (=T3)	QD at T3 OB at T3	Consultation if necessary

QD: questionnaire data; T0: before pregnancy; OB: oral bacteria; OHI-S: Simplified Oral Hygiene Index.

2.4.1. The Self-Assessment of Periodontal Disease (SAPD)

This scale developed by Nakamura *et al.* consists of six questions about subjective evaluation (each on a four-grade Likert scale) of symptoms of PD, such as gingival bleeding, subgingival abscess, and gingivalgia. Its discriminating validity was checked with diagnoses based on Community Periodontal Index (CPI) using multiple logistic regression analysis. The predictive accuracy depended on age: 71% for 20 s, 75% - 77% for 30 s, and 80% - 82% for 40 s, which reflects the fact that severe PD increases from 30 s [10].

We used SAPD to evaluate the effect of the intervention. As the outcome variable, we used a binary variable representing improvement of SAPD (whether the score decreased or not from the score before pregnancy) at T2 and T3 instead of SAPD itself to best avoid the effects of individual tendencies in rating and the difference at the baseline.

2.4.2. Oral Hygiene Behaviors

Oral hygiene behaviors were assessed by the frequency and duration of tooth brushing, the use of mouthrinse, and frequency of scaling. Subjective rating of sufficiency of oral health education they had received to date was also asked at T3.

2.4.3. Lifestyle Habits/Psychological State

The questionnaire included questions about lifestyle habits: eating (20 items), sleeping (4 items), physical exercise (1 item), drinking (1 item), and smoking (1 item). Also, the psychological state was measured using the Japanese version of General Health Questionnaire (GHQ 28) [11].

2.5. Microbial Counts

The status of the microbial environment in the mouth was assessed by culture methods followed by identification of microorganism by PCR. The total cultivable microbial count, prevalence of *Candida* species and *Staphylococcus aureus*, and the proportion of counts of *Candida* species and *S. aureus* to the total cultivable microbial count were used for analysis of association of microbiota with the outcome. The methods of culture and PCR are described in Fujiwara *et al.* [12]. For count n, $\log(n + 1)$ was used in data analyses.

2.6. Oral Health Education Program

Following the data collection at T1, experiment participants received an oral health education using a DVD displayer and training of the toothpick brushing method by a dental hygienist. They received plaque checks four or more weeks after T1 and T2. Consultation regarding tooth brushing was provided on request after data collection at T2 and T3. No restriction was made about additional oral health activities, and the frequencies of use of dental floss, mouthrinse, and professional plaque control during the intervention period were asked in the questionnaire.

2.6.1. Oral Health Education Using a DVD Player

A 15-minute program for prevention of PD provided the experiment participants with the knowledge for regular plaque control, smoking cessation, obesity prevention, relieving stress, and physical exercise.

2.6.2. Training of Tooth Brushing

For tooth brushing in intervention we employed the toothpick method, which was designed to remove dental plaque and relieve inflammation in interdental area, and has been proved to be effective with self-brushing by healthy dental students [13], professional brushing for malodor periodontal patients [14], and an educational intervention for patients with mental disorders [15].

The following directions were used in training experiment participants for toothpick method by a dental hygienist and illustrated by photographs using a plastic model in the leaflet given to the trainees.

1) Place the tips of the bristles on the gingival margin toward the crown at an angle of 30 degrees on the vestibular surface and vertically on the lingual surface.

2) Push the bristles into the interdental area and then pulled them out. Repeat this stroke seven or eight times in each interdental area.

The participants used a toothbrush with two rows of nylon bristles, five tufts per row, and 50 filaments per tuft specially designed for the toothpick method (PMJ V7).

2.6.3. Plaque Check

Simplified Oral Hygiene Index (OHI-S) [16] was employed to assess the status of oral hygiene.

2.7. Method of Analysis

The effects of intervention and other factors on the outcome variable were examined for statistical significance by cross tables and logistic regression analysis (LRA). The relation of the outcome with microbial data was examined by Mann-Whitney's U test and cross tables. The statistical software package SPSS (version 22) was used for these analyses.

2.8. Ethical Consideration

This research was approved by the IRB of Japanese Red Cross Hiroshima College of Nursing. The subjects were those who provided written consent to participate in the study after a process of informed consent using both oral and written explanation. The saliva collection, tooth-brushing education, and plaque check were carried out in a room for privacy.

3. Results

3.1. Participants

A total of 207 participants were recruited. The first 131 of them were assigned to the control group and the rest to the experimental group (n = 76). **Table 2** shows their obstetric history about parity and the outcome of the pregnancy. The proportion of multipara was higher in the control group although the difference was not statistically significant at 5% level. The age, stature, body weight, gestational age, and birth weight are shown in **Table 3**, where no statistical significant difference was detected between the two groups. There was no statistically significant group difference in lifestyle habits (sleeping, eating, drinking, and smoking), oral health behaviors (tooth brushing, rinsing, flossing, and dental health check), except that the control group enjoyed sports more frequently (chi2 = 4.544, d.f. = 1, $p = 0.048$) and had higher average of GHQ score ($p = 0.002$).

3.2. Measurements and Interventions

The data were collected from each participant at three scheduled times by questionnaires and salivary samplings. These times will be designated as T1, T2, and T3, and T0 designates the time period just before pregnancy. The questionnaire at T1 included the responses to questions about the statuses at T0 and T1. The results of dental plaque checks (OHI-S) four or more weeks after T1 and T2 will be designated as OHI-S #1 and OHI-S #2.

Table 4 shows rate of attendance of participants in each survey. The attendance rate did not differ between groups at T2 (exact test, $p = 0.443$). At T3, however, the attendance rate in the experimental group (61.8%) was

Table 2. Parity and outcome of the pregnancy of the participants.

Classification	Experimental group		Control group		Group difference
	n	(%)	n	(%)	(exact test)
(Parity)					
Primipara	37	(48.7)	47	(35.9)	
Multipara	37	(48.7)	79	(60.3)	$p = 0.102$
Unknown	2	(2.6)	5	(3.8)	
(Outcome of pregnancy)					
Normal delivery	60	(78.9)	99	(75.6)	
Abortion/Premature delivery	3	(3.9)	9	(6.9)	$p = 0.538$
Unknown (hospital transfer)	13	(17.1)	23	(17.6)	
Total	76	(100.0)	131	(100.0)	

Table 3. Physical attributes of participants, gestational age at delivery, and birthweight.

Attribute of participants	Experimental group				Control group				Group difference	
	n	Mean	SD	Range	n	Mean	SD	Range	t-value	*p*
Age	74	29.3	5.0	17 - 38	127	29.3	5.6	17 - 45	−0.082	0.935
Stature (cm)	74	157.2	5.0	148 - 170	127	157.7	5.4	145 - 173	0.549	0.584
Body weight* (kg)	72	51.7	9.1	37 - 96	124	51.9	9.0	37 - 98	0.197	0.844
Delivery weeks	62	40.9	1.3	38 - 43	101	41.1	1.3	37 - 43	0.752	0.453
Birth weight (kg)	62	3.01	0.34	2.37 - 3.89	102	3.00	0.36	2.04 - 4.02	−0.101	0.920

*body weight before pregnancy answered at baseline survey.

Table 4. Sample size and gestational age of subjects participated in the surveys. The percentage after sample size n indicates the rate of attendance of participants.

Data collection	Experimental group				Control group				Group difference		
	n (%)	Gestational week			n (%)	Gestational week			（Mann-Whitney）		
		Mean	SD	Range		Mean	SD	Range	U	z	*p*
Baseline survey	76 (100)	12.7	2.1	8 - 20	131 (100)	12.8	2.3	817	4858.0	−0.293	0.770
Plaque check #1	59 (77.6)	18.0	2.8	13 - 27							
Intermediate survey	56 (73.7)	23.1	2.9	19 - 32	99 (75.6)	23.0	2.1	20 - 29	2666.5	−0.399	0.690
Plaque check #2	49 (64.5)	26.9	2.8	23 - 36							
Final survey	47 (61.8)	33.1	2.8	27 - 40	98 (74.8)	34.2	1.7	29 - 40	1657.5	−2.779	0.005
Perfect attendance	46 (60.5)				87 (66.4)						

lower than in the control group (74.8%) with statistical significance (exact test, $p = 0.035$) due to the group difference in the rate of attendance at T3 among the participants who were absent at T2; they were 35.3% (12/34) in the control group and 4.8% (1/21) in the experimental group (exact test, $p = 0.017$). There was no statistically significant group difference in the final perfect attendant rate: 66.4% (87/131) in the control group and 60.5% (46/76) in the experimental group (exact test, $p = 0.452$).

The gestational age did not differ between groups for T1 and T2, but that of T3 was somewhat earlier in the

experimental group (33.1 ± 2.8 weeks) than in the control group (34.2 ± 1.7 weeks). This resulted from setting the date in accordance with the convenience of participants (**Table 4**).

Since the gestational age of T3 was not statistically associated with improvement of SAPD, the effect must be very limited. Theoretically, however, the effect is not negligible as the outcome could change between T2 and T3. Therefore, the gestational age at T3 was included among the possible predictors for stepwise selection in LRA.

3.3. Subjective Rating of Periodontal Symptoms

SAPD0, SAPD1, SAPD2, and SAPD3 shall denote the scores of SAPD at T0, T1, T2, and T3. *Imp*2 and *Imp*3 shall denote the improvement of periodontal symptoms at T2 and T3. Thus, if SAPD2 < SAPD0 then *Imp*2 = 1 (positive outcome) else *Imp*2 = 0 (non-positive outcome), and if SAPD3 < SAPD0 then *Imp*3 = 1 (positive outcome) else *Imp*3 = 0 (non-positive outcome).

The group difference on the rate of positive outcome was examined to evaluate the effect of intervention at T2 and T3 (**Table 5**). The rate of positive outcome was almost the same (22% and 23%) for the two groups at T2. At T3, however, it nearly doubled in the experimental group while it slightly decreased in the control group. The exact test of cross tables indicated that no substantial effect of intervention emerged at T2, and a positive effect emerged at T3. The OR of this positive outcome (at T3) for our educational intervention was compared between those who showed improvement of SAPD at T2 and the rest (**Table 6**). In both of them the intervention yielded similar ORs (3.11 vs 3.57) and the Breslow-Day's test indicated that the effect of intervention on the outcome at T3 did not depend on the status of periodontal symptoms at T2, which validated the Mantel-Haenszel's estimation of common OR (=3.44).

Table 5. The outcome of intervention at T2 and T3 expressed by existence of improvement of the status of periodontal symptoms compared to the status before pregnancy.

Time	Outcome		Experimental group		Control group		Total		Group difference (exact test)	OR
			n	(%)	n	(%)	n	(%)		
T2	Positive	(*Imp*2 = 1)	12	(22.2)	21	(23.3)	33	(22.9)	$p = 1.000$	0.94
	Non-positive	(*Imp*2 = 0)	42	(77.8)	69	(76.7)	111	(77.1)		
	Total		54	(100.0)	90	(100.0)	144	(100.0)		
T3	Positive	(*Imp*3 = 1)	19	(43.2)	20	(23.0)	39	(29.3)	$p = 0.025$	2.53
	Non-positive	(*Imp*3 = 0)	25	(56.8)	67	(77.0)	94	(70.7)		
	Total		44	(100.0)	87	(100.0)	133	(100.0)		

Table 6. The effect of intervention on the outcome at T3 (*Imp*3) assessed by OR and examination of its dependence on the status at T2 (*Imp*2).

Outcome at T2	Group	Outcome at T3				OR	Group difference (exact test)
		Positive (*Imp*3 = 1)	Non-positive (*Imp*3 = 0)	Subtotal	Positive %		
Positive (*Imp*2 = 1)	Experimental	8	2	10	80.0	3.11	$p = 0.399$
	Control	9	7	16	56.3		
	Subtotal	17	9	26	65.4		
Non-positive (*Imp*2 = 0)	Experimental	11	22	33	33.3	3.57	$p = 0.027$
	Control	7	50	57	12.3		
	Subtotal	18	72	90	20.0		
Total	Experimental	19	24	43	44.2	2.82	$p = 0.020$
	Control	16	57	73	21.9		
	Subtotal	35	81	116	30.2		

Dependence of OR on *Imp*2 (Breslow-Day's test)			Effect of intervention (Mantel-Haenszel's estimation)	
Chi-square	Probability		Common OR of positive outcome	95% CI of common OR
0.016	0.899	(n.s.)	3.44	1.36 - 8.70

3.4. LRA of Binary Outcome

The variables that exhibited statistically significant group difference and parity were included in the LRA to predict binary outcome *Imp*2 and *Imp*3. The parity was unconditionally included and others were subject to selection by the variable reduction method. First, the whole sample was analyzed where the group assignment was included as a predictor. Second, the data of the experimental group was analyzed.

3.4.1. LRA of Outcome at T2 (=*Imp*2)

Affirmative rating of sufficiency of oral health education and regular scaling before pregnancy contributed to positive outcome (*Imp*2 = 1, *i.e.*, SAPD2 < SAPD0) with statistical significance (**Table 7**). The omnibus test proved statistical significance of the model coefficients (chi2 = 10.203, d.f. = 3, $p = 0.017$). The Hosmer & Lemeshow's test indicated a good fit of the logistic regression model obtained (chi2 =0.381, d.f. = 5, $p = 0.996$).

The *exp*(B) in the table, which is interpreted as the odds ratio of positive outcome (*Imp*2 = 1) with other predictors unchanged, was 3.03 for sufficient oral health education and 2.68 for regular scaling before pregnancy. The odds ratio of positive outcome for multiparity was 1.76 although not statistically significant.

The univariate odds ratio of positive outcome (*Imp*2 = 1) was 2.89 for sufficient oral health education, 2.78 for regular scaling, and 1.60 for multiparity.

3.4.2. LRA of Outcome at T3 (=*Imp*3)

The statistically significant predictors were *Imp*2, mouthrinse at T1, being assigned to experimental group, and regular scaling before pregnancy (**Table 8**). The omnibus test of the coefficients indicated statistical significance (chi2 = 39.764, d.f. = 5, $p = 1.7E{-}7$), and the Hosmer & Lemeshow's test indicated a sufficient fit of the model obtained (chi2 = 7.306, d.f. = 6, $p = 0.293$). The odds ratio of positive outcome (*Imp*3 = 1, *i.e.*, SAPD3 < SAPD0) expressed by *exp*(B) in the table was 9.92 for *Imp*2, 6.08 for mouthrinse at T1, 3.83 for assignment to experimental group, and 3.35 for regular scaling before pregnancy. The odds ratio of multiparity was 1.59 although not statistically significant.

The univariate odds ratio was 7.56 for *Imp*2, 3.68 for mouthrinse at T1, 2.55 for assignment to experimental group, and 1.99 for regular scaling before pregnancy. The univariate odds ratio of parity was 1.68.

Table 7. Logistic regression analysis of *Imp*2 (outcome at T2).

Predictor variable	B	S.E.	Wald	*p*	*exp*(B)	95% CI of *exp*(B)	
						L. L.	U. L.
Sufficient oral health education	1.110	0.551	4.05	0.044	3.03	1.03	8.94
Regular scaling before pregnancy	0.987	0.502	3.86	0.049	2.68	1.00	7.18
Multipara	0.564	0.456	1.53	0.215	1.76	0.72	4.29
(Constant)	−2.494	0.584	18.22	<0.001	0.08		

L.L. & U.L. = Lower & Upper Limits.

Table 8. Logistic regression analysis of *Imp*3 (outcome at T3).

Predictor variable	B	S.E.	Wald	*p*	*exp*(B)	95% CI of *exp*(B)	
						L. L.	U. L.
*Imp*2 (positive outcome at T2)	2.294	0.572	16.09	6.0E−5	9.92	3.23	30.43
Mouthrinse at T1	1.805	0.590	9.35	0.002	6.08	1.91	19.32
Assigned to experimental group	1.344	0.522	6.64	0.010	3.83	1.38	10.66
Regular scaling before pregnancy	1.210	0.590	4.20	0.040	3.35	1.05	10.67
Multipara	0.465	0.512	0.83	0.363	1.59	0.58	4.35
(Constant)	−4.309	1.001	18.54	1.7E−5	0.01		

L.L. & U.L. = Lower & Upper Limits.

3.4.3. LRA of Outcome at T2 in Experimental Group

An LRA of *Imp*2 was carried out using the dataset including the variables related to the intervention. The sample size was 50. As shown in **Table 9**, only the regular scaling before pregnancy was statistically significant predictor. The omnibus test indicated the tendency toward statistical significance of the model (chi2 = 4.799, d.f. = 2, $p = 0.091$) and the Hosmer & Lemeshow's test indicated a good fitting of the model (chi2 = 0.467, d.f. = 2, $p = 0.792$).

The univariate odds ratio for regular scaling before pregnancy was 5.29, which is almost equal to *exp*(B) (= 5.28).

3.4.4. LRA of Outcome at T3 in Experimental Group

An LRA of *Imp*3 was carried out using the dataset including the variables related to the intervention. Although the sample size was small (n = 39), the omnibus test indicated statistical significance of the model (chi2 = 19.475, d.f. = 4, $p = 0.001$). The Hosmer & Lemeshow's test indicated a good fit of the model (chi2 = 1.368, d.f. = 5, $p = 0.928$). As shown in **Table 10**, proficiency of toothpick method brushing (OR = 24.93), mouthrinse at T1 (OR = 13.56), and *Imp*2 (OR = 13.08) were statistically significant predictors, and the contribution of multiparity (OR = 5.75) approached statistical significance ($p = 0.091$).

The univariate odds ratio was 5.45 for proficiency of toothpick method brushing, 3.38 for mouthrinse at T1, 8.00 for *Imp*2, and 1.75 for multiparity. The difference from the multivariate results can be explained by the negative correlations within these variables.

3.4.5. Brushing Proficiency and Dental Plaque

The score of OHI-S was compared between those who rated affirmatively and those who rated negatively about their proficiency of toothpick method brushing. Mann-Whitney's U indicated that those who highly rated their proficiency had lower plaque score in both the comparisons of OHI-S #1 (one sided $p = 0.037$) and OHI-S #2 (one sided $p = 0.024$).

3.4.6. Relation of Microbiota with the Outcome

The total cultivable microbial count exhibited no statistically significant association with *Imp*2 and *Imp*3 in both groups. The proportion of *Candida* count at T1 was positively associated with *Imp*2 ($p = 0.005$) and *Imp*3 ($p = 0.009$) only in the experimental group, while that of *Staphylococci* exhibited no such difference.

Table 9. Logistic regression analysis of *Imp*2 (outcome at T2) in experimental group.

Predictor variable	B	S.E.	Wald	*p*	*exp*(B)	95% CI of *exp*(B)	
						L. L.	U. L.
Regular scaling before pregnancy	1.664	0.755	4.86	0.028	5.28	1.20	23.19
Multipara	0.076	0.691	0.01	0.912	1.08	0.28	4.18
(Constant)	−1.702	0.533	10.18	0.001	0.18		

L.L. & U.L. = Lower & Upper Limits.

Table 10. Logistic regression analysis of *Imp*3 (outcome at T3) in experimental group.

Predictor variable	B	S.E.	Wald	*p*	*exp*(B)	95% CI of *exp*(B)	
						L. L.	U. L.
Brushing proficiency at T2	3.216	1.322	5.92	0.015	24.93	1.87	332.46
Mouthrinse used at T1	2.607	1.145	5.18	0.023	13.56	1.44	128.97
*Imp*2 (positive outcome at T2)	2.571	1.156	4.95	0.026	13.08	1.36	126.00
Multipara	1.750	1.034	2.86	0.091	5.75	0.76	43.68
(Constant)	−3.013	1.073	7.89	0.005	0.05		

L.L. & U.L. = Lower & Upper Limits.

The prevalence of *Candida* species was 38.2% (78/204) at T1, 41.1% (62/151) at T2, and 44.3% (62/140) at T3 without statistically significant group difference. Interestingly, the rate of positive outcome among *Candida*-positive subjects exhibited a significant group difference at both T2 and T3. Their rate of positive outcome at T2 was 38.9% (7/18) in the experimental group which was significantly greater than12.8%（5/39）in the control group (exact test, $p = 0.037$). Their rate of positive outcome at T3 was 50.0% (8/16) in experimental group which was significantly greater than 19.4% (7/36) in the control group (exact test, $p = 0.044$). The *Candida*-negative participants exhibited no such group difference at T2 and T3. In other words, the effect of "assignment to the experimental group" on the outcome at T2 and T3 was statistically significant only for the subjects who were *Candida*-positive at T1.

*Imp*3 was associated with neither the prevalence of *Candida* nor the proportion of *Candida* count at T3 in both groups, but positively associated with the decrease in the proportion of *Candida* count from T1 to T3 (Spearman's $\rho = 0.203$, $p = 0.025$).

The prevalence of *Staphylococcus aureus* was as high as 90.6% (186/203) at T1, 86.2% (131/152) at T2, and 93.5% (129/138) at T3 without statistically significant group difference. It was not possible to examine the association of its prevalence with the outcome because most of the subjects possessed *S. aureus*.

4. Discussion

4.1. Efficiency of Intervention

Improvement of SAPD score was used as the binary outcome variable, and its LRAs indicated that the intervention (OR = 3.83) and brushing proficiency (OR = 24.93) significantly contributed to predict the outcome at T3.

As Vogt *et al.* [2] demonstrated using a set of sound criteria for diagnosis, the prevalence of PD increases with gestation age even in low-risk pregnant women. The efficiency of the toothpick method had not been examined for pregnant women. Our results showed, however, that the educational intervention and resulting proficiency of toothpick method brushing could prevent exacerbation of PD or improve the status of periodontal symptoms even during pregnancy.

Since the outcome is based on self-assessment of participants, psychological effects must be taken into consideration in evaluating the outcome of the intervention. We conclude that the intervention has produced a substantial effect on the basis of the following facts.

1) The SAPD score should be objective to a considerable extent because it has been proved to be efficient for screening PD [10].

2) The positive outcome at T3 was associated with decrease of the (log-transformed) proportion of the count of *Candida* species. Vieira Colombo [17] reported an association of a most common *Candida* species, *C. albicans* with PD.

3) The effect of intervention did not emerge at T2 but at T3. It must have been detected already at T2 if statistically significant psychological effects existed.

4) The probability of positive outcome at T3 increased with not only brushing proficiency but also use of mouthrinse at T1 and the regular scaling before pregnancy, hence the outcome is likely to reflect substantial effects.

4.2. Oral Hygiene Education

Affirmative rating of sufficiency of oral health education was a statistically significant predictor in LRA of positive outcome at T2. It has been reported that higher oral health literacy, or better knowledge of oral hygiene and behavior, is associated with better oral health condition of PD patients [18] and college students [19].

There seems to be a problem with oral health literacy in Japanese pregnant women. Although they can receive dental checkup free of charge once during pregnancy, the rate of visits in 2012 was as low as 23.4% (253, 008/1080, 193) when calculated from the statistics in the annual report of the Ministry of Health, Labor and Welfare. Jiang *et al.* [20] reported that the frequency of dental visits in Minnesota was lower during pregnancy than before and after pregnancy with statistical significance. The reasons for decreased visits have been attributed to misunderstanding about its safety and appropriateness [21] as well as lower priority and financial concerns [21] [22].

It is necessary to promote the literacy of oral health of pregnant women and encourage them to receive dental checkup during pregnancy.

4.3. Use of Mouthrinse

Use of mouthrinse at T1 was a statistically significant predictor of outcome at T3. Mouthrinse has been known to reduce dental plaque and improve gingivitis regardless whether its agent is chlorhexidine [23] or essential oil [24]. An RCT with pregnant women with PD proved that the use of antibacterial rinse containing cetylpyridinium chloride improved PD in pregnancy [25].

As tooth brushing is usually uneasy around T1 because of morning sickness, use of mouthrinse then would have led to the positive outcome at T3 by reducing dental plaque and preventing exacerbation of gingivitis.

4.4. Regular Scaling

The regular scaling before pregnancy was a statistically significant predictor in the logistic regression of positive outcome at both T2 and T3. Scaling by dental professionals reduces dental plaque and improves gingival inflammation, and the effects are enhanced by combining it with an oral education [26] [27]. Participants who had received regular scaling might have had better knowledge and behaviors for own oral health. Sambunjak *et al.* [28] reported that flossing combined with tooth brushing was effective for improving gingivitis. The frequency of scaling before pregnancy in this study was correlated with the frequency of flossing at T0 ($r = 0.268$, $p < 0.001$), T1 ($r = 0.214$, $p < 0.002$), and T2 ($r = 0.251$, $p = 0.002$). This seems to indicate that participants who had regularly received scaling before pregnancy were more knowledgeable about oral health and tended to practice health behaviors such as flossing than others, which may have led to a positive outcome.

4.5. Association of Microbiota with the Outcome

The positive outcome at T3 was associated with decrease of the log-transformed proportion of *Candida* counts. This finding is in accordance with the report of Vieira Colombo *et al.* [17] which indicated the association of *Candida albicans* with periodontal inflammation and tissue destruction.

4.6. Scope and Limitation

The results of LRAs indicate that the brushing proficiency was more decisive (OR = 24.93) than assignment to the intervention group (OR = 3.83) for the outcome. Further study is needed to identify the factors affecting acquisition of brushing proficiency during pregnancy and improve the intervention program.

5. Conclusions

The effect of a health education program in early pregnancy including an oral health care education using a DVD displayer and training of the toothpick brushing method was evaluated by SAPD score and microbial data.

The LRA proved that the intervention (OR = 3.83) and brushing proficiency (OR = 24.93) were statistically significant predictors of the outcome at T3.

Thus an oral health education in early pregnancy followed by plaque checks in later pregnancy will improve pregnant women's oral health and the effect increases with their proficiency of toothpick method brushing.

The examination of microbial data suggests a significant association of existence or count of *Candida* species with the periodontal symptoms and the efficiency of toothpick method brushing to improve the status of periodontal symptoms.

Acknowledgements

This study was supported by JSPS Grant in Aid for Scientific Research (B) Number 18390596. We express our sincere gratitude to the participants and the people who enabled the research. We also thank Drs. Yuko Iwamoto and Fuminori Kato for their technical assistance and Dr. Anne J. Davis for correcting language use in the final version of the manuscript.

Conflict of Interest

The authors declare that no conflict of interest exists concerning this study.

References

[1] Wu, M., Chen, S. and Jiang, S. (2015) Relationship between Gingival Inflammation and Pregnancy. *Mediators of Inflammation*, **2015**, Article ID: 623472. http://dx.doi.org/10.1155/2015/623427

[2] Vogt, M., Sallum, A., Cecatti, J. and Morais, S. (2012) Factors Associated with the Prevalence of Periodontal Disease in Low-risk Pregnant Women. *Reproductive Health*, **9**, No. 3. http://dx.doi.org/10.1186/1742-4755-9-3

[3] American College of Obstetricians and Gynecologists, Committee on Health Care for Underserved Women (2013) Committee Opinion No. 569: Oral Health Care during Pregnancy and through the Lifespan. *American Journal of Obstetrics & Gynecology*, **122**, 417-422. http://www.acog.org/Resources-And-Publications/Committee-Opinions/Committee-on-Health-Care-for-Underserved-Women/Oral-Health-Care-During-Pregnancy-and-Through-the-Lifespan http://dx.doi.org/10.1097/01.AOG.0000433007.16843.10

[4] Hashim, R. (2012) Self-Reported Oral Health, Oral Hygiene Habits and Dental Service Utilization among Pregnant Women in United Arab Emirates. *International Journal of Dental Hygiene*, **10**, 142-146. http://dx.doi.org/10.1111/j.1601-5037.2011.00531.x

[5] Offenbacher, S., Katz, V., Fertik, G., Collins, J., Boyd, D., *et al.* (1996) Periodontal Infection as a Possible Risk Factor for Preterm Low Birth Weight. *Journal of Periodontology*, **67**, 1103-1113. http://dx.doi.org/10.1902/jop.1996.67.10s.1103

[6] Jeffcoat, M., Geurs, N., Reddy, M., Cliver, S., Goldenberg, R. and Hauth, J. (2001) Periodontal Infection and Preterm Birth: Results of a Prospective Study. *Journal of the American Dental Association*, **132**, 875-880. http://dx.doi.org/10.14219/jada.archive.2001.0299

[7] Chambrone, L., Guglielmetti, M., Pannuti, C. and Chambrone, L. (2011) Evidence Grade Associating Periodontitis to Preterm Birth and/or Low Birth Weight: I. A Systematic Review of Prospective Cohort Studies. *Journal of Clinical Periodontology*, **38**, 795-808. http://dx.doi.org/10.1111/j.1600-051X.2011.01755.x

[8] Polyzos, N., Polyzos, I., Zavos, A., Valachis, A., Mauri, D., *et al.* (2010) Obstetric Outcomes after Treatment of Periodontal Disease during Pregnancy: Systematic Review and Meta-Analysis. *BMJ*, **341**, Article ID: c7017. http://dx.doi.org/10.1136/bmj.c7017

[9] Uppal, A., Uppal, S., Pinto, A., Dutta, M., Shrivatsa, S., *et al.* (2010) The Effectiveness of Periodontal Disease Treatment during Pregnancy in Reducing the Risk of Experiencing Preterm Birth and Low Birth Weight: A Meta-analysis. *Journal of the American Dental Association*, **141**, 1423-1434. http://dx.doi.org/10.14219/jada.archive.2010.0104

[10] Nakamura, G., Tsutsui, A., Horiguchi, I. and Turumoto, A. (1999) The Evaluation of Reliability and Validity on a Questionnaire, FSPD-34 Type, for Periodontal Disease (1). *Journal of Dental Health*, **49**, 310-317. (In Japanese with English Abstract)

[11] Nakagawa, Y. and Daibo, I. (1985) Japanese Version of General Health Questionnaire-28. Nihon Bunka Kagakusha, Tokyo. (In Japanese)

[12] Fujiwara, N., Tsuruda, K., Iwamoto, Y., Kato, F., Odaki, T., *et al.* (2015) Significant Increase of Oral Bacteria in the Early Pregnancy Period in Japanese Women. *Journal of Investigative and Clinical Dentistry*. http://dx.doi.org/10.1111/jicd.12189

[13] Morita, M., Nishi, K. and Watanabe, T. (1998) Comparison of 2 Toothbrushing Methods for Efficacy in Supragingival Plaque Removal. The Toothpick Method and the Bass Method. *Journal of Clinical Periodontology*, **25**, 829-831. http://dx.doi.org/10.1111/j.1600-051X.1998.tb02377.x

[14] Tsuneishi, M., Yamamoto, T. and Hirata, Y. (2010) Effects of Professional Toothbrushing by the Toothpick Method on Oral Malodor. *Bulletin of Kanagawa Dental College*, **38**, 3-10.

[15] Mun, S., Chung, W., Min, S., Park, J., Kim, C., *et al.* (2014) Reduction in Dental Plaque in Patients with Mental Disorders through the Dental Hygiene Care Programme. *International Journal of Dental Hygiene*, **12**, 133-1140. http://dx.doi.org/10.1111/idh.12053

[16] Filogônio, C., Soares, R., Horta, M., Penido, C. and Cruz, R. (2011) Effect of Vegetable Oil (Brazil Nut Oil) and Mineral Oil (Liquid Petrolatum) on Dental Biofilm Control. *Brazilian Oral Research*, **25**, 556-561. http://dx.doi.org/10.1590/S1806-83242011000600014

[17] Vieira Colombo, A., Magalhães, C., Hartenbach, F., Martins do Souto, R. and Maciel da Silva-Boghossian, C. (2015) Periodontal-Disease-Associated Biofilm: A Reservoir for Pathogens of Medical Importance. *Microbial Pathogenesis*. http://dx.doi.org/10.1016/j.micpath.2015.09.009

[18] Wehmeyer, M., Corwin, C., Guthmiller, J. and Lee, J. (2014) The Impact of Oral Health Literacy on Periodontal Health Status. *Journal of Public Health Dentistry*, **74**, 80-87. http://dx.doi.org/10.1111/j.1752-7325.2012.00375.x

[19] Kanupuru, K., Fareed, N. and Sudhir, K. (2015) Relationship between Oral Health Literacy and Oral Health Status among College Students. *Oral Health & Preventive Dentistry*, **13**, 323-330.

[20] Jiang, P., Bargman, E., Garrett, N., Devries, A., Springman, S. and Riggs, S. (2008) A Comparison of Dental Service Use among Commercially Insured Women in Minnesota Before, during and after Pregnancy. *Journal of the American Dental Association*, **139**, 1173-1180. http://dx.doi.org/10.14219/jada.archive.2008.0332

[21] Detman, L., Cottrell, B. and Denis-Luque, M. (2010) Exploring Dental Care Misconceptions and Barriers in Pregnancy. *Birth*, **37**, 318-324. http://dx.doi.org/10.1111/j.1523-536X.2010.00427.x

[22] Le, M., Riedy, C., Weinstein, P. and Milgrom, P. (2009) Barriers to Utilization of Dental Services during Pregnancy: A Qualitative Analysis. *Journal of Dentistry for Children*, **76**, 46-52.

[23] Van Strydonck, D., Slot, D., Van der Velden, U. and Van der Weijden, F. (2012) Effect of a Chlorhexidine Mouthrinse on Plaque, Gingival Inflammation and Staining in Gingivitis Patients: A Systematic Review. *Journal of Clinical Periodontology*, **39**, 1042-1155. http://dx.doi.org/10.1111/j.1600-051X.2012.01883.x

[24] Stoeken, J., Paraskevas, S. and van der Weijden, G. (2007) The Long-Term Effect of a Mouthrinse Containing Essential Oils on Dental Plaque and Gingivitis: A Systematic Review. *Journal of Periodontology*, **78**, 1218-1228. http://dx.doi.org/10.1902/jop.2007.060269

[25] Jiang, H., Xiong, X., Buekens, P., Su, Y. and Qian, X. (2015) Use of Mouth Rinse during Pregnancy to Improve Birth and Neonatal Outcomes: A Randomized Controlled Trial. *BMC Pregnancy Childbirth*, **15**, 311. http://dx.doi.org/10.1186/s12884-015-0761-3

[26] Needleman, I., Nibali, L. and Di Iorio, A. (2015) Professional Mechanical Plaque Removal for Prevention of Periodontal Diseases in Adults—Systematic Review Update. *Journal of Clinical Periodontology*, **42**, S12-S35. http://dx.doi.org/10.1111/jcpe.12341

[27] Chapple, I. L., Van der Weijden, F., Doerfe, C., Herrera, D., Shapira, L., *et al.* (2015) Primary Prevention of Periodontitis: Managing Gingivitis. *Journal of Clinical Periodontology*, **42**, S71-S76. http://dx.doi.org/10.1111/jcpe.12366

[28] Sambunjak, D., Nickerson, J., Poklepovic, T., Johnson, T., Imai, P., *et al.* (2011) Flossing for the Management of Periodontal Diseases and Dental Caries in Adults. *The Cochrane Database of Systematic Reviews*, **12**.

Open Journal of Nursing, 2016, 6, 294-302
Published Online April 2016 in SciRes. http://www.scirp.org/journal/ojn
http://dx.doi.org/10.4236/ojn.2016.64030

Midwives and Nurses Compliance with Standard Precautions in Palestinian Hospitals

Imad Fashafsheh[1*], Ahmad Ayed[2], Mahdiah Koni[3], Safaa Hussein[1], Imad Thultheen[1]

[1]AL-Farabi Colleges, Dentistry-Medicine-Nursing, Riyadh, KSA
[2]Department of Nursing, Arab American University, Jenin, Palestine
[3]Department of Nursing, An-Najah National University, Nablus, Palestine
Email: *fashafsheh@gmail.com

Received 6 November 2015; accepted 19 April 2016; published 22 April 2016

Abstract

Midwives and nurses should use the standard precautions as the basic level of infection control precautions when delivering care to all patients, regardless of their presumed infection status. Therefore midwifes and nurses should have sound knowledge and compliance with standard precaution. Aim of the study: The study aimed to assess the level of the compliance of standard precautions among the midwives and nurses in the Palestinian Hospitals. Method: A cross sectional study was conducted from May to June 2015 on 81 midwives and nurses from Palestinian hospitals. The data were collected from labor rooms and postpartum departments of Palestinian hospitals. Data were collected using pretested questionnaire on 81 midwives and nurses selected by convenience sample. Results: The current study showed that the average of standard precautions knowledge level and compliance are 74.6% and 83.8% respectively. There are an association between age, education, work experience, and compliance with standard precautions at $p < 0.05$ (0.000, 0.031, and 0.043) respectively. At the same time no significant association between training courses and compliance to standard precautions at $p < 0.05$ (0.191). Conclusion: The midwives and nurses in the current study for both knowledge and compliance have high level regarding standard precautions. There is an association between age, education, work experience, and compliance with standard precautions. Recommendations: Knowledge of midwives and nurses should be updated; the importance of latest evidence-based practices of infection control in continuing education/training program should be emphasized; and training programs for newly midwives and nurses about standard precaution and at regular intervals should be provided.

*Corresponding author.

How to cite this paper: Fashafsheh, I., Ayed, A., Koni, M., Hussein, S. and Thultheen, I. (2016) Midwives and Nurses Compliance with Standard Precautions in Palestinian Hospitals. *Open Journal of Nursing*, **6**, 294-302.
http://dx.doi.org/10.4236/ojn.2016.64030

Keywords

Nurses, Midwives, Compliance, Standard Precautions

1. Introduction

Health care workers are constantly exposed to various microorganisms which caused for them serious or even lethal infections [1]. Increased infant mortality in developing countries resulted from hospital acquired infections which is one of the main causes as some studies have shown [2].

Statistics reported by World Health Organization (WHO), 1,400,000 people suffer from complications related to HAI. The rate of preventable hospital acquired infections in developing countries due to medical care is estimated to be about 40% or above [3]. Nosocomial infections, such as endometritis, postoperative pelvic infection, urinary tract infections, neonatal sepsis, etc., are serious complications in normal vaginal delivery.

The incidence of postoperative infections approaches 38%. Surgical site infection which is the third most common nosocomial infection includes obstetrics and gynecological sources [4]. An understanding of the fundamentals of the host, surgical risk factors and vaginal flora can aid in prevention of postoperative infections which result in significant morbidity and mortality [4].

It has been reported that the risk of health care-associated infection is 2 to 20 times higher in developing countries in comparison with developed countries and 5% to 10% of patients admitted to hospitals in developed countries acquire these infections (WHO, 2008) [5].

Infection control measures include appropriate hand hygiene and the correct application of basic precautions during invasive procedures are simple and of low-cost, but need health staff accountability and behavioral change, in addition to improve staff education, reporting and surveillance systems [6].

The human element stays the efficient role in increasing or decreasing the chances of catching HCAI [7]. Healthcare workers compliance with standard precautions has been recognized as an important means to prevent and control health care-associated infections in patients and health workers [8].

Standard precautions are defined as a set of infection prevention practices that apply to all patients, regardless of suspected or confirmed diagnosis or presumed infection status [9]. These precautions considered the basic level of infection control precautions which are to be used, as a level of precautions [10].

Standard precautions are recommended when delivering the care to all clients, regardless of their health condition. It is also recommended that when handling equipment and instruments are contaminated or suspected of contamination, and in situations of contact risk with body fluids, blood, secretions and excretions except sweat, without considering the presence or absence of visible blood and skin with solution of continuity and mucous tissues. They included precautions against agents that are transmitted by the following routes of transmission: droplet, air-borne, and contact routes [10] [11].

Standard precautions aim to prevent and/or reduce transmission of HAI, and, at the same time, to protect nurses from sharp injuries. These aims can be achieved by the application of standard precaution measures which consist of the following elements: hand hygiene, prevention of sharp injuries, and personal protective equipment (gloves, gown, gaggle, facemasks, head protection, foot protection and wearing face shields) [10].

Nurses are often exposed to several infections during the course of carrying out their nursing tasks [12]. Nosocomial infection or Health-care-associated infection (HCAI) refers to infection that is acquired during hospitalization, the process of care and not manifested at the time of admission to a hospital or other health-care facility [13].

Nurses and midwives are directly worked with patient and susceptible to acquire infections from patients especially blood borne diseases. It has been estimated that more than 170 million people worldwide are infected with Hepatitis C and about 40 million are living with HIV/AIDS [14].

The critical role of nurses in patient care emphasis on the role of the control hospital acquired infections. So the nurses are the key members of infection control team in hospitals. Therefore, nurses should have good knowledge and skills in the field of infection control [15].

As revealed from evidence, the proper compliance with Standard Precautions can protect health care workers from various kinds of Occupational Blood Exposure, Hospital Acquired Infections including pneumonia and

intravascular catheter infections [16]. [17] presumed that 38.2% had fair knowledge of standard precaution, and 77(37.8%) had good knowledge. However 24.0% of the studied sample had poor knowledge level. According to their compliance 52.9% had fair level, 45.6% had good level and only 1.5% had poor level.

A study conducted by [18] about hand hygiene among health care staff noted that nurses' knowledge about standard precautions is insufficient and many of them believed that by wearing gloves no need for washing hands). Another study results revealed that only 43% of nurses had a good knowledge in this regard [19]. A descriptive and cross-sectional study conducted by [20] reported that the participants have an acceptable level of knowledge regarding hand hygiene. The work experience and history of previous training were the most important predictors of participants' knowledge about hand hygiene.

A cross sectional study conducted among nurses in governmental hospitals of Palestine revealed that, around half of the subjects had fair knowledge level and the most of them had good practice level of infection control [21].

2. Subjects and Method

2.1. Aim of the Study

The study aimed to assess the level of the compliance of standard precautions among the midwives and nurses in the hospitals of Palestine.

2.2. Research Questions

The following three research questions were formulated to achieve the aim of the current study:

1. What are levels of midwives' and nurses' knowledge about the standard precautions at the selected Palestinian hospitals?
2. What are levels of midwives' and nurses' compliances of the standard precautions at the selected Palestinian hospitals?
3. Are there relationship between the standard precautions knowledge and compliance with age, gender, education, years of experience, and training course on standard precautions?

2.3. Research Design

It is a descriptive, cross-sectional study.

2.4. Study Setting

The data were collected from labor rooms and postpartum departments of Palestinian hospitals, eight of them governmental (Alia hospital in Hebron city, Al Husain hospital in Beit Jala, and Abu Al Hassan hospital in Yatta, Rafedia in Nablus city, Thabet Thabet n Tulkarm city, Khaleel Solaiman in Jenin city, Darweesh Nassal in Qalqellia city, and Yaser Arafat in Salfit city) and three private hospitals (Al-Ahli Hospital in Hebron city, Al Mizan Hospital in Hebron city, and *Arab* Society hospital in Bethlehem city)

2.5. Study Period

The study was conducted from May to June 2015 in the targeted hospitals.

2.6. Study Sample

A convenience sample includes 81 midwives and nurses.

2.7. The Inclusion Criteria

Palestinian midwives or nurses who work in the selected departments of the targeted hospitals with full time employment.

2.8. Tool of the Study

A self-administrative questionnaire was developed by researchers and used to assess:

a) Socio-demographic characteristics of subjects consist of age, marital status, Hospital, Qualification, Department of work, working experience, Special sharps disposal box in your department, Hepatitis B vaccine, and Infection control training course.

b) Subjects' knowledge consists of 32 items, each item had a group of answer points, one point was awarded for correct answer; incorrect or I don't know answer took zero. The correct responses were summed up to get a total knowledge scores for each participant. Total score for all questions reached 32 grades and transformed to 100%.

c) Compliance consist of 23 items using a 3-item Likert scale (every time (3), sometime (2), and never (1)). The compliance scores were summed up to get total scores and transformed to 100%.

3. Validity and Reliability of the Study

To assure the content validity of the questionnaire, it was revised and validated by panel of 5 experts in academic and health field; they agreed and no comments. Internal consistency among the questionnaire items was assessed 0.88 Cronbach's alpha (α) and it was considered acceptable.

4. A Pilot Study

Ten midwives from the labor department of Nablus special hospital as a pilot study was included to assess the clarity of the questions, effectiveness of instructions, completeness of response sets, time required to complete the questionnaire and success of data collection technique. Pilot subjects were asked to comment on the applicability and appropriateness (validity) of the questionnaire. All questions were answered no clarity of questions were required. Then, the researchers determined that it would take 20 minutes to complete the questionnaire.

5. Ethical Considerations

This study was approved by the nursing department, Arab American University. This emphasized by MOH agreement with their permission for the investigators to utilize the targeted hospitals. Approval from midwives and nurses were obtained. Several strategies were utilized to protect the nurse's rights who agreed to participate in this study. First, oral verbal consent of the midwives and nurses was obtained prior to the administration of the questionnaire. The midwives and nurses were informed of the purpose of the study, and that they had the right to refuse to participate. Also the voluntary nature of participation was stressed as well as confidentiality. Furthermore, the midwives and nurses were told that they can refrain from answering any questions and they can terminate at any time. Anonymity of them was maintained at all times.

6. Results

Table 1 presents demographic characteristics of the studied sample. It clarifies that the majority of the studied nurses 64 (79.04%) were in the age group of 20 - 30 years, and 57 (70.4%) had bachelor degree. However, around two thirds 52 (64.2%) were single, and 53 (65.4%) had less than five years of experience. All of the samples assured that they have sharp box 81 (100.0%). Regarding attendance of training courses, the most of the studied sample 70 (86.4%) were received training course about infection control and 77 (95.1) had vaccinated against hepatitis B.

Table 2 presents the knowledge and compliance mean of the universal precautions among midwives and nurses in the targeted settings. It clarified that the knowledge mean was 74.57% while compliance mean was 83.8%. Hand washing knowledge and compliance items had the highest mean 91.8% and 86% respectively while the knowledge about infection microorganisms had the lowest mean 56.9%. At the same time, both sharp box and needle using compliance items had the lowest mean according to universal precautions compliance 78.2%.

Table 3 shows percentage distribution of the participants according to their knowledge and compliance of standard precautions. It clarifies that around half of the participants 40 (49.4.0%) had fair knowledge level, 33 (40.7%) had good knowledge, and 8 (9.9%) had poor knowledge level. On the other hand, it indicated that two thirds of the participants 51 (63.0%) had good compliance, 27 (33.3%) had fair compliance, and the rest 3 (3.7%) had poor compliance.

Table 4 shows a comparison between the mean of the knowledge scores and the socio-demographic characteristics of the studied sample. It displays that high mean knowledge scores were found among those who were at

Table 1. Assessment of the socio-demographic and characteristics of the sample.

Parameters		No.	%
Age	20 - 30 years old	64	79.0
	31 - 40 years old	10	12.3
	More than 40	7	8.6
Education	Nursing diploma	21	25.9
	Bachelor	57	70.4
	Master	3	3.7
Marital status	Single	52	64.2
	Married	29	35.8
Department	Labor room	52	64.2
	Post partum ward	29	35.8
Experience	5 years or less	53	65.4
	6 - 15 years	18	22.2
	more than 15 years	10	12.3
Sharp box	Yes	81	100.0
	No	0	00.0
Training course	Yes	70	86.4
	No	11	13.6
Hepatitis B vaccine	Yes	77	95.1
	No	4	4.9

Table 2. Assessment of the knowledge and compliance of the universal precaution among midwives and nurses.

Knowledge and compliance mean of universal precautions						
Universal precautions Knowledge	**N**	**Mean**	**Std. Deviation**	**Universal precautions compliance**	**Mean**	**Std. deviation**
Hand washing	81	91.8210	11.71946	Hand washing	86.0082	15.34399
Wearing gloves	81	58.8477	19.73548	Wearing gloves	85.9259	17.70122
Needles using	81	77.7778	19.00292	Needle using	78.1893	20.96767
Sharp box	81	74.0741	35.45341	Sharp box	78.1893	23.07024
Medical waste disposing	81	82.2222	29.83287	Gown and mask	80.4527	21.04726
Gown and mask	81	82.0988	31.92632	**Total compliance**	**83.8075**	**15.78778**
Knowledge about infectious microorganisms	81	56.9959	32.36770			
Total knowledge	**81**	**74.5756**	**12.70105**			

Table 3. Assessment of the midwives and nurses knowledge and compliance level of universal precautions.

	levels of standard precautions			**Total**
Item	**Poor**	**Fair**	**Good**	
Knowledge	8 (9.9%)	40 (49.4%)	33 (40.7%)	81 (100.0%)
Compliance	3 (3.7%)	27 (33.3%)	51 (63.0%)	81 (100.0%)

Table 4. The relationship between the age, education, experience, and training course of the midwives and the nurses towards the knowledge of universal precautions.

Items		N	Mean	Std. deviation	F	Sig
Age	20 - 30 years old	64	74.7559	12.21532		
	31 - 40 years old	10	78.4375	7.13371	1.607	0.207
	More than 40	7	67.4107	20.55996		
Education	Diploma	21	72.7679	12.30881	1.801	0.172
	Bachelor	57	74.5614	12.89064		
	Master	3	87.5000	0.00000		
Experience	5 years or less	53	75.9434	10.28414	0.895	0.413
	6 - 15 years	18	72.2222	14.96353		
	Above 15 years	10	71.5625	19.17629		
Training course	Yes	70	75.3125	12.15733	1.751	0.190
	No	11	69.8864	15.57948		

the age group of 31 - 40 years, master degree, had years of experience 5 years or less, and had attended training courses with means of (78.4375, 87.5000, 75.9434, and 75.3125) respectively. No significant statistical differences were found in mean knowledge scores in relation to age, education, experience, and training course (F = 1.607, 1.801, 0.895, and 1.751) at $p < 0.05$ (0.207, 0.172, 0.895, and 0.190) respectively.

Table 5 shows the comparison of mean compliance scores in relation to socio-demographic characteristics of the studied sample. It displays that high mean practices scores were found among those who were at the age group 20 - 30 years old, bachelor degree, had years of experience 5 years or less, and attended training courses with means of (87.6585, 86.6260, 86.9292, and 84.7205) respectively. No significant statistical differences were found between mean practice scores towards training course (f = 1.740) at $p < 0.05$ (0.191). At the same time, significant statistical differences were found between mean practice scores towards age, education, and experience (f = 14.294, 3.620, and 3.276) at $p < 0.05$ (0.000, 0.031, and 0.043) respectively.

Table 6 shows that there was significant statistical difference found between knowledge and compliance of standard precautions of the studied sample (t = 4.590) at $p < 0.05$ (0.000).

7. Discussion

Hospital acquired infection is a common problem all over the world. Therefore, up to date knowledge and nurses midwives skills can play important roles in standard precautions. Midwives and nurses should have the opportunity to practice standard precautions on a day-to-day basis as an integral part of patients' care. The outcome of this study showed that the average of the knowledge level with standard precaution among the midwives and nurses was 74.6%. The finding of this study is different from [21] which revealed that knowledge level rate of standard precaution by nurses is around 54% in Palestine.

According to the compliance with standard precaution among the midwives and nurses the average was 83.8%. It could be said from this result that the level of compliance with standard precaution is high. This may due to the work climate of the hospitals. This finding consistent with [22] study which discovered that promotion of safety climate often time leads to compliance to standard precaution. Another study, [23] supports these finding which reported that wearing of sterile surgical gloves by health workers is very conducive for the patient and for the protecting against occupational risk caused by blood borne infections from patients as well as cross-infection. Also, this finding is in line with the work of [21] which showed that the majority of the Palestinian midwives and nurses had good practice towards infection control. The finding of this study is inconsistent with [24] which revealed that compliant rate of standard precaution by nurses is less than 38% in London.

The findings of the study revealed that the average of the knowledge level of hand washing, wearing gloves, needle using, sharp box, medical waste disposing, gown and mask, and knowledge about infection microorganisms

Table 5. The relationship between the midwives and nurses age, education, experience, and training course towards the compliance of universal precautions.

Items		N	Mean	Std. deviation	F	Sig
Age	20 - 30 years old	64	87.6585	12.33539		
	31 - 40 years old	10	63.4783	21.95598	14.294	0.000
	More than 40	7	77.6398	10.54614		
Education	Diploma	21	76.1215	20.45286	3.620	0.031
	Bachelor	57	86.6260	13.28288		
	Master	3	84.0580	0.00000		
Experience	5 years or less	53	86.9292	12.35483	3.276	0.043
	6 - 15 years	18	78.9050	23.73723		
	Above 15 years	10	76.0870	9.88274		
Training course	Yes	70	84.7205	15.78504	1.740	0.191
	No	11	77.9974	15.22523		

Table 6. The relationship between the midwives and nurses knowledge and compliance of universal precautions.

Item	Mean	N	Std. deviation	t	df	Sig.
knowledge	74.5756	81	12.70105	4.590	80	0.000
Compliance	83.8075	81	15.78778			

were (92%, 59%, 78%, 74%, 82%, 82%, and 56%) respectively. The implication of this finding is that the knowledge level of the standard precautions is well in hospital settings except the knowledge of microorganisms which need more attention on it.

It was observed from the findings that the midwives and nurses adhered strictly to the use of the standard precautions of hand washing, wearing gloves, needle using, sharp box, gown and mask (86%, 86%, 87%, 78%, and 80%) respectively. The implication of this finding is that the use of the standard precautions of hand washing is well established in the clinical and hospital settings. This is in line with the previous findings of [25] that compliance on the part of healthcare workers with standard precautions has been recognized as an efficient means to prevent and control health care-associated infections in patients and health workers.

Lastly, the outcome of this study revealed an association between age, education, work experience, and compliance with standard precautions. At the same time no significant association between training courses and compliance with standard precautions. This may due to that these training courses not specific for standard precaution.

8. Conclusion

Knowledge and compliance of standard precaution of midwives and nurses cannot be neglected as it has proved to be of great importance as they are susceptible to different infection and diseases when precautious measures are not properly. Based on the findings of this study, it can be concluded that midwives and nurses in the current study for both knowledge and compliance have high level regarding standard precautions. There is an association between age, education, work experience, and compliance with standard precautions.

9. Recommendations

The study recommends

- Keep updating knowledge and compliance of midwives and nurses according standard precaution through continuing in-service educational programs.

- Emphasizing the importance of the latest evidence-based practices of infection control in continuing education/training programs.
- Training programs for newly nurses and midwives according standard precautions and must be at regular intervals.
- This study should be replicated using observation checklist to assess the level of compliance.

Acknowledgements

The authors would like to express their sincere gratitude to the hospitals administrating team who helped in facilitating conduction of this study. Great appreciation as well is to the midwifery and nursing staff who accepted to participate in the current study.

References

[1] Twitchell, K.T. (2003) Blood Borne Pathogens. What You Need to Know—Part II. *AAOHNJ*, **51**, 89-97.

[2] Huis, A., Hulscher, M., Adang, E., Grol, R., van Achterberg, T. and Schoonhoven, L. (2013) Cost-Effectiveness of a team and Leaders-Directed Strategy to Improve Nurses' Adherence to Hand Hygiene Guidelines: A Cluster Randomised Trial. *International Journal of Nursing Studies*, **50**, 518-526. http://dx.doi.org/10.1016/j.ijnurstu.2012.11.016

[3] World Health Organization (2014) Improved Hand Hygiene to Prevent Health Care Associated Infections. http://www.who.int/gpsc/tools/faqs/evidence_hand_hygiene/en/2014

[4] Faro, C. and Faro, S. (2008) Postoperative Pelvic Infections. *Infectious Disease Clinics of North America*, **22**, 653-663. http://dx.doi.org/10.1016/j.idc.2008.05.005

[5] World Health Organization (2008) The First Global Patient Safety Challenge: "Clean Care Is Safer Care". WHO, Geneva. http://www.who.int/gpsc/background/en/index.html

[6] Boullègue, O., Naija, W., Said, H., Nouria, A., Jaidane, N., Dhidah, L. and Boujaafar, N. (2013) Incidence of ICU Acquired Nosocomial Infections in University Hospital of Sahloul (Sousse-Tunisia). *Antimicrobial Resistance and Infection Control*, **2**, 233.

[7] Cole, M. (2007) Infection Control: Worlds apart Primary and Secondary Care. *British Journal of Community Nursing*, **12**, 301, 303-306.

[8] Garner, J.S. (1996) Guideline for Isolation Precautions in Hospitals. The Hospital Infection Control Practices Advisory Committee. *Infection Control and Hospital Epidemiology*, **17**, 53-80.

[9] Center of Disease Prevention and Control (CDC) (2012) Glossary of Terms .Atlanta, USA.

[10] Center of Disease Prevention and Control CDC (2007) Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. US, 136 p. http://www.cdc.gov/hicpac/pdf/isolation/isolation2007.pdf

[11] Vaz, K., McGrowder, D., Lindo, R.A, Gordon, L., Brown, P. and Irving, R. (2010) Knowledge, Awareness and Compliance with Universal Precautions among Health Care Workers at the University Hospital of the West Indies, Jamaica. *International Journal of Occupational and Environmental Health*, **1**, 171-181.

[12] Kosgeroglu, N., Ayranci, U., Vardareli, E. and Dincer, S. (2004) Occupational Exposure to Hepatitis Infection among Turkish Nurses: Frequency of Needle Exposure, Sharps Injuries and Vaccination. *Epidemiology and Infection*, **132**, 27-33. http://dx.doi.org/10.1017/S0950268803001407

[13] Nejad, S.B., Allegranzi, B., Syed, S.B., Ellis, B. and Pittet, D. (2011) Health-Care-Associated Infection in Africa: A Systematic Review. *Bulletin of the World Health Organization*, **89**, 757-765. http://dx.doi.org/10.2471/BLT.11.088179

[14] Richmond, J.A., Dunning, T.L. and Desmond, P.V. (2007) Health Professionals' Attitudes toward Caring for People with Hepatitis C. *Journal of Viral Hepatitis*, **14**, 624-632. http://dx.doi.org/10.1111/j.1365-2893.2007.00849.x

[15] Joukar, F. and Taherri Ezbarami, Z. (2007) Nursing Student and Staff Knowledge about Nosocomial Infection. *Iranian Journal of Infectious Diseases*, **12**, 83-86.

[16] Tetali, S. and Choudhry, P. (2006) Occupational Exposure to Sharps and Splash: Risk among Health Care Providers in Three Territory Care Hospitals In South India. *Indian Journal of Occupational and Environmental Medicine*, **10**, 35-40. http://dx.doi.org/10.4103/0019-5278.22894

[17] Ayed, A., Eqtait, M., Fashafsheh, I. and Ali, G. (2015) Knowledge & Compliance of Nursing Staff towards Standard Precautions in the Palestinian Hospitals. *Advances in Life Science and Technology*, **36**, 21-30.

[18] Malekmakan, L., Haghpanah, S., Askarian, M., Jowkari, M. and Moalaee, M. (2008) Hand Hygiene in Iranian Health Care Workers. *American Journal of Infection Control*, **36**, 602-603. http://dx.doi.org/10.1016/j.ajic.2008.01.006

[19] McLaws, M.L., Maharlouei, N., Yousefi, F. and Askarian, M. (2012) Predicting Hand Hygiene among Iranian Health

Care Workers Using the Theory of Planned Behavior. *American Journal of Infection Control*, **40**, 336-339. http://dx.doi.org/10.1016/j.ajic.2011.04.004

[20] Asadollahi, M., Arshadi Bostanabad, M., Jebraili, M., Mahallei, M., Seyyed Rasooli, A. and Abdolalipour, M. (2015) Nurses' Knowledge Regarding Hand Hygiene and Its Individual and Organizational Predictors. *Journal of Caring Sciences*, **4**, 45-53.

[21] Fashafsheh, I., Ayed, A., Eqtait, F. and Harazneh, L. (2015) Knowledge and Practice of Nursing Staff towards Infection Control Measures in the Palestinian Hospitals. *Journal of Education and Practice*, **6**, 79-90.

[22] Kermode, M., Jolley, D., Langkham, B., Thomas, M.S., Holmes, W. and Gifford, S.M. (2005) Compliance with Universal/Standard Precautions among Health Care Workers in Rural North India. *American Journal of Infection Control*, **33**, 27-33. http://dx.doi.org/10.1016/j.ajic.2004.07.014

[23] Osborne, S. (2003) Influences on Compliance with Standard Precautions among Operating Room Nurses. *American Journal of Infection Control*, **31**, 415-423. http://dx.doi.org/10.1067/mic.2003.68

[24] Gammon, J. and Gould, D. (2005) Universal Precautions. A Review of Knowledge, Compliance and Strategies to Improve Practice. *Journal of Research in Nursing*, **10**, 529-547. http://dx.doi.org/10.1177/136140960501000503

[25] Aniebue, P.N., Aguwa, E.N. and Obi, E.I. (2010) Universal Precautions: Awareness and Practice of Patent Medicines Vendors in Enugu Metropolis, South East Nigeria. *Nigerian Medical Journal*, **51**, 30-34.

Open Journal of Nursing, 2016, 6, 303-308
Published Online April 2016 in SciRes. http://www.scirp.org/journal/ojn
http://dx.doi.org/10.4236/ojn.2016.64031

Part A: The Development of mI SMART, a Nurse-Led Technology Intervention for Multiple Chronic Conditions

Jennifer A. Mallow[1*], Laurie A. Theeke[1], Rebecca Walls[2], Elliott Theeke[1], Brian K. Mallow[3]

[1]School of Nursing, West Virginia University, Morgantown, West Virginia, USA
[2]Milan Puskar Health Right, Morgantown, West Virginia, USA
[3]Sovern Run, LLC, Albright, West Virginia, USA
Email: *jamallow@hsc.wvu.edu, ltheeke@hsc.wvu.edu, etheeke@hsc.wvu.edu, bkmallow@gmail.com

Received 29 March 2016; accepted 25 April 2016; published 28 April 2016

Abstract

Background: The treatment of Multiple Chronic Conditions (MCC) is complex for both patients and providers. Used as integrated tools, technology may decrease complexity, remove the barrier of distance to obtain care, and improve outcomes of care. A new platform that integrates multiple technologies for primary health care called mI SMART (Mobile Improvement of Self-Management Ability through Rural Technology) has been developed. The purpose of this paper is to present to development of mI SMART, a nurse-led technology intervention for treating for MCC in primary care. Methods: The creation of mI SMART was guided by the model for developing complex nursing interventions. The model suggests a process for building and informing interventions with the intention of effectiveness, sustainability, and scalability. Each step in the model builds from and informs the previous step. Results: The process resulted in the integrated technologies of mI SMART. The system combines a HIPAA compliant, web-based, structure of mHealth sensors and mobile devices to treat and monitor multiple chronic conditions within an existing free primary care clinic. The mI SMART system allows patients to track diagnoses, medications, lab results, receive reminders for self-management, perform self-monitoring, obtain feedback in real time, engage in education, and attend visits through video conferencing. The system displays a record database to patients and providers that will be integrated into existing Electronic Health Records. Conclusion: By using the model for developing complex nursing interventions, a multifaceted solution to clinical problems was identified. Through modeling and seeking expert review, we have established a sustainable and scalable integrated nurse-led intervention that may increase access and improve outcomes for patients living in rural and underserved areas. The first trial of mI SMART has been completed and evaluated for feasibility, acceptability, and effectiveness in persons in rural areas living with multiple chronic conditions.

*Corresponding author.

How to cite this paper: Mallow, J.A., Theeke, L.A., Walls, R., Theeke, E. and Mallow, B.K. (2016) Part A: The Development of mI SMART, a Nurse-Led Technology Intervention for Multiple Chronic Conditions. *Open Journal of Nursing*, **6**, 303-308.
http://dx.doi.org/10.4236/ojn.2016.64031

Keywords

Multiple Chronic Conditions, mHealth, Telehealth, Health Disparities, Nursing Informatics

1. Introduction

People living with chronic conditions suffer from poor health, disability, and pre-mature death [1]. It is estimated that 117 million (half) of US adults have a chronic condition, and 1 in 4 adults have Multiple Chronic Conditions (MCC) [2]. In addition, most health-care expenditures in the United States are due to chronic conditions [3]. Due to the complexity of treatments, conflicting advice for each condition, and co-existing lack of the social, health and behavioral determinants of health due to disparities, individuals with MCC often have difficulty in achieving treatment goals [4]-[7]. Therefore, simplifying treatment regimens, managing conflicting advice, and assessing determinants of heath such as addressing the availability of resources, access to healthcare, and improved diet physical activity are imperative to improving outcomes and self-management ability.

Healthcare technology is developing rapidly and may offer an opportunity to enhance care. Use of technology can improve healthcare systems' ability to monitor patients without travel, coordinate the services of multiple healthcare providers, and manage patient symptoms in real time [5] [8]. In addition, technology interventions augment care and management of MCC by improving access to care and improving patient outcomes. The subsequent long-term effects of technology use lead to diminished health disparities and reduced healthcare costs [9]. However, much of the available healthcare technology intended to treat MCCs is developed by private industry and used in non-academic settings. In the current literature, widespread reporting of development process is not present. Therefore, questions remain about acceptability, feasibility and efficacy across populations.

Some examples of existing patient facing technology interventions include: Access to information from electronic medical records, requesting medication refills and appointments through automated systems, communicating with healthcare providers using secure messing systems, managing specific chronic conditions using telehealth, using personal health records to track progress, and interacting with on-line support groups using social media [10]. The available literature on these individual technology interventions is promising and does provide limited evidence of improving outcomes, cost effectiveness and cultural relevance [11]. However, the lack of integration of data into existing systems and healthcare records, lack of reimbursement for technology services, and the necessity to access multiple technology interventions individually, increase complexity for both healthcare systems and patients and decrease widespread use for patients with MCC.

Nurses are uniquely trained to address the complexity of caring for the whole person as an individual in the context of their family, community, and environment. The Institute of Medicine (IOM) calls nurses to practice to the full extent of their education and to be partners in redesigning heath care in the United States [12]. As patient advocates who store, maintain and communicate data and information [13], nurses are trained to use validated processes to develop complex interventions, to think about patients within systems, and to implement and improve interventions [14]. The purpose of this paper is to present the development of mI SMART (Mobile Improvement of Self-Management Ability through Rural Technology), a nurse-led technology intervention for treating for MCC in primary care.

2. Methods for Intervention Development

The model for developing complex nursing interventions [15] guided the overall process of intervention development. The model was developed and refined from the Medical Research Council (MRC) frame-work for developing complex interventions [16] and other guidelines that contribute additional guidance to inform the development of nursing interventions. The model suggests a process for building and informing interventions with the intention of effectiveness, sustainability, and scalability. Each step in the model builds from and informs the previous step. The steps include: problem identification, practice analysis, identification of the overall objective, identification of theory or key principles, building and planning, modelling and seeking expert review, and developing the study protocol.

2.1. Problem Identification & Practice Analysis

The first phase of mI SMART development, problem identification, was undertaken through a needs, practice

and policy analysis. The identified problem originally started with a concern for the poor outcomes of persons with diabetes in a rural clinic serving uninsured and underinsured individuals. A retrospective review of the combined pharmacy records, front desk scheduling system, and Electronic Health Record (EHR) found that diabetes patients who lived further than 30 miles from the clinic and had more than one chronic condition missed appointments compared to those who live closer and had only one chronic condition [17]. Based on these findings, the research team decided that an intervention was needed that addressed MCCs and overcame the disparity of access to care due to distance. A search of the empirical evidence related to eliminating the burden of distance revealed the use of mHealth tools as a potential intervention to improve care [10]. In addition, it was also noted that policies for federal payers were improving and Medicare pays for services that provide live, interactive videoconferencing [18]. Hence, the decision was made to begin to develop an intervention that incorporated mHealth tools with live videoconferencing.

2.2. Identification of the Overall Objective

The overall objective of the mI SMART project is to improve quality of life and outcomes of care for rural and underserved individuals living with multiple chronic conditions. This objective was determined using a series of activities. First, the thoughts and ideas of nurses, including in-patient, out-patient, advanced practice, and researchers were sought. In addition, conversations intentionally included physicians, pharmacists, social workers, health educators, computer scientists, engineers, and private industry leaders. This objective will be accomplished by improving access, self-management ability, and communication with use of technology within a healthcare system that is trusted by patients.

2.3. Identification of the Theory or Key Principles

A substantive review of potential foundational theories was conducted. Two models came forward as having relevance and utility in the development of mI SMART. The first model, the Quality Health Outcomes Model, was selected for its broad concepts that could be conceptualized and adapted based on the system, patient population, and evolving intervention [19]. The second model chosen, the Chronic Care Model, assists in understanding how to build an intervention that changes healthcare delivery at the healthcare system level [20].

The Quality Health Outcomes Model was developed by the American Academy of Nursing's Expert Panel on Quality Health Care in 1996 as an expansion of Donabedian's structure-process-outcome framework. The four major concepts are: system, interventions, patients, and outcomes. The model is a dynamic framework that recognizes the reciprocal relationship that occurs between patients, the system where care is provided, and interventions [21]. Outcomes are linked to the interactions of a patient with the healthcare system and with healthcare interventions that are focused on the individual, family, or community [19]. Interventions are affected by both system and patient characteristics in producing desired outcomes.

The Chronic Care Model consists of six interrelated system changes meant to make patient-centered, evidence based care easier to accomplish [22]. The major concepts in the model are: health system, community support, self-management support, decision support, clinical information systems, and delivery system design [23]. This model is operationalized through a prepared healthcare team delivering planned interactions, self-management support with effective use of community resources, integrated decision support, and supportive information technology (IT) which are designed to work together to strengthen the provider-patient relationship, improve communication and improve health outcomes [23]. Therefore, the development of mI SMART is based on the major concepts and underlying assumptions of the Quality Health Outcomes Model and the Chronic Care Model.

2.4. Building, Planning & Modeling

Based on the guiding frameworks, problem identification and overall goals of the intervention, the first version of the mI SMART platform was modeled and a basic plan for implementation was developed. The expertise of an information technology specialist was sought to complete the programming involved. While the initial intervention was planned to be implemented in a free clinic in a rural location, the thought of expanding the intervention was a consideration. The decision was made to make the platform web-based as opposed to a system specific application (app). Hence, the first iteration of mI SMART was web-based, HIPAA compliant, system that

includes the use of self-monitoring devices, video conferencing capabilities, real-time feedback, automatic patient specific reminders for self-monitoring and medication, links and video education for chronic illness, and secure messaging.

2.5. Seeking Expert Review

After a model of the mI SMART platform was developed, expert review was sought by holding focus groups for in various settings [11]. The participants invited to the focus groups were intended to represent both the first users of the system and future potential users. The mI SMART platform was demonstrated to each group and specific questions were used to elicit conversation and feedback. After participation in the focus groups, participants were asked to complete surveys. Focus groups were attended by 37 individuals and surveys were completed by 29 healthcare team members including 7 males and 22 females, age range 23 to 62. The participants included: Medical Assistants, Registered Nurses, front desk staff, Physicians, Nurse Practitioners, Physician's Assistants, Pharmacists, Social Workers, Administrators, and Board Members. The focus group participants identified perceived obstacles of patient use as: ability, willingness, and time. System obstacles were identified as: lack of integration, lack of reimbursement, and cost. Many positive attributes of mI SMART were identified and included: capability for virtual visits, readability, connectivity, user-friendliness, ability to capture biophysical measures, enhanced patient access, and incorporation of multiple technologies. Providers suggested increasing capability for biophysical and symptom monitoring for more common chronic conditions.

2.6. Developing the Study Protocol

Based on the feedback provided in the focus groups, changes were made to the mI SMART system prior to developing the study protocol. The system combines a HIPAA compliant, web-based, structure of mHealth sensors and mobile devices to treat and monitor multiple chronic conditions. The mI SMART system allows patients to track diagnoses, medications, lab results, receive reminders for self-management, perform self-monitoring, obtain feedback in real time, engage in education, and attend visits through video conferencing. The system displays a record database to patients and providers that will be integrated into existing Electronic Health Records. Once these changes were made, the study protocol was developed and funding for the project was sought and obtained. The first trial of the mI SMART platform has been completed. The model for developing complex nursing interventions will be used to guide the refinement of the mI SMART platform prior to a larger randomized trial.

3. Discussion

The use of the model for developing complex nursing interventions was essential to the successful development of a robust, adaptive and empirically ground technology platform (see **Figure 1** for the operationalization of the Model for Developing Complex Interventions in Nursing). The mI SMART platform is an improvement over the currently available systems. Combining multiple health sensors, education, reminders, video conferencing, lab results, and secure messaging removes the necessity to access multiple technology interventions individually. This combination of services decreases complexity of care for both healthcare systems and patients. The intervention has been implemented with 30 adult participants living in a rural area who have MCCs and are experiencing difficulties attending clinic visits. Feasibility and acceptability for both the patients and healthcare providers was evaluated and reported in Part B. In addition, efficacy of the intervention was evaluated with patient outcomes which will be reported in a separate paper. The first implementation of mI SMART was targeted to a specific population and clinic. Future use of the mI SMART platform should be adapted to other populations and practice settings. The content of the platform in its present iteration is reflective of current empirical evidence about the use of technology, a specific needs and practice analysis, and has been adapted based on feedback of a wide, but not exhaustive, variety of healthcare providers.

4. Conclusion

Our long-term objective is to create a new and substantive departure from the status quo by integrating multiple mHealth tools into one platform within an existing rural health clinic to go beyond traditional office visits and shifting to real-time exchanges between patients and providers across geographical boundaries. An efficacious

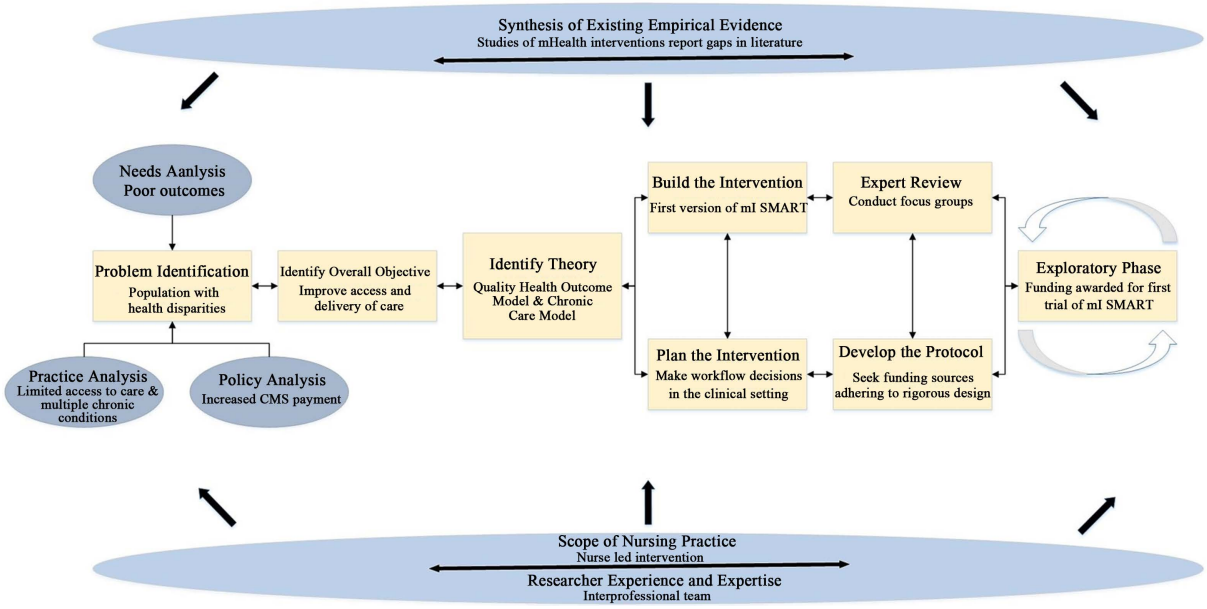


Figure 1. Operationalization of the model for developing complex interventions in nursing. This figure is based on the model found in [15].

shift in the traditional rural healthcare delivery paradigm to one that uses technology is expected to result. The model for developing complex nursing interventions is currently being used to update mI SMART based on patient and provider feedback and integration into the EHR is planned. The initial feasibility and acceptability of the mI SMART platform is published in Part B of this article. Other plans include fully disseminating the results of the first implementation of mI SMART, pursuing commercialization and seeking funding for the larger trial.

Acknowledgements

This project was supported by the Robert Wood Johnson Foundation Nurse Faculty Scholars Program. The Robert Wood Johnson Foundation Nurse Faculty Scholars Program is working to develop the next generation of national leaders in academic nursing through career development awards for outstanding junior nursing faculty. The program aims to strengthen the academic productivity and overall excellence of nursing schools by providing mentorship, leadership training and salary and research support to faculty.

References

[1] Centers for Disease Contro and Prevention. Death and Mortality. National Center for Health Statistics 2013.

[2] Ward, B.W., Schiller, J.S. and Goodman, R.A. (2014) Peer Reviewed: Multiple Chronic Conditions Among US Adults: A 2012 Update. *Preventing Chronic Disease*, **11**, E62.

[3] Bauer, U.E., Briss, P.A., Goodman, R.A. and Bowman, B.A. (2014) Prevention of Chronic Disease in the 21st Century: Elimination of the Leading Preventable Causes of Premature Death and Disability in the USA. *The Lancet*, **384**, 45-52. http://dx.doi.org/10.1016/S0140-6736(14)60648-6

[4] Grembowski, D., Schaefer, J., Johnson, K.E., Fischer, H., Moore, S.L., Tai-Seale, M., *et al*. (2014) A Conceptual Model of the Role of Complexity in the Care of Patients with Multiple Chronic Conditions. *Medical Care*, **52**, S7-S14. http://dx.doi.org/10.1097/MLR.0000000000000045

[5] LeRoy, L., Bayliss, E., Domino, M., Miller, B.F., Rust, G., Gerteis, J., *et al*. (2014) The Agency for Healthcare Research and Quality Multiple Chronic Conditions Research Network: Overview of Research Contributions and Future Priorities. *Medical Care*, **52**, S15-S22. http://dx.doi.org/10.1097/MLR.0000000000000095

[6] Magnan, E.M., Palta, M., Mahoney, J.E., Pandhi, N., Bolt, D.M., Fink, J., *et al*. (2015) The Relationship of Individual Comorbid Chronic Conditions to Diabetes Care Quality. *BMJ Open Diabetes Research & Care*, **3**, e000080. http://dx.doi.org/10.1136/bmjdrc-2015-000080

[7] Tinetti, M.E. and Basu, J. (2014) Research on Multiple Chronic Conditions: Where We Are and Where We Need to

Go. *Medical Care*, **52**, S3-S6. http://dx.doi.org/10.1097/MLR.0000000000000093

[8] Khairat, S., Wijesinghe, N., Wolfson, J., Scott, R. and Simkus, R. (2014) Building a Multicenter Telehealth Network to Advance Chronic Disease Management. In: Mantas, J., Househ, M.S. and Hasman, A., Eds., *Integrating Information Technology and Management for Quality of Care*, Vol. 202, IOS Press, Amsterdam, 299-302.

[9] Shi, L., Chen, C.-C., Nie, X., Zhu, J. and Hu, R. (2014) Racial and Socioeconomic Disparities in Access to Primary Care among People with Chronic Conditions. *The Journal of the American Board of Family Medicine*, **27**, 189-198. http://dx.doi.org/10.3122/jabfm.2014.02.130246

[10] Mallow, J.A., Theeke, L.A., Barnes, E.R., Whetsel, T. and Mallow, B.K. (2014) Using mHealth Tools to Improve Rural Diabetes Care Guided by the Chronic Care Model. *Online Journal of Rural Nursing and Health Care*, **14**, 43. http://dx.doi.org/10.14574/ojrnhc.v14i1.276

[11] Mallow, J.A., Theeke, L.A., Long, D.M., Whetsel, T., Theeke, E. and Mallow, B.K. (2015) Study Protocol: Mobile Improvement of Self-Management Ability through Rural Technology (mI SMART). *SpringerPlus*, **4**, 423. http://dx.doi.org/10.1186/s40064-015-1209-y

[12] Institute of Medicine (2011) Committee on the Robert Wood Johnson Foundation Initiative of the Future of Nursing. The Future of Nursing: Leading Change, Advancing Health.

[13] Dykes, P.C., Hurley, A., Cashen, M., Bakken, S. and Duffy, M.E. (2007) Development and Psychometric Evaluation of the Impact of Health Information Technology (I-HIT) Scale. *Journal of the American Medical Informatics Association*, **14**, 507-514. http://dx.doi.org/10.1197/jamia.M2367

[14] Hoyt, R.E. and Yoshihashi, A.K. (2014) Health Informatics: Practical Guide for Healthcare and Information Technology Professionals. Lulu.com, Raleigh, 27.

[15] Corry, M., Clarke, M., While, A.E. and Lalor, J. (2013) Developing Complex Interventions for Nursing: A Critical Review of Key Guidelines. *Journal of Clinical Nursing*, **22**, 2366-2386. http://dx.doi.org/10.1111/jocn.12173

[16] Craig, P., Dieppe, P., Macintyre, S., Michie, S., Nazareth, I. and Petticrew, M. (2008) Developing and Evaluating Complex Interventions: The New Medical Research Council Guidance. *British Medical Journal*, **337**, a1655.

[17] Mallow, J.A., Theeke, L.A., Barnes, E.R., Whetsel, T. and Mallow, B.K. (2014) Free Care Is Not Enough: Barriers to Attending Free Clinic Visits in a Sample of Uninsured Individuals with Diabetes. *Open Journal of Nursing*, **4**, 912. http://dx.doi.org/10.4236/ojn.2014.413097

[18] Gilman, M. and Stensland, J. (2013) Telehealth and Medicare: Payment Policy, Current Use, and Prospects for Growth. *Medicare & Medicaid Research Review*, **3**, No. 4. http://dx.doi.org/10.5600/mmrr.003.04.a04

[19] Mitchell, P.H., Heinrich, J., Moritz, P. and Hinshaw, A.S. (1997) Outcome Measures and Care Delivery Systems. Introduction and Purposes of Conference. *Medical Care*, **35**, NS1-NS5. .

[20] Wagner, E.H. (1998) Chronic Disease Management: What Will It Take To Improve Care for Chronic Illness? *Effective Clinical Practice*, **1**, 2-4.

[21] Mitchell, P.H., Ferketich, S. and Jennings, B.M. (1998) Quality Health Outcomes Model. American Academy of Nursing Expert Panel on Quality Health Care. *Image—The Journal of Nursing Scholarship*, **30**, 43-46. http://dx.doi.org/10.1111/j.1547-5069.1998.tb01234.x

[22] Roger, V.L., Go, A.S., Lloyd-Jones, D.M., Benjamin, E.J., Berry, J.D., Borden, W.B., *et al.* (2012) Heart Disease and Stroke Statistics—2012 Update: A Report from the American Heart Association. *Circulation*, **125**, e2-e220. http://dx.doi.org/10.1161/CIR.0b013e31823ac046

[23] Pullicino, P.M., McClure, L.A., Howard, V.J., Wadley, V.G., Safford, M.M., Meschia, J.F., *et al.* (2011) Identifying a High Stroke Risk Subgroup in Individuals with Heart Failure. *Journal of Stroke and Cerebrovascular Diseases*, **22**, 620-626.

Open Journal of Nursing, 2016, 6, 309-313
Published Online April 2016 in SciRes. http://www.scirp.org/journal/ojn
http://dx.doi.org/10.4236/ojn.2016.64032

Knowledge, Attitude and Practices about Colostrum Feeding among Pregnant Women in Military Hospital Rawalpindi of Pakistan

Rifat Aisha[1], Fakhar Batool[1], Saema Sultana[2]

[1]College of Nursing, AFPGMI, RWP
[2]College of Nursing, PIMS, Islamabad, Pakistan
Email: fakharbatool@gmail.com

Received 28 December 2015; accepted 25 April 2016; published 28 April 2016

Abstract

Background: It is well known that colostrum is important for promoting health, growth and development of the newborn, and it also helps to prevent against the infections. Breast feeding is a common practice in Pakistan but the importance of colostrums feeding is still poorly understood due to cultural variations. Objectives: The objectives are to assess the knowledge about the importance of colostrums feeding and to promote the practice of colostrums feeding in pregnant women. Methods: Data collection was done through semi-structured questionnaire regarding colostrum feeding among pregnant women. Gynaecology and Obstetrics Outpatient Department (OPD) and Antenatal Ward of Military Hospital Rawalpindi were selected for study purpose. Results: This study showed that 65% of women heard about colostrums from various sources like media, family and friends, and 35% heard from the health professional during antenatal visits. Only 6% of women knew that it is nutritious milk for the new born. Only women (9%) were aware about its protective effects and had knowledge that it helps to improve the growth of the babies and fight against infections. 35% of women perceived that there is something harmful which is not good for the newborn while 25% of women asked that this is the milk to be fed to baby and 15% of women asked this the milk to be discarded before feeding. There were still many women (39%) who lacked knowledge about colostrum, only 14% of the women in this study knew that the appropriate time for feeding colostrum is immediately after birth (1/2-1hour), whereas 86% of women starts feeding after 6 - 24 hrs. Majority of them who came from the rural areas were uneducated. Conclusion: Many women were aware about the importance of colostrum but the data still indicate that further efforts are required to improve the Knowledge, Attitude and Practice of colostrums feeding.

Keywords

Knowledge, Attitude, Practices and Colostrum

How to cite this paper: Aisha, R., Batool, F. and Sultana, S. (2016) Knowledge, Attitude and Practices about Colostrum Feeding among Pregnant Women in Military Hospital Rawalpindi of Pakistan. *Open Journal of Nursing*, **6**, 309-313.
http://dx.doi.org/10.4236/ojn.2016.64032

1. Introduction

The colostrum feeding has significant effects for immediate and future health of newborn infants especially in developing countries such as Ethiopia that have high rates of malnutrition, infectious diseases and mortality for children under the age of 5 years [1] [2]. Exclusive breast-feeding from birth to 6 months of age has prolonged health benefits and emotional bonding for mother and child and is associated with lower infant morbidity and mortality rate, and better growth & development of the baby [3].

Colostrum is the first milk produced by the mammary glands of mammals in late pregnancy just prior to giving birth and continuing through the early days of breastfeeding [4]. Colostrum is very rich in proteins, carbohydrates, vitamin A, and sodium chloride, but contains lower amounts of lipids and potassium than normal milk [5]-[7]. It also encourages the passage of stool. This helps to clear excess bilirubin which is produced in large quantities at birth and helps prevent jaundice. It contains various immunoglobulins like IgA (reactive to *Escherichia coli* virulence associated proteins) [8], IgG and IgM [9]. Other immune components of colostrum are lactoferrin, lysozyme, lactoperoxidase, complement and protein rich peptide (PRP). It also contains various cytokines and growth factors. PRP helps to fight against various viral infections like herpes viruses and HIV, bacterial and viral infections which are difficult to treat, various cancer, asthma, allergies and autoimmune diseases. It helps to reduce one of the leading causes of death in our country like diarrhoea and ARI [10].

There are many other qualities of colostrum that make it truly unique. Colostrum contains high amounts of sodium, potassium, chloride, and cholesterol. This combination is believed to encourage optimal development of the infant's heart, brain, and central nervous system. This may account for the prolonged secretion of colostrum in mothers who deliver their babies prematurely. All these components offer premature infants the best chance for the optimal development of their fragile organs [11].

Unfortunately colostrum feeding is not given to newborn for various societal myths and misconception. In a false belief of gutty honey, sugar water, glucose, and mishri water were fed as pre-lacteal feeds [12]. These manmade problems affect directly and indirectly health of newborn infants and cause malnutrition and high mortality rate in infants. This cross sectional study was undertaken to evaluate the awareness, knowledge and practices regarding the importance of clostrum feeding in Rawalpindi, Pakistan.

2. Methodology

It is a cross-sectional study, conducted in Combined Military Hospital and Military Hospital from January 2014-Oct 2014. 150 mothers were delivered during this period. Among them 150 were primi mothers and 100 were second para. 100 of them who were willing to participate and meeting the inclusion criteria were selected for study purpose, the information regarding practice of exclusive breast feeding and introducing complementary feeds was obtained only from second para mothers. A pre-tested questionnaire was used to carry out the study. After collection of data, information gathered was entered into **SPSS** version 18 & analyzed by using percentage/proportions and presented in suitable tabular and graphical forms

The sampling was based on the following inclusion and exclusion criteria. **(i) Inclusion Criteria:** Mothers who already delivered their baby and those with a child who is below 5 years old and willing to participate were included in this survey. **(ii) Exclusion Criteria:** Pregnant women unwilling to participate, having a child with any kind of malformations and are above 5 years old were excluded. A voluntary written informed consent was taken from the participants in the language that the participant could understand and comprehend prior to the data collection

The study was conducted as per recommendations of Helsinki Declaration. Ethical approval was obtained from Ethical Review Committee (ERC) and Institutional consent was taken from the respective authority. They were offered support and given the choice to discontinue the interview for the time being. Moreover, they have an option to refuse to answer any question. However, none of the participants opted to discontinue or refused to answer any question

3. Results

Table 1 shows the demographic data of the participants 100 antenatal mothers were interviewed during the study period, majority of them were between the age of 18 - 40 years. The mean age of the participants was 26.7

Table 1. Demographic data.

Total N = 100	Demographic data	% ages
Age of participants	18 - 25	60.0%
	25 - 40	40.0%
Education status	Illiterate	63.0%
	literate	37.0%
Occupation	House wives	77.0%
	Employed	23.0%
Number of children	Primi para	65.0%
	Multi para	45.5%
Period of Gestation during study	1st trimester	40.0%
	2nd trimester	33.0%
	3rd trimester	27.0%

years. 63% of the women were iliterate and 37% were literat. 77.0% of them were house wife where as 23% women were working in different fields, 45.5% had previously delivered a baby. 65.0% have become pregnant for the first time.

Figure 1 represents about 90% women have heard about colostrum among which 15% received information through media. 30% got to know about it from family and friends. Antenatal visits helped 35% of them, and 10% of women got to know about it from other sources and 10% of them did not know about colostrum feeding.

Figure 2 highlights the myths and misconception of women regarding colostrum feeding. 40% women answered that breast milk is not enough to satisfy the baby, 37% said that gutty is the part of our tradition and better than first milk, 12% women said due to nipple pain they don't like to feed. 6% women said that baby is not able to suck properly and not satisfied and 6% women said that they do not like the colour of colostrum and need to give supplement feeding. . We have lower percentage of women who have knowledge on the importance of colostrum compared to few other studies done in this region.

Figure 3 shows the knowledge of the mother regarding the importance of clostrum feeding. 10% women answered that this is just a 15% asked first breast milk to be discarded, only 25% women said that this is the milk to be fed the new born, whether 35% women perceived that there is something which is harmful for the new born, only 15% women asked that there is something extra for good health and it also prevent the neonate from infectious diseases.

Figure 4 represents that only 14% percent of the women knew that the appropriate time for feeding colostrum is immediately after the birth (1/2 - 1 hour), Where as 86% of women starts feeding within 6 - 24 hrs. There is a huge gap in the practices of colostrum feeding. Special attention is needed by the health care workers for pregnant women.

4. Discussion

A study was conducted by Joshi and his fellows In Nepal. Regarding the importance of colostrum to child's health, in this study 41% women believed that it helps for proper growth of child and fights against infection, 27% perceived it adds to good health 31% women had no knowledge about colostrum and only 1 woman thought it has bad effect to the child's health, In our study only 15 women knew that colostrum feeding could help the baby in fighting against infections. These findings highlight the need to give greater attention towards the women's health and well-being of pregnant women. We have lower percentage of women who have knowledge on the importance of colostrum compared to few other studies done in this region. There is an intense need to improve the knowledge of the women about feeding of clostrum through different awareness programs.

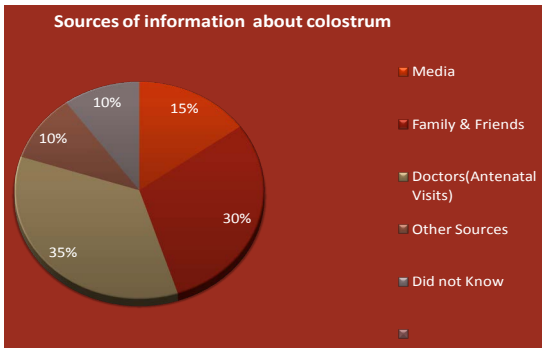


Figure 1. Knowledge, attitude and practice.

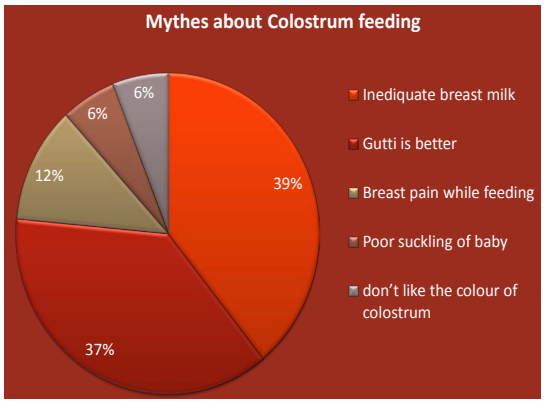


Figure 2. Myths and misconceptions.

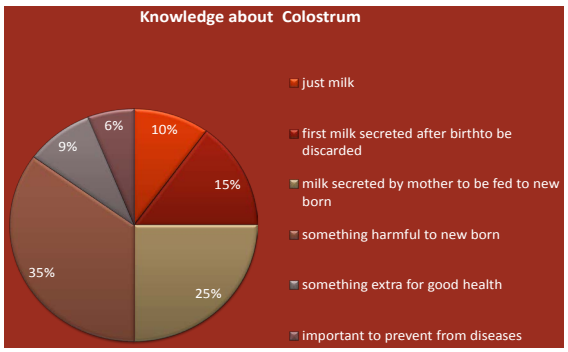


Figure 3. Knowledge about colostrums.

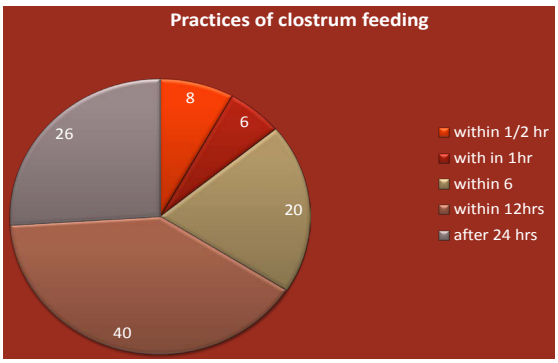


Figure 4. Practices of colostrums.

4.1. Outcome & Utilization of Study

This study will help in spreading knowledge, attitude and practices of colostrum feeding among general population as well as to create awareness regarding its importance.

4.2. Recommendations

- ❑ Information related to the clostrum feeding should be provided through health care providers and the media.
- ❑ Educational sessions should be arranged not only for the pregnant women.
- ❑ Media can play a vital role in this regard.
- ❑ Counseling services can be provided at work setting.
- ❑ Information's should be provided through local magazines & pamphlet in OPDs in local languages for the awareness of the society.
- ❑ Researches should be funded by the funding agencies.

5. Conclusion

Most of the women were not aware about the importance of colostrum, the data still indicate that further efforts are needed to improve the Knowledge, Attitude and Practice of colostrum feeding. Further awareness programs should be arranged to improve the Knowledge, Attitude and Practice of colostrum feeding in Pakistan.

References

[1] Silva, P. (2005) Environmental Factors and Children's Malnutrition in Ethiopia: Policy Research. Working Paper Series No. 3489, The World Bank, Washington DC.

[2] Alemayehu, T., Haidar, J. and Habte, D. (2009) Determinants of Exclusive Breastfeeding Practices in Ethiopia. *Ethiopian Journal of Health Development*, **23**, 12-18. http://dx.doi.org/10.4314/ejhd.v23i1.44832

[3] Mannel, R., Martens, P. and Walker, M., Eds. (2007) Core Curriculum for Lactation Consultant Practice. 2nd Edition, Jones and Bartlett Publishers, Sudbury, MA.

[4] La Leche League International. What Is Colostrum? How Does It Benefit My Baby? http://www.llli.org/faq/colostrum.html

[5] Ghai, O.P., Paul, V.K. and Bagga, A. (2009) Textbook of Paediatrics. 7th Edition, CBC Publisher and Distributors, New Delhi, 768.

[6] Heather Fisher Senior Thesis Project (2000) Colostrum: Properties, Functions, and Importance: The Relationship between the Immunoglobulin Concentration in Holstein Colostrum and the Total Senlm Protein in Holstein Heifer Calves.

[7] Science Daily (Homepage on the Internet). Colostrum. http://www.sciencedaily.com/articles/c/colostrum.html

[8] Loureiro, I., Frankel, G., Adu-Bobie, J., Dougan, G., Trabulsi, L.R. and Carneiro-Sampaio Magda, M.S. (1998) Human Colostrum Contains IgA Antibodies Reactive to Enteropathogenic *Escherichia coli* Virulence-Associated Proteins: Intimin, BfpA, EspA, and EspB. *Journal of Pediatric Gastroenterology & Nutrition*, **27**, 166-171. http://dx.doi.org/10.1097/00005176-199808000-00007

[9] Arifeen, S., Black, R.E., Antelman, G., Baqui, A., Caulfield, L. and Becker, S. (2001) Exclusive Breastfeeding Reduces Acute Respiratory Infection and Diarrhoea Deaths among Infants in Dhaka Slums. *Pediatrics*, **108**, e67. http://dx.doi.org/10.1542/peds.108.4.e67

[10] Oddy, W. (2002) The Impact of Breast Milk on Infant and Child Health. *Breastfeeding Review*, **10**, 5-18.

[11] United Nations Children's Fund. The State of the World's Children 2013: Children with Disabilities. Three United Nations Plaza, New York.

[12] UNICEF (2009) The Baby Friendly Hospital Initiative. http://www.unicef.org/newsline/tenstps.htm

Open Journal of Nursing, 2016, 6, 314-322
Published Online April 2016 in SciRes. http://www.scirp.org/journal/ojn
http://dx.doi.org/10.4236/ojn.2016.64033

Nursing Diagnoses of the Domain Safety/Protection and Socioeconomic and Clinical Aspects of Critical Patients

Anna Lívia de Medeiros Dantas[1], Ana Beatriz de Almeida Medeiros[1], Jéssica de Araújo Olímpio[1], Jéssica Dantas de Sá Tinôco[1], Maria Isabel da Conceição Dias Fernandes[1], Ana Luísa Brandão de Carvalho Lira[2]

[1]Nursing, Federal University of Rio Grande do Norte, Natal, Brasil
[2]The Nursing Department and Post-Graduate Nursing Program, Federal University of Rio Grande do Norte, Natal, Brasil
Email: livia_enfa@yahoo.com.br, abamedeiros@gmail.com, jessicaa_olimpio_@hotmail.com, jessica.dantas.sa@hotmail.com, bebel_6@hotmail.com, analuisa_brandao@yahoo.com.br

Received 12 March 2016; accepted 25 April 2016; published 28 April 2016

Abstract

Objective: The objective is to correlate the nursing diagnoses of the domain Safety/Protection of NANDA-I in critically ill patients with sociodemographic and clinical data. Method: A cross-sectional study with 86 individuals was conducted, from October 2013 to May 2014 in the Intensive Care Unit of a university hospital in northeastern Brazil, through a formal interview and physical examination. Results: It was possible to identify a total of 20 significant statistical associations, and 15 were clinically justified by the literature, namely: risk for aspiration and reason for admission; impaired dentition and age; risk for peripheral neurovascular dysfunction and sex and comorbidity; skin integrity and comorbidity; risk for impaired skin integrity and gender and reason for admission; impaired tissue integrity and gender and reason for admission; risk for perioperative positioning injury and reason for admission; risk for thermal injury and age and comorbidity; delayed surgical recovery and reason for admission; risk for poisoning and years of schooling; and risk for imbalanced body temperature and age. Conclusions: By understanding the relationship between customers' answers and the sociodemographic and clinical profile, positive health outcomes can be achieved in particular in the prevention of risks facing vulnerability characteristics, providing greater safety and protection for the critical customer.

Keywords

Nursing Diagnosis, Patient Safety, Intensive Care

How to cite this paper: de Medeiros Dantas, A.L., de Almeida Medeiros, A.B., de Araújo Olímpio, J., de Sá Tinôco, J.D., da Conceição Dias Fernandes, M.I. and de Carvalho Lira, A.L.B. (2016) Nursing Diagnoses of the Domain Safety/Protection and Socioeconomic and Clinical Aspects of Critical Patients. *Open Journal of Nursing*, **6**, 314-322.
http://dx.doi.org/10.4236/ojn.2016.64033

1. Introduction

Intensive Care Unit (ICU) is a critical area for admission of critically ill patients, who are greatly dependent on care and have multiple comorbidities and chronic diseases that require professional, specialized and continuous care, as well as specific materials and technologies necessary to diagnosis, monitoring and therapy [1] [2].

Thus, given the characteristics of these patients, there is a need of interventions of extreme complexity, as even the most basic actions become complex when performed in patients in critical condition. This required proper planning and a trained team [3].

Therefore, the ICU comprises a specialized nursing care with safe and complete approach that requires high technical and scientific competence [4]. Thus, the assessment of the critical patient is part of the nursing work process, whose aim is to check the health status and the care needs. The data obtained from this evaluation guide the formulation of a care plan directed to individual needs [5].

In this context, the safety and protection of critical patients become essential activities, in view of the complexity of care to which these individuals are subjected. Thus, from the perspective of patient evaluation, we highlight the nursing diagnoses (ND) of NANDA International (NANDA-I), inserted in the domain safety/protection, defined as "being free of danger, injury, or damage to the immune system; conservation against losses and protection of safety and of absence of dangers" [6].

The need for safety and protection in this clientele stands out in face of the high number of adverse events, mainly related to excessive risk exposure. Therefore, nurses must act precisely, with valid interventions, in an attempt to minimize such adverse events, considering their attitude toward aspects of structure and process that may trigger risks in critically ill patients while providing care [7].

It is understandable, therefore, the importance of addressing this issue in order to highlight the need for nursing staff emphasizes attention to quality of care, especially the reduction of errors and iatrogenic complications related to the care process. Thus, the nurse must know and evaluate the patient in order to identify early problems and adopt behaviors more quickly [2].

From this perspective, there is the need to recognize the social and clinical context in which critical patients are inserted, showing their relations with changes in safety and security they experience during hospitalization, in an attempt to direct the nursing actions before the specific characteristics of this clientele. Thus, the following question arose: Are the nursing diagnoses of the domain safety/protection of NANDA-I associated with the sociodemographic and clinical data of critically ill patients? Thus, this article aimed to correlate nursing diagnoses of the domain safety/protection of NANDA-I with the sociodemographic and clinical data in critically ill patients.

2. Method

This is a cross-sectional study conducted in the ICU of a university hospital in northeastern Brazil. This ICU has 19 beds for the treatment of general and surgical patients.

The study population consists of 791 patients admitted to the unit from October 2011 to September 2012. The sample was calculated from the application of the formula developed for studies of finite populations, considering the parameters: confidence level 95% ($Z\infty = 1.96$), sampling error of 10% and a population of 791 patients. From the application of the formula, we found a sample size of 86 individuals.

Patients were recruited according to the inclusion criteria: aged 18 years or older and patients undergoing medical or surgical treatment. Exclusion criteria were: patients hospitalized in the unit for a period less than 24 hours and those readmitted. The selection was held by convenience sampling and consecutively.

Data collection occurred from October 2013 to May 2014 (eight months), through an interview form and physical examination, with open and closed questions about the socioeconomic data and the defining characteristics (signs and symptoms), related/risk factors present in the domain safety/protection of NANDA-I. It is highlighted that this domain has a total of 37 ND, in six classes (infection, physical injury, violence, environmental risks, defensive processes and thermoregulation) [6]. However, the class 3-violence, which has five diagnoses, did not meet the study of customers in question, so it was excluded. The diagnosis risk for sudden infant death syndrome also did not apply to study customers. Finally, 31 diagnoses were analyzed in this study, these are: risk for contamination, risk for injury, risk for falls, risk for allergy response, risk for trauma, risk for infection, risk for aspiration, risk for shock, impaired dentition, ineffective airway clearance, risk for peripheral neurovascular dysfunction, impaired skin integrity, risk for impaired skin integrity, impaired tissue integrity, risk for pe-

rioperative positioning injury, risk for thermal injury, impaired oral mucous membrane, risk for dry eye, delayed surgical recovery, risk for bleeding, risk for suffocation, risk for vascular trauma, contamination, risk for poisoning, risk for adverse reaction to iodinated contrast media, risk for latex allergy response, hyperthermia, risk for imbalanced body temperature, ineffective thermoregulation, latex allergy response and hypothermia.

It is noteworthy that the instrument in question has been validated for the appearance and content by three experts in the fields of nursing diagnosis and/or intensive care, in order to verify the adequacy and relevance of the content and to identify the existence of gaps. The appropriate adjustments were made in the instrument.

Data were collected by three interviewers, they were the researcher and two collaborating students, of whom one was from graduation and the other from the multidisciplinary residence. They went through a previous training in order to enhance the use of the instrument used in the study, as well as on the selected theme, reducing possible biases at the time of collection. That training took place in September 2013 and consisted of a course on Systematization of Nursing Care to the hospitalized customer in the ICU, with a schedule of eight hours.

After collection, 86 sheets were prepared, each relating to a patient, containing sociodemographic and clinical data and the nursing diagnoses investigated, with the list of diagnosis components.

After, it was performed the process of diagnostic inference by diagnosticians, who were recruited among experts chosen according to the curriculum; these were specialists in Systematization of Nursing Care (SAE in Portuguese). Selection criteria were: having published articles referring to SAE and/or expertise or experience in the intensive care area.

In order to recruit the diagnosticians, it was held training with six experts chosen from pre-established criteria, and then their diagnostic capability was evaluated, in order to identify which professionals had greater diagnostic inference capacity for this domain. For this purpose, authors prepared 12 fictitious clinical cases, involving 31 nursing diagnoses of the domain safety/protection of NANDA-I. In these clinical cases, clinical histories with signs and symptoms of the studied diagnoses were reported, in which the expert should check the presence or absence of each diagnosis of the investigated domain. Experts performed the diagnostic inference of the 12 clinical histories three times, reaching a total of 36 assessments by expert, as recommended in the literature [8].

At the end, the performance of each specialist was assessed by Kappa test and, after that, three experts were selected as diagnosticians for this study. Subsequently, the diagnosticians received the 86 spreadsheets developed by the researcher, each relating to a patient and containing all the defining characteristics, the related factors and the risk of the domain under study, already marked for the presence (P) and the absence (A), as well as additional information regarding the socioeconomic and clinical data and observations relevant to the diagnostic inference process, in which diagnosticians judged the presence or absence of diagnosis in each patient.

The data were analyzed according to descriptive statistics for frequency measures, central tendency and dispersion. To check the normality of the data, authors used the Kolmogorov-Smirnov test ($p < 0.05$). For the inferential analysis, the Mann Whitney U, the Fisher's exact and the chi-square tests were used. To verify statistical association between the study variables, authors considered p-value <0.05.

The study was approved by the Ethics Research Committee of the institution under the Protocol 440/414 and presentation of certificate for ethical appreciation No. 22955113.2.0000.5292. All study participants or their legal representatives signed the Informed Consent Form.

3. Results

The study evaluated 86 critically ill patients admitted to the Intensive Care Unit, of which the majority were female (52.3%), had a religion (95.3%) and a partner (70.9%). Regarding origin, 61.6% came from the countryside. With regard to age, the average was 53.4 years old (±16.5), with a minimum of 18 and maximum of 81. With regard to the years of study, the median was six years, with a minimum of zero and a maximum of 20. These data will be presented in **Table 1**.

On the clinical data, it was observed that: the majority of patients (73.3%) were admitted to the ICU due to postoperative of major surgeries or for treatment of complications related directly to surgical procedures. Most patients (70.9%) had chronic diseases, did not smoke regularly (72.1%) and did not use alcohol (77.9%).

Of the 31 nursing diagnoses of the domain Safety/Protection investigated in critically ill patients, 29 presented varying frequencies. The following prevalence was identified: the diagnoses risk for contamination, risk for

Table 1. Socioeconomic characteristics of patients admitted to the intensive care unit of the University Hospital Onofre Lopes. Natal/RN, 2014.

Variables		n	%
Gender			
Female		45	52.3
Masculine		41	47.7
Total		86	100.0
Breed			
Brown		48	55.8
White		22	25.6
Black		15	17.4
Yellow		01	1.2
Total		86	100.0
Religion			
Yes		82	95.3
No		04	4.7
Total		86	100.0
Marital status			
with a partner		61	70.9
without a partner		25	29.1
Total		86	100.0
Origin			
Countryside		53	61.6
Capital city		33	38.4
Total		86	100.0

	Average	Standard deviation	Median	Minimum	Maximum	P-value
Age (in years)	53.4	16.5	54.5	18.0	81.0	0.200
Years of study	6.3	4.5	6.0	0.0	20.0	0.000**

**Kolmogorov-Smirnov test ($p < 0.05$).

injury, risk for falls, risk for allergy response and risk for trauma were present in 100% of the sample; risk for infection and risk for dry eye in 98.8%; risk for poisoning and risk for vascular trauma in 96.5%; impaired skin integrity in 95.3%; impaired dentition in 93%; risk for bleeding in 83.7%; risk for imbalanced body temperature in 82.6%; impaired tissue integrity in 76.7%; risk for perioperative positioning injury in 73.3%; risk for peripheral neurovascular dysfunction in 72.1%; risk for adverse reaction to iodinated contrast media in 69.8%; Risk for shock in 61.6%; and risk for aspiration in 50% of the sample investigated.

The other diagnoses had prevalence lower than 50%, namely: risk for thermal injury (46.5%), delayed surgical recovery (43.0%); ineffective airway clearance (40.7%); risk for suffocation (34.9%); risk for impaired skin integrity (17.4%); risk for latex allergy response (9.3%); hyperthermia (7.0%); ineffective thermoregulation (5.8%); impaired oral mucous membrane (2.3%); and contamination (1.2%).

Regarding the association between sociodemographic and clinical variables and the nursing diagnoses of the domain safety/protection of NANDA-I, **Table 2** presents the identified associations.

Table 2. Distribution of association between the nursing diagnoses of the domain safety/protection of NANDA-I and the sociodemographic and clinical variables of critical patients. Natal/RN, 2015.

Nursing diagnoses	Age	Years of study	Gender	Religion	Marital status	Origin	Reason for hospitalization	Comorbidity	Smokers	Alcoholic
Risk for infection	0.171[1]	0.656[1]	1.000[2]	1.000[2]	1.000[2]	0.384[2]	0.326[2]	1.000[2]	1.000[2]	1.000[2]
Risk for aspiration	0.853[1]	0.791[1]	0.280[3]	0.116[2]	0.096[3]	0.121[3]	**0.021[3]**	0.812[3]	1.000[3]	0.795[3]
Risk for shock	0.344[1]	0.681[1]	0.442[3]	0.636[2]	0.772[3]	0.542[3]	0.076[3]	0.437[3]	0.918[3]	0.877[3]
Impaired dentition	**0.033[1]**	0.088[1]	0.678[2]	0.255[2]	0.351[2]	0.399[2]	0.386[2]	1.000[2]	0.179[2]	0.610[2]
Ineffective airway clearance	0.135[1]	0.774[1]	0.763[3]	0.643[2]	0.690[3]	0.273[3]	0.222[3]	0.378[3]	0.546[3]	0.698[3]
Risk for peripheral neurovascular dysfunction	0.055[1]	0.447[1]	**0.033[3]**	0.064[2]	0.109[3]	0.918[3]	0.352[3]	**0.033[3]**	0.485[3]	0.450[3]
Impaired skin integrity	0.069[1]	0.657[1]	0.118[2]	0.176[2]	1.000[2]	1.000[2]	0.099[2]	**0.006[2]**	0.573[2]	1.000[2]
Risk for impaired skin integrity	0.466[1]	0.810[1]	**0.000[3]**	0.542[2]	0.757[2]	0.305[3]	**0.000[2]**	0.353[2]	0.542[2]	0.505[2]
Impaired tissue integrity	0.118[1]	0.434[1]	**0.001[3]**	1.000[2]	0.647[3]	0.723[3]	**0.000[3]**	0.505[3]	0.142[3]	0.542[2]
Risk for perioperative positioning injury	0.185[1]	0.569[1]	**0.044[3]**	0.568[2]	0.221[2]	0.624[3]	**0.000[3]**	0.542[2]	0.539[2]	0.746[2]
Risk for thermal injury	**0.001[1]**	0.903[1]	0.976[3]	0.120[2]	0.211[3]	0.549[3]	0.170[3]	**0.007[3]**	0.297[3]	0.139[3]
Impaired oral mucous membrane	0.108[1]	0.665[1]	1.000[2]	1.000[2]	0.499[2]	0.521[2]	1.000[2]	0.499[2]	0.483[2]	0.395[2]
Risk for dry eye	0.614[1]	0.224[1]	0.477[2]	1.000[2]	0.291[2]	0.384[2]	1.000[2]	0.291[2]	1.000[2]	1.000[2]
Delayed surgical recovery	0.137[1]	0.183[1]	**0.015[3]**	0.289[2]	0.481[3]	0.276[3]	**0.000[3]**	0.366[3]	0.820[3]	0.962[3]
Risk for bleeding	0.164[1]	0.473[1]	0.118[3]	0.122[2]	0.749[2]	0.328[3]	0.000[2]	1.000[2]	0.100[2]	0.500[2]
Risk for suffocation	0.673[1]	0.553[1]	0.555[3]	0.293[2]	0.719[3]	0.482[3]	0.281[3]	0.064[3]	0.851[3]	0.375[3]
Risk for vascular trauma	0.216[1]	0.962[1]	1.000[2]	0.135[2]	1.000[2]	1.000[2]	1.000[2]	1.000[2]	0.187[2]	0.532[2]
Contamination	0.087[1]	0.656[1]	1.000[2]	**0.047[2]**	0.291[2]	1.000[2]	0.326[2]	0.291[2]	1.000[2]	0.221[2]
Risk for poisoning	0.102[1]	**0.042[1]**	0.243[2]	0.135[2]	0.201[2]	1.000[2]	0.246[2]	0.201[2]	0.557[2]	0.532[2]
Risk for adverse reaction to iodinated contrast media	0.189[1]	0.222[1]	0.853[3]	0.081[2]	**0.022[3]**	0.329[3]	0.789[3]	0.819[3]	0.511[3]	0.885[3]
Risk for latex allergy response	0.608[1]	0.590[1]	0.716[2]	0.328[2]	1.000[2]	**0.050[2]**	1.000[2]	0.686[2]	0.680[2]	1.000[2]
Hyperthermia	0.147[1]	0.912[1]	0.678[2]	1.000[2]	1.000[2]	0.399[2]	1.000[2]	0.667[2]	0.670[2]	1.000[2]
Risk for imbalanced body temperature	**0.006[1]**	0.904[1]	0.512[3]	0.139[2]	0.757[2]	0.659[3]	0.128[2]	0.353[2]	0.752[2]	0.305[2]
Ineffective thermoregulation	0.612[1]	0.933[1]	1.000[2]	1.000[2]	0.625[2]	0.151[2]	0.659[2]	1.000[2]	0.130[2]	1.000[2]

Legend: [1]Mann Whitney U test; [2]Fisher's exact test; [3]Chi-square test. p-value < 0.05.

It is worth mentioning that it was not possible to perform the association tests for the diagnoses that showed prevalence of 100% of the sample (risk for contamination, risk for injury, risk for falls, risk for allergy response and risk for trauma) and for those that were not present in any patient (latex allergy response and hypothermia), since the formation of 2x2 tables is not allowed.

The results indicate the following statistically significant associations: risk for aspiration and reason for hospitalization (p = 0.021); impaired dentition and age (p = 0.033); risk for peripheral neurovascular dysfunction and gender (p = 0.033) and comorbidity (p = 0.033); impaired skin integrity and comorbidity (p = 0.006); risk

for impaired skin integrity and gender ($p = 0.000$) and reason for hospitalization ($p = 0.000$); impaired tissue integrity and gender ($p = 0.001$) and reason for hospitalization ($p = 0.000$); risk for perioperative positioning injury and gender ($p = 0.044$) and reason for hospitalization ($p = 0.000$); risk for thermal injury and age ($p = 0.001$) and comorbidities ($p = 0.007$); delayed surgical recovery and gender ($p = 0.015$) and reason for hospitalization ($p = 0.000$); contamination and religion ($p = 0.047$); risk for poisoning and years of study ($p = 0.042$); risk for adverse reaction to iodinated contrast media and marital status ($p = 0.022$); risk for latex allergy response and origin ($p = 0.050$); and risk for imbalanced body temperature and age ($p = 0.006$).

4. Discussion

Patients treated in Intensive Care Units are considered critical because they present changes in one or more vital organs, risk or hemodynamic instability and severe disorders that need individualized care by the multidisciplinary team. So, it is vital to ensure their safety and protection [9].

Age showed statistically significant association with impaired dentition, risk for thermal injury and risk for imbalanced body temperature. Thus, corroborating the data from this study in relation to impaired dentition and age, in a study developed with elderly patients in the center-west of Brazil, in order to determine the prevalence of the nursing diagnoses in the domain Safety/protection, the diagnosis impaired dentition was found in all seniors. The elderly participants of that study reported that difficulty of access to the dentist in childhood and adolescence, lack of knowledge about the importance of dental hygiene, including caring for dental prosthesis, and the fact of being smokers during adulthood were factors that influenced on the state of their teeth [10], which supports the association found in this study between age and the diagnosis impaired dentition.

Moreover, the association seen between age and thermal injury is based in the fact that senility causes skin changes that promote loss of thickness of the dermis, of approximately 20% in elderly individuals. The reduction of collagen decreases the skin resistance and hinders healing. The decrease of Langerhans cells makes elderly patients more susceptible to microorganism invasion, particularly in the occurrence of denuded skin. These factors may contribute to the appearance of skin lesions due to the loss of supporting tissue, which becomes more fragile and prone to abrasive, compression and thermal injuries [10].

The control of body temperature occurs difficultly in the elderly, since the regulatory mechanisms are altered by the aging process [11]. Elderly experience atrophy of the sweat and sebaceous glands, which reduces the amount of perspiration, thereby contributing to changes in thermoregulation, the loss and heat retention, which increases the risk for imbalanced body temperature [10]. These facts justify the correlation between age and the diagnosis risk for imbalanced body temperature.

The diagnosis risk for poisoning has been related to inappropriate use of drugs, with emphasis in the lack of knowledge about the risks of using them incorrectly, resulting in harm to the patient. This diagnosis showed a statistically significant association with the variable years of study. A descriptive study conducted in Brazil on drug intoxication identified that, although there is no statistical significance, people with less than three years of study represented approximately half of the deaths due to drug intoxication [12], which leads to infer that the lower the level of education, the more likely the person is to make improper administration of medication and possible poisoning.

The variable gender showed a statistically significant association with the diagnoses: risk for peripheral neurovascular dysfunction, impaired tissue integrity, risk for impaired skin integrity, risk for perioperative positioning injury and delayed surgical recovery.

This study identified prevalence of female subjects, which presents greater evidence with regard to neuroendocrine disorders. In addition, pregnancy, postpartum and higher incidence of varicose veins favor the emergence of vascular disorders, such as chronic venous insufficiency, justifying the association between gender and risk for neurovascular dysfunction [13]. In addition, a higher incidence of varicose veins in women favors the development of injuries, especially in the lower limbs, such as venous ulcers, which explains the association of the variable gender with risk for impaired skin integrity and impaired tissue integrity [13].

There was statistically significant association between the variable reason for hospitalization and five diagnoses of the domain Safety/protection, namely: risk of aspiration, risk for impaired skin integrity, impaired tissue integrity, risk for perioperative positioning injury and delayed surgical recovery.

It is known that critically ill patients from major surgeries are at increased risk for entry of gastrointestinal and oropharyngeal secretions, solids or fluids in the tracheobronchial tract, due to several factors, such as ga-

stroparesis, presence of endotracheal tube, reduced level of consciousness, drug therapy, among others [14]. These factors influence the increased risk for aspiration.

Thus, patients with altered level of consciousness are more prone to aspirate secretions in the airways due to the decreased airway protective reflexes, such as cough and pharyngeal reflex. It is indispensable that the nurse performs a rigorous evaluation about the patient's level of consciousness to identify early changes in neurological status, as well as swallowing pattern, thus avoiding the risk for aspiration [5].

In the ICU context, the postoperative monitoring is the most common, since after major surgical procedures, patients are usually transferred to the Intensive Care Unit, where they are monitored continuously and receive the necessary assistance [15]. In this sense, the present study revealed that, regarding the reason for ICU admission, most of the patients were admitted due to postoperative in major surgeries or due to complications that culminated in performing the surgery.

Some medical conditions and/or surgical procedures require the patient to remain bedridden or in the operating table, even keeping some part of the body restricted to avoid accidents or iatrogenesis. However, the positioning of the surgical patient requires special attention because the sedated or anesthetized patients are unable to reposition themselves when necessary to relieve discomfort. For this reason, team members should be alert to the need for repositioning, avoiding the risk of injury from the perioperative period [16] [17]. These facts may explain the association between the reason for hospitalization and the risk for perioperative positioning injury, even because most of the research subjects were admitted to the ICU after surgery.

Surgical patients, during hospitalization in the ICU, can remain in sedation or under the influence of anesthetic drugs and also under the positioning constraint. Such factors may interfere with skin breakdown of the critical patient, considering, in particular, the shortage of tissue perfusion and circulatory and ventilatory impairment, multiple surgical approaches, sepsis, use of vasoactive drugs and impaired nutritional status [16]. For this reason, the association between reason for hospitalization and risk for impaired skin integrity and impaired tissue integrity is relevant.

It is emphasized the profile of the studied hospital with regard to surgical procedures, since it is a reference in the performance of major surgeries for the entire state, with emphasis on cardiovascular and neurosurgical procedures. These types of surgeries require specific care, making the knowledge about the nursing care recommended to these patients fundamental [18]. Due to the large complexity of most surgeries, from which patients are sent to the ICU, the possibility of delayed postoperative recovery is evident, justifying the existing statistical association between the diagnosis delayed surgical recovery and the variable reason for hospitalization.

The study results showed that most patients had comorbidities associated with the critical clinical picture. Comorbidity can be defined as the presence of co-existing or additional diseases with respect to the underlying disease. This can change the prognosis and length of hospital stay and increase health care-related costs [19].

The most frequent comorbidities in critically ill patients under intensive care are diabetes, hypertension and chronic obstructive pulmonary disease (COPD) [20]. Arterial hypertension and diabetes mellitus are related to the risk of injury, for generating vascular complications that cause poor circulation, interfering with the skin integrity and subsequently in the wound healing process [21]. The association of these two conditions causes the progression to the development of renal failure, lower limb amputations, blindness and cardiovascular disease, with a view that hypertension increases the risk for macrovascular and microvascular injuries, exacerbating cardiac events and the appearance of lower limb injuries [21].

Among the comorbidities, diabetes stands out with regard to the association with the diagnosis risk for peripheral neurovascular dysfunction, which is defined as the risk of disturbance in circulation, sensitivity or movement of an end [6]. In the context of the complications of diabetes, there is the peripheral neuropathy, that causes, in addition to the loss of protective sensation, biomechanical changes and loss of sweating that protects the skin against dryness, and therefore is related to the associated diagnosis, as can be verified by the statistical significance between the two variables [21].

Some sociodemographic variables, despite presenting significant associations with the nursing diagnoses of the domain safety/protection, did not show plausible clinic justification, as the following associations: risk for perioperative positioning injury and gender; delayed surgical recovery and gender; contamination and religion; risk for adverse reaction to iodinated contrast media and marital status; risk for latex allergy response and origin.

Facing the association of the nursing diagnoses of the domain safety/protection and the sociodemographic and clinical aspects of critical patients, such findings are relevant in view of the possibility of building care plans targeted to the major needs of this clientele, according to the context in which they are inserted. It is, therefore,

nurses' responsibility to direct their assistance with a view to reduce risks to which this population is exposed, reducing complications and achieving positive health outcomes.

5. Conclusions

We can conclude that the nursing diagnoses of the domain safety/protection identified in critically ill patients in Intensive Care Unit may be influenced by their sociodemographic and clinical characteristics.

From the results, it was possible to identify a total of twenty significant statistical associations, and fifteen have been clinically justified by the literature, namely: risk for aspiration and reason for admission; impaired dentition and age; risk for peripheral neurovascular dysfunction and gender and comorbidity; impaired skin integrity and comorbidity; risk for impaired skin integrity and gender and reason for admission; impaired tissue integrity and gender and reason for admission; risk for perioperative positioning injury and reason for admission; risk for thermal injury and age and comorbidity; delayed surgical recovery and reason for admission; risk for poisoning and years of study; and risk for unbalanced body temperature and age.

Five associations showed no clinical support, although the *p*-value was <0.05, namely: risk for perioperative positioning injury and gender; delayed surgical recovery and gender; contamination and religion; risk for adverse reaction to iodinated contrast media and marital status; risk for latex allergy response and origin. This finding indicates the need for further studies with different methods in order to justify the relationships identified here.

As a limitation to the study, we identified the difficulty for the measurement of certain clinical indicators, which did not relate to the customer in question or could not be measured due to the health status of patients, in addition to indicators that were related to knowledge of other professionals, including: aspects related to nutritional factors; indicators for the diagnoses impaired dentition and impaired oral mucous membrane.

Thus, the present findings will enable nurses to know and evaluate patients, identifying their peculiarities, with a view to adopt an individualized assistance and closer to the needs of each individual. Thus, by understanding the relationship between customers' human responses and their sociodemographic and clinical profile, positive health outcomes can be achieved, in particular in the prevention of risks facing the vulnerability characteristics, providing greater safety and protection to critical patients.

References

[1] Resolution-RDC Nº 7, de 24 de fevereiro de 2010. Diário Oficial da União. Imprensa Nacional. Nº 37-DOU de 25 de fevereiro de 2010. Vol. 1, Agência Nacional de Vigilância Sanitária, Ministério da Saúde, 48.

[2] Inoue, K.C. and Matsuda, L.M. (2010) Dimensioning of Nursing Staff in the Intensive Care Unit for Adults. *Acta Paulista de Enfermagem*, **23**. https://www.fen.ufg.br/fen_revista/v11/n1/pdf/v11n1a07.pdf

[3] Lima, D.V.M. and Lacerda, R.A. (2010) Oxy-Hemodynamic Effects of Bathing in the Adult Patient in Critical Condition in Hospital: A Systematic Review. *Acta Paulista de Enfermagem*, **23**. http://www.scielo.br/scielo.php?pid=S0103-21002010000200020&script=sci_arttext

[4] Camelo, S.H.H., Silva, V.L.D.S., Laus, A.M., *et al.* (2013) Professional Profile of Nurses Working in Intensive Care Units of a Teaching Hospital. *Ciência e Enfermagem*, **19**. http://www.scielo.cl/pdf/cienf/v19n3/art_06.pdf

[5] Padilha, K.G., Vattimo, M.F.F. and Silva, S.C. (2010) ICU Nursing: Caring for Critically Ill Patients. Manole, Barueri.

[6] Herdman, T.H. (2013) NANDA International Nursing Diagnoses: Definitions and Classification 2012-2014. Wiley-Blackwell, Oxford.

[7] Lobão, W.M. and Menezes, I.G. (2013) Psychometric Analysis of Predisposition Scale to Adverse Events Occurred in Nursing Care in ICUs. *Revista Latino-Americana de Enfermagem*, **21**. http://dx.doi.org/10.1590/S0104-11692013000100015 http://www.scielo.br/pdf/rlae/v21n1/pt_v21n1a15.pdf

[8] Lopes, M.V.O., Silva, V.M. and Araújo, T.L. (2012) Methods for Establishing the Accuracy of Clinical Indicators in Predicting Nursing Diagnoses. *International Journal of Nursing Knowledge*, **23.** http://onlinelibrary.wiley.com/doi/10.1111/j.2047-3095.2012.01213.x/pdf

[9] Knobel, E. (2010) Intensive Care: Nursing. Atheneu, São Paulo.

[10] Guedes, H.M., Nakatani, A.Y.K., Santana, R.F., *et al.* (2009) Identification Domain Nursing Diagnoses Safety/Protection in the Elderly Admitted to the Hospital System. *Revista Eletrônica de Enfermagem*, **11**, 249-256. http://www.fen.ufg.br/revista/v11/n2/v11n2a03.htm

[11] Hardcastle, T.C., Stander, M., Kalafatis, N., *et al*. (2013). External Patient Temperature Control in Emergency Centers, Trauma Centers, Intensive Care Units and Operating Theatres: A Multi-Society Literature Review. *South African Medical Journal*, **103**, 609-611. http://www.samj.org.za/index.php/samj/article/view/7327/5362 http://dx.doi.org/10.7196/SAMJ.7327

[12] Mota, D.M., Melo, J.R.R., Freitas, D.R.C., *et al*. (2012) Profile of Mortality from Poisoning with Drugs in Brazil, 1996-2005: Portrait of a Decade. *Ciência e saúde coletiva*, **17**, 61-70. http://www.scielo.br/pdf/csc/v17n1/a09v17n1.pdf http://dx.doi.org/10.1590/S1413-81232012000100009

[13] Macêdo, E.A.B., Oliveira, A.K.A., Melo, G.S.M., *et al.* (2010) Socio-Demographic Characteristics of Patients with Venous Ulcers Treated at a University Hospital. *Revista de Enfermagem UFPE Online*, **4**, 1863-1867. https://www.researchgate.net/publication/49591915_Characterization_socio-demographic_of_patients_with_venous_ulcers_treated_at_a_university_hospital

[14] Luk, J.K.H. and Chan, D.K.Y. (2014) Preventing Aspiration Pneumonia in Older People: Do We Have the "Know-How"? *Hong Kong Medical Journal*, **20**, 421-427. http://www.hkmj.org/abstracts/v20n5/421.htm

[15] Smeltzer, S.C., Bare, B.G., Suddarth, D., *et al.* (2011) Treaty of Medico-Surgical Nursing. 12th Edition, Guanabara Koogan, Rio de Janeiro.

[16] Spruce, L. and Van, W.S.A. (2014) Back to Basics: Positioning the Patient. *Association of Perioperative Registered Nurses Journal*, **100**, 298-305. http://www.aornjournal.org/article/S0001-2092%2814%2900656-5/pdf

[17] Melo, E.M., Albuquerque, M.P. and Aragão, R.M. (2012) Prevalent Nursing Diagnoses in the Intensive Care Unit of a Public Hospital. *Revista de Enfermagem UFPE Online*, **6**, 1361-1368. http://www.revista.ufpe.br/revistaenfermagem/index.php/revista/article/view/2514/pdf_1243

[18] Lira, A.L.B.C., Araújo, W.M.D., Souza, N.T.C., *et al.* (2012) Mapping of Nursing Care for Patients after Cardiac Surgery. *Revista Rene*, **13**, 1171-1181. http://www.repositorio.ufc.br/ri/bitstream/riufc/4587/1/2012_art_albclira.pdf

[19] Rouquayrol, M.Z., Gurgel, M. (2013) Epidemiology & Health. 7th Edition, MedBook, Rio de Janeiro.

[20] Tolentino, A.C.M.S., Schutz, V., Peregrino, A.F., *et al*. (2014) Epidemiological Profile of Patients in ICU Use of Indwelling Catheters. *Revista de Enfermagem UFPE Online*, **8**, 3256-3265. http://www.revista.ufpe.br/revistaenfermagem/index.php/revista/article/view/6002/pdf_6203

[21] Morais, G.F.C., Soares, M.J.G.O., Costa, M.M.L., *et al.* (2009) Diabetic before the Treatment, Risk Factors and Chronic Complications. *Revista de Enfermagem UERJ*, **17**, 240-245. http://www.facenf.uerj.br/v17n2/v17n2a18.pdf

Open Journal of Nursing, 2016, 6, 323-332
Published Online April 2016 in SciRes. http://www.scirp.org/journal/ojn
http://dx.doi.org/10.4236/ojn.2016.64034

Part B: The Feasibility and Acceptability of mI SMART, a Nurse-Led Technology Intervention for Multiple Chronic Conditions

Jennifer A. Mallow[1*], Laurie A. Theeke[1], Rebecca Walls[2], Elliott Theeke[1], Brian K. Mallow[3]

[1]School of Nursing, West Virginia University, Morgantown, West Virginia, USA
[2]Milan Puskar Health Right, Morgantown, West Virginia, USA
[3]Sovern Run, LLC, Albright, West Virginia, USA
Email: [*]jamallow@hsc.wvu.edu, ltheeke@hsc.wvu.edu, etheeke@hsc.wvu.edu, bkmallow@gmail.com

Received 29 March 2016; accepted 25 April 2016; published 28 April 2016

Abstract

Background: An opportunity to improve care of multiple chronic conditions for those living in rural areas of the country may exist through the use of technology. Integrating technology interventions into existing rural health systems allows for increased access to healthcare services and augments self-management ability for patients. However, questions remain about acceptability and feasibility of technology use in rural populations. The purpose of this paper is to present the feasibility of mI-SMART, a HIPAA compliant, web-based, structure of mHealth sensors and mobile devices designed to overcome the known health determinant of access to care for rural, chronically ill patients by using technology. Methods: The study was conducted at a primary-care clinic that provided healthcare at no or low cost to low income adults. Inclusion criteria encompassed adults, with at least one chronic condition, having at least 3rd grade reading level, without having dementia/psychosis. Each participant was given a Nexus7 tablet and Bluetooth self-monitoring devices. Feasibility was evaluated in four ways and acceptability was evaluated with post-intervention questionnaires. Results: Thirty participants [mean age: 52 years (SD: 10.0, range: 29 - 74)] were majority female (70%), white (70%), married (60%), high-school educated or less (56.7%), impoverished (less than $20,000 per annum (56.7%), with multiple chronic conditions (96.7%)). During the trial, all participants were able to transmit data. No error messages were due to the mI-SMART system. Errors were user related and solved with technical support. Mean number of self-monitor transmissions was 219.7 [(SD: 197.4), range: 1 - 733]. Participants logged into the system an average of 163. 1 [(SD: 169.7), range: 2 - 568] times and viewed an average of 1092.1 [(SD: 1205.6), range: 8 - 3851] intervention components. Over eighty-six percent of participants sent data for 12 weeks and 43.1% used the intervention for longer. Conclusions: The mI-SMART system is a feasible option for impoverished persons living in rural areas.

[*]Corresponding author.

How to cite this paper: Mallow, J.A., Theeke, L.A., Walls, R., Theeke, E. and Mallow, B.K. (2016) Part B: The Feasibility and Acceptability of mI SMART, a Nurse-Led Technology Intervention for Multiple Chronic Conditions. *Open Journal of Nursing*, **6**, 323-332. http://dx.doi.org/10.4236/ojn.2016.64034

Keywords

Multiple Chronic Conditions, mHealth, Telehealth, Health Disparities, Nursing Informatics

1. Introduction

An opportunity to improve care of multiple chronic conditions (MCC) for those living in rural areas of the country may exist through the use of technology. Integrating technology interventions into existing rural health systems may allow for increased access to healthcare services and augment self-management ability for patients [1] [2]. Examples of how technology has been used to improve care for chronic conditions includes: accessing information in electronic medical records, requesting medication refills and appointments through computerized systems, communicating using secure message systems, using connected devices to manage specific chronic conditions, using personal health records to track progress, interacting with on-line support groups, and using video conferencing to complete office visits [3]. The subsequent long-term effects of technology use lead to diminished health disparities, improved patient outcomes, and reduced healthcare costs [4].

Improving care for individuals with MCC is a priority in the United States. Approximately one in four Americans have two or more chronic conditions and individuals who experience MCC have an increased risk of dying, poor day-to-day functioning, and increased hospitalizations [5]. As such, the department of Health and Human Services developed a strategic framework to improve the health status of individuals with MCC [6]. There are four goals of the framework. First, the promotion of health system changes intended to improve the health of individuals with MCC. Second, use of self-care management and other services with empirical evidence of efficacy to improve care for individuals with MCC is supported. Next, providing better tools and information for those who deliver care to individuals with MCC is warranted. Lastly, facilitating research to fill knowledge gaps about interventions and systems for those with MCC is encouraged.

In order to address the strategic framework set forth by the department of human services, a new technology platform was developed. The platform, called mI SMART (Mobile Improvement of Self-Management Ability through Rural Technology), was developed using the model for developing complex nursing interventions [7]. The model suggests a progression for development of interventions with the purpose of increasing effectiveness, sustainability, and scalability. The theoretical underpinnings of mI SMART are based on the Chronic Care Model which consists of six interrelated system changes meant to make patient-centered, evidence based care easier to accomplish [8]. The major concepts in the Chronic Care Model are: health system, community support, self-management support, decision support, clinical information systems, and delivery system design [9]. The Chronic Care Model is operationalized via mI SMART through a prepared healthcare team delivering planned interactions, self-management support with effective use of technology resources, integrated decision support, and supportive information technology (IT) which are designed to work together to strengthen the provider-patient relationship, improve communication, self-management ability, and improve health outcomes.

However, private industries have developed much of the available healthcare technology and technology is often being used in non-academic settings. Therefore, questions remain about acceptability and feasibility of technology use in rural populations. The purpose of this paper is to present the initial feasibility and acceptability of mI SMART, a nurse-led technology intervention for MCC in primary care.

2. The mI SMART Platform

The completed system combines a HIPAA compliant, web-based, structure of mHealth sensors and mobile devices to treat and monitor multiple chronic conditions. Different from what currently exists, mI SMART integrates primary care of multiple chronic conditions into one technology intervention. The mI SMART system allows patients to track diagnoses, medications, lab results, receive reminders for self-management, perform self-monitoring, obtain feedback in real time, engage in education, and attend visits through video conferencing. The system displays a record database to patients and providers. Integration into existing Electronic Health Records is in progress.

3. Methods

3.1. Setting

The study was conducted at Milan Puskar Health Right, a primary care clinic that provides health care at no or low cost to uninsured or underinsured, low income, adults aged 18 - 64 living in West Virginia. The clinic provides direct healthcare, health education, medications, and social services for this patient population. Our previous pilot studies using the EMR of the rural healthcare clinic where the intervention took place have identified that mean travel distance to this clinic for patients is 21 miles. The clinic has more than 28,000 patient encounters annually. The study was conducted between December 2, 2014 and December 8, 2015. This research study was reviewed by the West Virginia University Institutional Review Board (IRB) and was approved in accordance with 46 CFR 46.101b (Protocol # 1501534474).

3.2. Participants

At-risk patients are those patients for whom attending frequent clinic visits is difficult due to a lack of transportation, working hours that are not conducive to regular office visits, or distance to the clinic is greater than the average distance. In addition, each participant must have a current diagnosis of Multiple Chronic Conditions that could be addressed using the mI SMART system. For example, participants can live with any combination of depression, diabetes, obesity, hypertension, or hyperlipidemia. Given these parameters, the identification of 30 participants was done through the recommendations of nurse practitioners and physicians in the clinic. The sample size was determined by the cost of the equipment and the amount of funding received. Inclusion criteria include being an adult age 18 - 64 with a diagnosis of multiple chronic illnesses and receiving care at the free clinic. Study participants are of both genders. Exclusion will include participants who do not speak or read English at a 3rd grade reading level, and those with dementia or psychosis that would prevent on-going education and communication.

3.3. The Intervention

The mI SMART platform was implemented for 12 weeks with each recruited patient. The period of twelve weeks was chosen to overcome the potential for Hawthorne effect, allowing participants to establish a routine of using mI SMART. After the potential participants were identified by nurse practitioners and physicians in the clinic, they were contacted by the front desk staff and invited to participate. Potential participants were scheduled to come into the clinic for intervention explanation and completion of informed study consent. Each consenting participant was given a Nexus 7 tablet, and Bluetooth enabled self-monitoring devices that were individualized to their specific chronic illness diagnoses. The available devices were a glucometer, blood pressure cuff and scale. Instruction on how to use the tablet, the mI SMART platform, the self-monitoring devices, and personalized expectations of how and when to use the self-monitors were given to each participant. The participant was given the opportunity to ask questions. In addition to a verbal and hands-on demonstration, participants were given written and recorded instructions regarding how to use the system. Each participant was also given contact information for study staff for technical assistance. The participants answered pre-intervention surveys using the tablet prior to leaving the initial visit. Once the participant returned home, they began their 12 week intervention, using mI SMART to access the clinic instead of in-person visits. During the 12 weeks, each participant received education videos and live video conferencing with a health educator via the mI SMART platform. The content of the videos and education were dependent on the unique combination of chronic conditions of the participant. Tailored education included blood glucose monitoring, medication, nutrition, exercise, foot care, heart disease, complications of chronic illnesses, behavior change and more topics based on participant need. Patients received automated reminders for using the self-monitoring devices and taking medications. All clinic healthcare visits were completed using the mI SMART developed video conferencing system and were scheduled per the wishes of the provider and patient. The healthcare provider performed an assessment of the health history, limited physical exam, medication adjustments, and appropriate referrals via the developed video teleconferencing system. In addition to the automated feedback provided by the mI SMART system, a Registered Nurse reviewed and provided feedback and appropriate referral for finger stick logs, blood pressure logs and weights via the developed secure messaging system. At the end of the 12 week period each participant was able to keep the equipment provided.

3.4. Demographics

Demographics were collected so that descriptive reports of the sample can be reported. The following demographics were collected: age, gender, ethnicity, marital status, education, income, number of chronic illnesses, and number of people in household.

3.5. Feasibility and Acceptability

The use of the developed technology to deliver the intervention and to collect and store data was evaluated in four ways: (1) reviewing the presence or absence of data in the database from each participant, (2) assessing the electronic activity logs and error messages for each participant, (3) assessing the electronic activity logs and error messages for each provider (4) analyzing the electronic activity logs of each application for number of times each application was used as well as common errors. Lastly, we assessed the acceptability of the technology with post intervention electronic patient satisfaction questionnaires. The questionnaires were accessible to the participants within the mI SMART system on the provided tablet and released to them on the last day of the intervention. Reminders were sent to each participant through the notification system within mI SMART and via telephone call to complete the questionnaires.

3.6. Patient-Provider Communication & Satisfaction

Participants were provided questionnaires to assess communication based on 5-point Likert scale (see **Figure 1** for the questionnaire used). The ease and convenience of communication, promptness of replies, quality and amount of information, and quality of care were evaluated. In addition, participants' satisfaction with the overall system was assessed. All communication requiring interaction between the patient and health care provider was stored in an activity log. The activity log was analyzed for frequencies of all patient-provider communication.

4. Results

4.1. Demographics

Thirty participants were enrolled and consented to participate in the study. The mean age of participants was 52 years (SD: 10.0, range: 29 - 74). The remainder of the participant demographics can be found in **Table 1**.

4.2. Feasibility

During the trial, all participants were able to transmit data from their self-monitoring devices located in their home in rural areas of West Virginia to our centralized servers. No error messages were received that were due to the mI-SMART system. All errors were user related and solved with technical support.

The most common errors were due to dual connections, third party vendor issues, hardware failure, and user unfamiliarity. The first type of error was due to security practices. When the tablet was connected to both a wifi connection and the mobile data service, the video conferencing would fail to connect to the provider. This problem was solved by instructing participants to turn off the wifi connection on the tablets for the duration of the study. The second type of error was due to issues with connectivity of third-party self-monitoring devices. A transmission error would occur that would delay the readings from reaching the mI SMART database. This was not an error that could be controlled internally. While the connection issue was usually resolved by the third-party vendor within 30 minutes, the tablet would announce a loss in connection. If this occurred at night, the announcement was disruptive to the patient. This was solved by contacting the vendor and instructing the patient to turn the audio off on the tablet when not in use. In addition, patients reported that the battery life of the tablet was about 12 hours and the glucometer batteries needed to be replaced at least once during the 12 week intervention. This was solved by instructing the patient to turn the blue-tooth connection off when not in use and by providing the patient with more batteries for the glucometer. Three blood pressure cuffs were damaged and two tablets were broken (a dog ate one and a baby dropped the other), each piece of damaged equipment was replaced. The user error problems were mostly due to an unfamiliarity with the technology and solved with education provided by phone or secure messaging.

Mean number of self-monitor transmissions for each participant was 219.7 [(SD: 197.4), range: 1 - 733] readings. Participants logged into the system an average of 163. 1 [(SD: 169.7), range: 2 - 568] times and viewed an

Table 1. Demographics.

Demographic	N	%
Gender		
Male	9	30
Female	21	70
Ethnicity		
African American	2	6.7
Asian/Pacific Islander	1	3.3
Hispanic	3	10
Native American	1	3.3
White	21	70
Other	2	6.7
Marital status		
Divorced	4	13.3
Married	18	60
Separated	3	10
Single	2	6.7
Widowed	3	10
Education		
Less than high school	7	23.3
High school/GED	10	33.3
Some College	5	16.7
2 year college degree	3	10
4 year college degree	3	10
Master's degree	2	6.7
Income		
Less than $20,000	17	56.7
$20,000 - $34,999	8	26.7
$35,000 - $49,999	3	10
$50,000 - $74,999	1	3.3
More than $100,000	1	3.3
Household size		
Lives alone	4	13.3
2 people in the home	8	26.7
3 people in the home	4	13.3
4 people in the home	3	10
5 people in the home	3	10
Did not answer	8	26.7
Number of chronic illnesses		
1	3.3	3.3
2	3	10
3	4	13.3
4	8	26.7
5	3	10
6	6	20
7	2	6.7
9	1	3.3
10	1	3.3
12	1	3.3

mI SMART Satisfaction Questionnaire

Instructions: After reading each question, pick the answer that *best* describes your situation. The order of the answers varies between the questions, so take a moment to read each question carefully.

1. How satisfied are you with mI SMART?
   Very satisfied
   Satisfied
   Neither satisfied nor dissatisfied
   Dissatisfied
   Very dissatisfied
2. How satisfied are you with the explanations the research coordinator has given you about the mI SMART system?
   Very dissatisfied
   Dissatisfied
   Neither satisfied nor dissatisfied
   Satisfied
   Very satisfied
3. The Nurse practitioner was as careful to check everything when seeing you with the mI SMART system as they would be in person.
   Strongly agree
   Agree
   Not sure
   Disagree
   Strongly disagree
4. How satisfied were you with using mI SMART when receiving your health care?
   Very dissatisfied
   Dissatisfied
   Neither satisfied nor dissatisfied
   Satisfied
   Very satisfied
5. The mI SMART system increased communication with the healthcare team.
   Strongly agree
   Agree
   Not sure
   Disagree
   Strongly disagree
6. The mI SMART system increased the amount of times I check my finger stick.
   Strongly agree
   Agree
   Not sure
   Disagree
   Strongly disagree
7. The mI SMART system increased the amount of times I check my blood pressure.
   Strongly agree
   Agree
   Not sure
   Disagree
   Strongly disagree
8. The mI SMART system increased the amount of times I check my weight.
   Strongly agree
   Agree
   Not sure
   Disagree
   Strongly disagree
9. Are you satisfied with the care you received with mI SMART?
   Very satisfied
   Satisfied
   Neither satisfied nor dissatisfied
   Dissatisfied
   Very dissatisfied

What did you like best about the mI SMART system?
What did you like least about the mI SMART system?
What you would change about the mI SMART system?
What were the barriers to using the mI SMART system?
What helped you to use the mI SMART system?
If you could continue to use mI SMART would you?

Do you think mI SMART increased your access to care?
_____ Yes
_____ No
Do you think mI SMART helped you to interact with healthcare more frequently?
_____ Yes
_____ No
Do you think mI SMART decrease your burden in receiving healthcare?
_____ Yes
_____ No
How do you think the mI SMART platform would affected your healthcare?
_____ Improved my healthcare
_____ My healthcare was about the same
_____ Negatively affected my Healthcare
_____ I don't know how it affected healthcare
What do you think is most important for a healthcare provider to understand about you before making treatment decisions?
Have you ever left a clinic visit and been confused about what you were to do when you got home?
_____ Yes, but not very often
_____ Yes, all the time
_____ No
Do you feel like a system like mI SMART would be helpful when you are confused about how to care for yourself at home?
_____ Yes, but not very often
_____ Yes, all the time
_____ No
What outcomes are most important to you? (Check all that apply)
_____ Quality of Life
_____ Knowledge of my conditions
_____ Measurement readings like fingersticks, blood pressures, weight, ect.
_____ Other, Please list:

Please provide any other suggestions you may have for the developers of mI SMART:

Figure 1. Acceptability questionnaire.

average of 1092.1 [(SD: 1205.6), range: 8 - 3851] intervention components (see **Table 2** for details of intervention components viewed).

Over eighty-six percent of participants (N = 26) sent data for the entire 12 weeks of the intervention and 46.61% (N = 14) used mI SMART for longer than the 12 week intervention. One participant began a new job that required travel and left the equipment at home. When he returned to his residence the intervention period was over. Two participants were lost to follow-up after the first day of monitoring. Follow-up with these participants was attempted but no response was received (see **Figure 2**. It is important to note that no-show rates for office visits in this particular clinic have been historically around 42%). Hence, the 13.4% attrition rate in this study is promising.

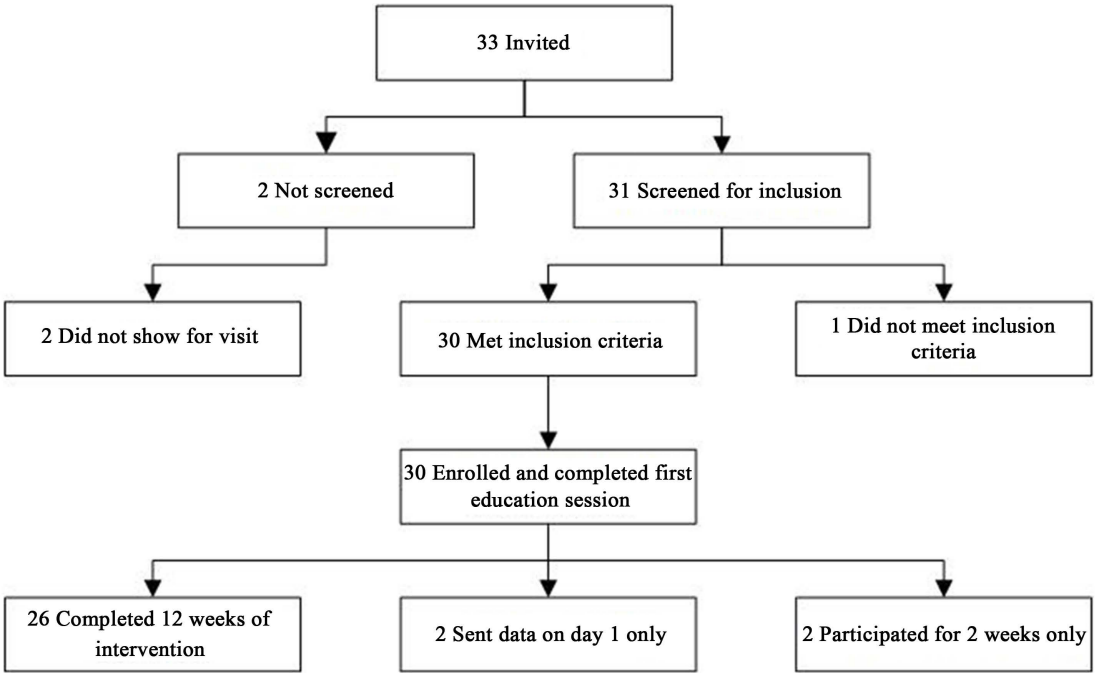


Figure 2. Summary of recruitment, enrollment, and completion by participants.

Table 2. Intervention component views.

Intervention component	Range	SD	Mean
Notifications/reminders	1 - 2540	821.5	542.20
Self-monitor results	1 - 362	81.95	71.70
Appointment list	4 - 429	84.10	69.33
Messages	1 - 250	69.00	63.40
Education	1 - 41	10.20	12.23
Virtual visits (video conferencing)	1 - 96	18.31	10.77
Prescription list	1 - 50	11.37	10.43
Lab results	1 - 103	18.63	8.80
Diagnosis list	1 - 18	3.85	4.23

4.3. Acceptability

One-third of the participants (N = 10) of the first trial of mI SMART responded to the post-intervention satisfaction questionnaire. Of the participants that responded, reported that they were either satisfied or very satisfied with the mI SMART platform. When asked if the healthcare providers were as careful when using mI SMART as they would be in person, nine respondents either agreed or strongly agreed and one participant was unsure. Eight participants felt that the mI SMART system increased communication with the healthcare team, 2 participants were not sure. Seven participants felt that using the system increased the amount of times that they performed self-monitoring such as taking glucometer, blood pressure and weight readings. Three participants reported that they completed their self-monitoring about the same amount using the mI SMART system as they would without. No one felt that the system decreased the amount of self-monitoring completed. Six participants answered the open-ended question, "What did you like best about the mi SMART system?" The responses included:

- "Increasing communication with my nurse",

- "Easy to use",
- "Being more aware of my overall health",
- "Not having to go to the office",
- "Knowing that health professionals are looking over your shoulder all the time gives a very reassuring feeling",
- "That my Doctor could monitor everything and that I could talk to her."

Five responses were received to the question "What did you like least about the mI SMART system?" two responses were related to the short battery life of the tablet, two responses were related to having unreliable internet connection in certain areas and one person stated "nothing".

The changes participants would make to mI SMART included, two participants asking to "add a food log", one asked for "better monitoring equipment" and one asked for "longer battery life of the tablet." There were two responses to the barriers of using the mI SMART system and they were both related to having to seek out the best place in their house to find internet connectivity. When asked what helped them to use the mI SMART system three respondents reported that the project coordinator was helpful, one said that they Health Right clinic was helpful, one reported all of the information they were given about the system, and one stated that being familiar with tablets and computers was helpful. Eight respondents reported that the system increased their access to care and that they interacted with healthcare providers more frequently. Eight participants reported that mI SMART improved their healthcare, one felt that the healthcare was about the same, and one didn't know how using the system affected their healthcare. When asked what outcomes were the most important to them, seven reported measures like glucose and weight, two reported quality of life, and one responded knowledge of conditions. All 10 respondents reported that if they could continue to use the mI SMART system they would.

5. Discussion

This study examined the feasibility and acceptability of mI SMART, a new technology intervention to improve access and outcomes for rural and underserved individuals living with multiple chronic conditions. West Virginia is the only state that is entirely located in the rural Appalachian mountain region. Prior to this trial, it was unknown if a technology platform using internet and wireless data was possible in such rural locations. It is noteworthy that all participants were able to transmit data from their homes at least once. Meaning, using internet interventions in rural populations is feasible. While no error messages were received in the database related to the mI SMART system, users did experience technical difficulties. Hence, patients having access to dedicated technical support will continue to be important as the intervention grows. Knowing the most common technical difficulties patients experience is important as future trials will include education on how to problem solve these issues. Hopefully, this will decrease frustration with the technology so that patients can focus on desired health outcomes.

Based on transmissions logs, most participants sent more than one self-monitoring reading per day for the duration of the intervention. Not surprisingly, the most used components of the intervention were interactive and required patients to engage with the system. Patient notifications and reminders was by far the most used part of the mI SMART intervention. However, the standard deviation was large and the range was wide. Hence, further investigation of which aspects of the notification system were desirable and effective is warranted. The least used components were education, prescriptions, laboratory results and diagnosis. To some degree, these results are understandable. If participants did not have recent laboratory tests or changes in diagnosis, it is expected that they would not interact with these components of the intervention. However, the lack of interaction with education components of the system warrants further investigation. The types of education, format of education, and amount of education patients' desire is still unknown.

Several factors affected patient acceptability of mI SMART. For example, one patient stopped using the system after 2 weeks, reporting that the frequent monitoring and small battery life of the tablet were frustrating and problematic. In addition, nearly half of the participants interacted with the system for longer than the 12 week intervention. The participants were only given 12 weeks of data service. Hence, this finding is interesting for two reasons. First, this would require participants to purchase their own data plans to continue to use the system, further supporting that internet interventions are feasible in rural and low resource environments. Secondly, the patients found the intervention acceptable enough to continue.

Despite reminders, the limited number of participants who completed acceptability surveys gave a limited

view of the general acceptability of mI SMART. Though only 1/3 completed, one could logically infer from the continued use of mI SMART by the majority of participants, that it was useful. It is a key point that those who completed the surveys indicated that they would plan for continued use if available. More so, knowledge was gained about the similarities of mI SMART to in-person care which is similar to the literature. Most reported that they felt their care was similar to in-person care. Since mI SMART was noted to increase communication and self-monitoring, broader future evaluations of patient engagement in multiple self-care behaviors would be a strategic next step. Investigating other tablet options for longer battery life will be important in future trials.

6. Limitations

This study had several limitations. First, the study used a convenience sample of chronically ill adults receiving care at a free clinic. The sample was mostly female, white, married, with more than four chronic conditions living with low socioeconomic status. While the sample is representative of this particular state and clinic, the findings are not generalizable to the larger population. The low number of responses to post-intervention surveys limits what can be extrapolated related to acceptability of the intervention. Lastly, due to the small size of the clinic where the intervention was delivered, the feasibility and acceptability of the intervention for healthcare providers could not be evaluated. Hence, recommendations related to workflow, satisfaction of delivering care remotely, and cost of delivering the intervention cannot be assessed.

7. Conclusion

This study adds new knowledge about the feasibility and acceptability of mI SMART, a nurse led technology intervention for treating MCC in primary care. The development of the intervention is also available in part A of this publication series. In addition, the study team has completed the initial investigation of the effectiveness of mI SMART, which is reported in a separate manuscript. The mI SMART intervention has the potential to be a sustainable and scalable technology intervention to improve access to care after future longitudinal trails are accomplished. The next step will be to conduct larger longitudinal trials of mI SMART to appropriately assess the long-term health and health system benefits.

Acknowledgements

This project was supported by the Robert Wood Johnson Foundation Nurse Faculty Scholars Program. The Robert Wood Johnson Foundation Nurse Faculty Scholars Program is working to develop the next generation of national leaders in academic nursing through career development awards for outstanding junior nursing faculty. The program aims to strengthen the academic productivity and overall excellence of nursing schools by providing mentorship, leadership training and salary and research support to faculty.

References

[1] Khairat, S., Wijesinghe, N., Wolfson, J., Scott, R. and Simkus, R. (2014) Building a Multicenter Telehealth Network to Advance Chronic Disease Management. In: Mantas, J., Househ, M.S. and Hasman, A., Eds., *Integrating Information Technology and Management for Quality of Care*, Vol. 202, IOS Press, Amsterdam, 299-302.

[2] LeRoy, L., Bayliss, E., Domino, M., Miller, B.F., Rust, G., Gerteis, J., *et al.* (2014) The Agency for Healthcare Research and Quality Multiple Chronic Conditions Research Network: Overview of Research Contributions and Future Priorities. *Medical Care*, **52**, S15-S22. http://dx.doi.org/10.1097/MLR.0000000000000095

[3] Mallow, J.A., Theeke, L.A., Barnes, E.R., Whetsel, T. and Mallow, B.K. (2014) Using mHealth Tools to Improve Rural Diabetes Care Guided by the Chronic Care Model. *Online Journal of Rural Nursing and Health Care*, **14**, 43. http://dx.doi.org/10.14574/ojrnhc.v14i1.276

[4] Shi, L., Chen, C.-C., Nie, X., Zhu, J. and Hu, R. (2014) Racial and Socioeconomic Disparities in Access to Primary Care among People with Chronic Conditions. *The Journal of the American Board of Family Medicine*, **27**, 189-198. http://dx.doi.org/10.3122/jabfm.2014.02.130246

[5] United States Department of Health & Human Services (2015) HHS Initiative on Multiple Chronic Condition. 200 Independence Avenue, S.W.-Washington D.C. 20201: U.S. Department of Health & Human Services. http://www.hhs.gov/ash/initiatives/mcc/#_edn3

[6] United States Department of Health & Human Services (2014) How Is HHS Addressing Multiple Chronic Conditions?

200 Independence Avenue, S.W.-Washington D.C. 20201: U.S. Department of Health & Human Services. http://www.hhs.gov/ash/initiatives/mcc/implementation/address-mcc.html#framework

[7] Corry, M., Clarke, M., While, A.E. and Lalor, J. (2013) Developing Complex Interventions for Nursing: A Critical Review of Key Guidelines. *Journal of Clinical Nursing*, **22**, 2366-2386. http://dx.doi.org/10.1111/jocn.12173

[8] Roger, V.L., Go, A.S., Lloyd-Jones, D.M., Benjamin, E.J., Berry, J.D., Borden, W.B., *et al.* (2012) Heart Disease and Stroke Statistics—2012 Update: A Report from the American Heart Association. *Circulation*, **125**, e2-e220. http://dx.doi.org/10.1161/CIR.0b013e31823ac046

[9] Pullicino, P.M., McClure, L.A., Howard, V.J., Wadley, V.G., Safford, M.M., Meschia, J.F., *et al.* (2011) Identifying a High Stroke Risk Subgroup in Individuals with Heart Failure. *Journal of Stroke and Cerebrovascular Diseases*, **22**, 620-626.

Open Journal of Nursing, 2016, 6, 333-341
Published Online April 2016 in SciRes. http://www.scirp.org/journal/ojn
http://dx.doi.org/10.4236/ojn.2016.64035

The Impact of Alzheimer's Disease on the Life of Family Caregivers: A Phenomenological View

Berta Sheila Souza Ribeiro[1], Luciana Krauss Rezende[2*], Selma Petra Chaves Sa[3], Wiliam César Alves Machado[4]

[1]Science of Health Care, Aurora Afonso Costa Nursing School, Fluminense Federal University, Human Resources Management at the Anhanguera University Centre, Niterói, Brazil
[2]Science of Health Care Graduate Program of the Aurora Afonso Costa Nursing School, Fluminense Federal University, Developmental Disorders at the Mackenzie Presbyterian University, Niterói, Brazil
[3]Nursing, Federal University of Rio de Janeiro, Department of Nursing Administration Fundamentals and of the Fluminense Federal University and the Science of Health Care Graduate Program (MACCS) and Nursing Graduate School (MPEA), Health Care for the Elderly in the UFF Nursing School, Niterói, Brazil
[4]Graduate Program in Health and Hospital Space Technology, PPGSTEH and Graduate Program, Federal University of the State of Rio de Janeiro, Rio de Janeiro, Brazil
Email: *lukrare@uol.com.br, niceshindo@gmail.com, rita.j.gray@gmail.com

Received 2 March 2016; accepted 25 April 2016; published 28 April 2016

Abstract

The objectives of this study are to describe the perception of caregivers about the process of caring for elders with Alzheimer's disease, analyze the impact of the care process on the caregiver's life from the biological and emotional aspects, and discuss the changes in the caregiver's life in the light of Gestalt Therapy. This was a qualitative and descriptive study with a phenomenological analysis. The results showed that family caregivers are in a vulnerable situation because they are usually women who are also aging or are already elderly, who do not receive the necessary support to meet their needs. Because of the demands of providing care for Alzheimer's patients, caregivers fail to consider their own issues and develop more mechanized ways of relating to their situation, using crystallization as a defense mechanism. Stress and isolation can adversely affect the physical and mental health of caregivers.

Keywords

Elderly, Family Caregivers, Alzheimer's Disease, Care

*Corresponding author.

How to cite this paper: Ribeiro, B.S.S., Rezende, L.K., Sa, S.P.C. and Machado, W.C.A. (2016) The Impact of Alzheimer's Disease on the Life of Family Caregivers: A Phenomenological View. *Open Journal of Nursing*, **6**, 333-341.
http://dx.doi.org/10.4236/ojn.2016.64035

1. Introduction

According to [1], the development of chronic diseases in caregivers with the subsequent need for medications is the result of work overload in the care of elders with Alzheimer's disease. The health complications which arise will be influenced by time, stage of disease, and support that the family caregiver receives.

Some studies demonstrate that there are difficulties on the part of family caregivers to delegate care to another person or institution based on the social belief that family care is ideal, that institutionalizing means abandonment when the elderly requires specialcare, and that institutionalization can lead to the death of the elderly [2].

Humans are relational beings, and their existence is linked to the expression of their experiences in the world, embracing the totality of this experience that is presented in the expression, me-the other-the world. The individual can change and act on the environment he lives in according to his experiences. Assuming the principle of adaptation and self-regulation, the person is seen in his entirety through revealed potentials as he experience a given reality [3]. Thus, the family caregiver is modified when facing the reality that Alzheimer's disease brings, and can develop or fail to develop conditions that directly influence both the way she provides care and the quality of the care provided.

Considering the changes in the life of caregivers due to the presence of an elder with a chronic disease such as Alzheimer's, and the lack of support with which to deal with the reality of Alzheimer's, the issues that guided the study were: how family caregivers of elders with Alzheimer's disease attending the Elderly and Caregiver Health Care Center perceive the activity of care?

Objectives

To describe the perception of family caregivers about the process of caring for elders with Alzheimer's disease, analyze the impact of the care process on the life of the caregiver considering biological and emotional aspects, and discuss the changes in the life of family caregivers in the light of Gestalt Therapy.

2. Method

This was a qualitative and descriptive study with a phenomenological analysis.

2.1. Site

The study was conducted at the Elderly and Caregiver Health Care Center/CASIC at the Fluminense Federal University located in the city of Niteroi, a facility which assists elderlies and caregivers in the city and surroundings. The study subjects were people who care for elders with Alzheimer's disease, are family members, and attended the Nursing Extension Project activities in the Elderly and Caregiver Health Care Center (EASIC) conducted in the CASIC/UFF.

2.2. Inclusion/Exclusion Criteria

The inclusion criterion was that the family caregiver must live in the same household or near the elderly with Alzheimer's disease. The exclusion criteria included secondary caregivers that help family caregivers and live in the same domicile and those who have support from other resources such as daily or weekly care in nursing homes.

2.3. Risks

The study did not expose the participants to any physical or psychological risk.

2.4. Study Contributions

The study is expected to contribute to the implementation of the Psychology Service with the focus on dementia to provide extended support to caregivers of demented elderly. The assessment of needs of caregivers and referrals to provide solutions is another benefit from the study.

2.5. Data Collection

Family caregivers were identified through the analysis of medical records provided by the Nursing team at

CASIC-UFF. Those who fit the inclusion criteria were contacted via telephone. Caregivers referred to the Psychology Service were also invited to participate in the study. Initially, 30 caregivers would participate in the study (100% of the sample) this number was established based on the assumption that it would facilitate the understanding of the phenomenon through the way caregivers experience and perceive the act of caring. However, the interviews revealed context saturation, even though this was a unique and singular experience, therefore, the sample size was established as 10 participants (33.3% of the sample) without compromising the study.

The interviews were conducted according to the participants' availability. They were conducted individually and in the appropriate setting; participants were allowed to stop the interview at any time. The interview had an average duration of one hour and was conducted from July to September of 2014. The interviews were recorded with the participant's permission, and ethical aspects were respected. The following guiding questions initiated the interviews: How has your life been since the diagnosis of Alzheimer's disease in your family? How do you feel about it? How are you affected by this in your daily life? How can psychology contribute to the health care of the caregiver?

The participants were identified in the numerical order of interviews preceded by the letter E (*i.e.*, E1 means interviewed 1 and so on).

2.6. Data Analysis

The data analysis was based on the phenomenological reduction method proposed by Edmund Husserl that means going back to the same thing, and through the adaptation of [4].

The words and sentences that most frequently appeared in the experience of caregivers were surveyed in each interview transcript and grouped into thematic units according to repetitions.

Thus, speeches of each subject were grouped in seven universal structural categories proposed by [4] temporality: descriptions of time experiences; spatialization; presentation of space experience; aspects related to the body, how they feel the impact of the experience in their bodies, what kind of relationship they establish with the body; motivation: how they understand the phenomenon seeking justifications for living the given situation, what makes them stay in the relationship; materiality: search for figures of speech, metaphors that are used and capture the totality; relationship with the world of self: identification of feelings that arose, even if not expressed in words but by bodily manifestation; relationship with others and the surroundings: trying to identify how to maintain links with the outside world besides the elderly [5].

This analysis stage was individual. During the second reading of each interview, we sought to identify the speeches that repeated and drew attention, which were highlighted. In a third reading, we tried to identify the speeches that served the universal structures being grouped in a chart (Chart 1) to visualize the situation and facilitate the phenomenological reduction for the discussion of the phenomenon.

Thus, the Intentional Analysis and Understanding of the Interview phase occurred as presented above, seeking to identify the meaning of the act of caring given by the respondent and the impact on his life; this, helped to discuss the human condition mainly in the caring situation.

Furthermore, the Contact Cycle was used, which is a Gestalt therapy construct consisting of the expression of a system of a total vital field that the body presents interactions that the self organizes through self-regulation. When the body is not updated, disturbances or cycle blocks occur, which mean disturbances in the I-world [6] The contact blocks verified in the survey were: introjection, projection, retroflexion, deflection; confluence [7].

Through the cycle we sought to understand how caregivers avoid contact and what types of psychological diseases they present throughout the process, or may arise if they are not living consciously and mindfully about themselves.

After this individual analysis stage, we set up a general chart consisting of the universal structures and speeches identified for each participant forming the whole of the interview. Therefore, after this grouping of individual themes units we sought to identify the units themes that emerged through the repetition of words.

2.7. Ethical Aspects

Studies with humans require attention to the legal aspects, therefore, an informed consent form was prepared according to Resolution No. 466, of December 12, 2012, from the National Health Council/MS, which, through its legal powers, establishes the guidelines and standards that regulate research involving humans.

The study was submitted to the Research Ethics Committee from the Antônio Pedro University Hospital

(HUAP) that is linked to the Academic Master's Program in Health Care Sciences-UFF (MACCS-UFF) and approved under CAEE: 31286814.9.0000.5243 and number 686791 on 06/06/2014.

The study was developed with the researcher's resources and brought the benefit of encouraging the creation of spaces for listening and embracing caregivers of elders with Alzheimer's disease.

3. Results and Analysis

The study subjects were women ranging in age from 42 to 68 years who were married (7), single (2), and in a stable union (1). The time since the diagnosis of Alzheimer's disease ranged from 1 to 13 years. Only four participants had professional/technical training as a secretary, executive secretary, physiotherapist technician, and accountant; only one was still employed in the profession. Three participants were retired, and six had no source of income. Two were house owners and lived near the elderly, and eight lived with the elderly. The educational level was distributed as middle school (4), high school with technical training (4), and college (2).

The following conditions were identified in the medical records of participants: Hypertension (7), Diabetes II (3), Mitral Valve Prolapse (1), Chronic Renal Failure (1), Fibromyalgia (1), and Depression (1); one caregiver showed no medical diagnosis. Caregivers who assume the responsibility for the elderly have a degree of intimacy with the intense relationship. These participants were middle-aged women who assume the role of caregivers in addition to other roles such as homemakers, mothers, wives, grandmothers, daughters, sisters, daughters-in-law, and sisters-in-law.

The study results confirm that the caregiver activity is still attached to the female gender; the majority of participants left their work activities to stay at home caring for the elderly. Only one maintained a job because she is the head of the household; she had the support of another caregiver during the day. According to studies on caregiver profiles, most are women occupying the position of daughters or wives and are dedicated exclusively to patient family care. This maybe linked to the social and cultural roles of women in society and the sexual division of labor. Their responsibility for caring for children make them more prepared to assume the caregiver role while men remain the financial provider for the family [8]. The perception that life does not go forward, or that the past was better than the present appeared as reality for these participants. Life and time crystallization is observed in the participants' speeches. According to Gestalt, the process of figure-background formation is a continuous coming and going with attention on things that are necessary for the individual at that time. This process is impaired for caregivers because they demonstrate that the time caring for the elderly with dementia leads to the crystallization of their desires and dreams.

Thus, the speeches from participants showed a need to return to previous experiences that brought satisfaction and included the description that life stopped in time because they do not reap results from the actions they are performing. The speeches below demonstrate this:

"*I look back, and nothing has changed.*" *E*1

"*I stopped my life.*" *E*5

The organismic self-regulation mentioned in Gestalt is compromised because it only occurs when the body can understand what is happening in the present, integrating thoughts and feelings that will be directed for action. Therefore, these facts demonstrate the crystallization of feelings, the family caregiver perceptions in relation to the elderly. These can paralyze the caregiver in her biopsychosocial needs. Thus, the temporal fixation related to previous experiences may result from the numerous demanded activities promoting distancing from the present moment and self.

"*It was so good, I never thought I wouldgo through this, we went out a lot.*" *E*2

It is understood that the fixation with time observed in the caregivers' speeches result from dealing with a disease in which the elderly lose short-term memory, which implies a daily conduct of repetition for the caregiver and the need of avoiding accidents with the elderly. Additionally, this situation generates difficulties in understanding what is happening, which may also momentarily paralyze them.

Crystallization can compromise the quality of relationships established in the world. There is no time for social activities or activities that generate pleasure; this has a direct impact on the caregiver's quality of life.

Thus, the crystallization brought about by the illness of their elders is seen as threatening because the familiar border is exposed. The caregiver does not recognize that experience as familiar, but as an environmental burden on self. The following speech illustrates this assertion:

"*I am watching him* 24 *hours, afraid that he will get hurt*; *I am available to him all the time.*" *E*9

Therefore, the crystallization can be understood as an avoidance effect on self-needs, and a block that has a direct impact on the caregiver's awareness of her own feelings and thoughts.

It was observed that for some caregivers, the relationship with space is a way to preserve or redeem the world of self. Spatialization is understood as how a person experiences the space in the universal structure. The space discussed here refers to the housing situation that caregivers maintain or the house where he lives with the elderly.

In this study, the need to maintain the space delimited by the caregiver, that is, they sought to live near the elderly, was identified as facilitating dislocation or remaining in the elderly's home in case of worsening disease and complete dependence. It was observed through the interviews that those who care for the elderly 24 hours a day do not seek to satisfy their minimal needs such as tasting foods that they appreciate. The food and flavors are meant for the elderly, and the caregiver's basic functions are ignored. This phenomenon has repercussions in the psyche because caregivers fail to realize what is nurturing to them in the relationship with the world.

Family caregivers sought strategies that would minimize their suffering in an attempt to keep their protected territory. Avoiding moving in with the elderly and choosing the dislocation path to meet the needs of the elderly can be understood as a form of self-preservation in order to maintain mental balance and promote self-organismic regulation. The following speeches confirm this statement:

"*I still keep my house; I will move in there as the last resort.*" *E*1

"*I lived there too. I left, I have my partner, my life, I lived too much with my mother.*" *E*7

Therefore, getting very close to the elderly and providing the intense care demanded by Alzheimer's patients can promote suffering and generate defense mechanisms through a creative adjustment in order to cause the caregiver to remain in self-organismic regulation.

It was observed that caregivers restore balance when they to go home to organize their activities, check bill payments, and relate to other family members and activities. The need for balance in family relations was evident because some caregivers report difficulties in the relationship with spouses due to the attention given to the elderly. One participant mentions a case of betrayal, another of separation, and another of an argument that required psychotherapeutic intervention as presented below:

"*I noticed a strange behavior in him; I think he got someone else.*" *E*6

"*This is the case of the husband, he does not liketo take care, so I had problems yes, I also focus more on her, thinking that he is already an adult, canreason and knows his way around but people getjealous, it is not because they grew up that they will not be jealous.*" *E*8

Additional important information with respect to space is the need to ensure that the elderly will remain in the environment that is familiar in order to minimize confusion as the disease progresses. However, this can only occur if the caregiver lives in the elderly's environment and this need compromises his organismic balance.

Elderly caregivers can have their exposure border disrupted. According to [9] the exposure border is having the ability to speak your mind, expose difficulties and fears, be critical and not follow the points of a hegemonic view, check and defend personal views, be authentic, and sharefeelings. Maintaining an exposure border is important because often the caregiver lives with abuse and disrespect, a situation whichparalyzes the abilityto speak.Self-protection from exposure is a natural mechanism in humans; this is a contact boundary that allows the individual to avoid being identified or judged by others because he or she may not bear meeting the requirements and expectations generated by others (The speeches below demonstrate the magnitude of the exposure border:

"*At the beginning of the treatment, I had to leave the set.*" *E8*

"*I realize that she takes things experienced here at home with mom to her boyfriend's family.*" *E*3

Both exposure border and familiarity border seek to define the human experience in situations that may cause imbalance and suffering. However, when they become rigid, they promote conditions of psychic stagnation and reproduction of behaviors that are harmful to the individual. Thus, it is necessary to restore contact and search for other consciousness expanding pathways for the adaptive processes to occur.

Activities aimed at promoting the welfare of others and disregarding self-well-being are observed when family caregivers are caring for the elderly. The numerous demands compromise the caregiver's attention to self. The increased elderly dependency on the caregiver leads to increased overload and compromised health. The speeches below demonstrate this statement.

"*In the eighth year, I confess that I was already very tired, worn out.*" *E*8

"*My column is suffering a lot.*" *E*9

Health occurs as the body can recognize and meet needs. It is through contact that the body self-regulates according to the principles of Gestalt. No one body is self-sufficient; it requires the world to satisfy needs. There is always interdependence between organism and environment. According to [10] the body is a part of the world.

Tiredness mentioned by the caretaker showed that because of the numerous responsibilities, she could not stop to get the relaxation and rest she needed; she showed changes in behavior and demonstrated aggression towards all members of her family.

"*In the lack of control I suffer from anemia because I do not eat well, and if I am agitated, I lose my appetite.*" *E*9

"*When I fight with her, my husband fights with me.*" *E*10

The body has difficulties focusing and prioritizing what should be done when it encounters unfinished situations. The lack of comprehension is experienced by the body, which may lead to blocking the contact cycle that could be translated into mental and physical illness.

Some of the justifications presented for this phenomenon were: lack of financial resources to hire supporting services, lack of family support, and activity overload.

"*I have a hard time finding a person to stay at home for a little bit so I can leave for a while because everyone is committed, have their responsibilities, their schedules.*" *E*9

"*And we are left for later, some days I stress a lot, I cling to God, I ask Our Lady for strength because you feel abandoned. Everyone has their commitments."E*5

These actions affect the family caregiver who is increasingly limited to carrying out the practice of care due to his emotional and psychological conditioning. Therefore, they present somatization, *i.e.*, the discharge of psychic energy in the body.

The relationship with the world of self is a universal framework that allows the identification of feelings, which are non-expressed thoughts. However, the caregiver is intensely committed to her restricted world. The speechesbelow illustrate the thought:

"*I do not say anything; I keep everything to myself.*" *E*1

"*Today I do not feel anything.*" *E*3

Physical or mental illness may result from the process of being unaware of individual needs or perceiving and dismissing them. These attitudes are not conscious: they are linked to the automatism generated by the demands of daily life, blocking contact. The needs are linked to the environment and geographical, social, and economic, and affective fields where the person lives.

The tension or psychic energy that arises in a particular region (body system) is understood as a single necessity or multiple necessities and tends to produce an effect illustrating emotions, desires, hunger, thirst, sex, sleep, and rest. Equilibrium is restored when needs are met [11]. This theme is the one that underscores the loss of the sense of existence: the body begins to function automatically without consciousness, and therefore, health is compromised because one of the elements considered critical to health, satisfaction of needs, is ignored.

The absence of contact is visible. It is through contact that man is organized. The living space is a product and result of a complex network of contacts that were made at various moments in life in the relationship with self and with others. The living space is not static, it exists, renewing itself every time a new contact occurs, it is a relational process, the expression of consciousness in the world [6].

This unit, Gratitude, reveals what motivates each participant to undertake the care of the elderly with Alzheimer's disease. The person in balance seeks to integrate the two movements that at first glance appear to be antagonistic but are, in fact, complementary. The picture that emerged of duty and gratitude demonstrates affection from the caregiver to the elderly as it is presented below:

"*While caring for her, I lost that hurt. I was seven years indoors with her.*" *E*4

"*I was handpicked. I pray to God to have enough strength to follow through.*" *E*9

The experience of caregiver E4 was striking because it portrays the story of a daughter who had unfinished Gestalten (perceptual configurations) with her mother, she had left home very young and returned to see her mother when her father became ill and had to be taken care of. This situation caused the rapprochement with the mother, and after her father's death, the mother developed Alzheimer's disease and was under her care. Caregiver E4 points out that such an event has provided the opportunity to forgive and modify her feelings towards her own mother.

It is shown from the speech of caregiver E10 that she has an appreciation for the elderly person she cares for because this person took care of the family all her life and now needs care.

"*She fought hard to raise my brothers and me.*" *E10*

Based on the speeches, it is noted that the caring attitude is based on two polarities, obligation/duty, and gratitude. For caregivers, there is a need to return the care that had been given in the past by the elderly.

During the study, it was observed that staying as the responsible caregiver is linked with the affective polarity in which the bonds built by experiences were highlighted and the intimate relationship that was built with the elderly predominates. This generates the physical and psychological situations that were describedin the study. The speeches below reinforce this statement:

"*It is more than* 58 *years together, always good between us, we went out a lot, and we would drop everything.*" *E*2

"*She isnot my sister-in-law she is a sister to me.*" *E*7

The deficit in using effective coping strategies such as alternative perceptions of the situation and handling/solving problems were associated with high levels of anxiety, depression, stress, and work overload [12]. Thus, psychological support for the family caregiver who lives in a state of tension and preoccupation is necessary to achieve a positive relation between the caregiver and the world.

The therapeutic setting offered bysome programs or units to caregivers of elderlieswith dementia include: (1) time providing assistance with taking care of the dementia patient, and (2) identifying how the changes are affecting the caregiver's perception of the world and finding away for her to live with the disease by becoming the agent of change. The references below present these perceptions of caregivers.

"*the worst thing for me is to be hindered.*" *E*4

"*I am rebuilding myself.*" *E*6

The need for discussions about best caregiver support policies to provide not only full assistance to the elderly with dementia but also to provide care for the caregiver is a concern that should be seen as a priority due to the increasing number of elders.

The family caregiver in this study sees the world and people as indifferent to their suffering experience. Therefore, staying isolated was a behavior that resulted in response to indifference: caregivers believe that they cannot count on anyone in the caring process.

"*You feel in the look of others that you are being judged.*" *E*1

"*I cannot talk to others because they do not like to hear.*" *E*4

The world is a set of meaningful relationships through which people are individualized and separated by their differences [3], and this process of differentiation is being determined by the contacts made. The person exists in an individual/environment field. The field differs by its borders. A boundary is a separation and connection process, and this determines the contact that leads to growth. Thus, isolation generates impoverishment in the individuation process. The movement of contact-drift away-assimilate is the basis for the healthy and dynamic process [13].

The feeling of loneliness that emerged in the study can influence the perception of the world as a hostile place where people do not care and, therefore, generates the conclusion that caregivers need to protect themselves. "The feelings flow seeking to placate the loss that the caregiver experiences. There are three main types of loss: loss of someone who loves you, or the loss of love or sense of being loved; loss of control; and loss of self-esteem" [14].

Alzheimer's disease is a gradual tracking of losses. It is not possible to teach how to cope with it. The image of the coffin going down into the pit in a burial configures the dementia process: they are the last moments of life with the person who is loved, who will be slipping away in front of the caregiver, losing uniqueness, being less present each day. The family caregiver has to adapt to this experience and live it every day.

"*now he does not run away, up until one year ago, he would burst the locks.*" *E*9

"*I am dealing with it; she has changed a lot.*" *E*10

This confirms the need for psychotherapeutic support to help the caregiver coping with the illness by learning to remain balanced, self-conscious, able to distinguish what is dangerous or deeply painful, and able to self-protect from falling into severe psychological distressing processes.

"*I confess that I needed therapy to lift me up from this phase.*" *E*8

Therefore, the family caregiver directly involved in the care for an elderly with Alzheimer's disease may fail to make contact with her own feelings, especially with the sadness that occurs through little or no interaction with others. Group activities, conversational spaces, and workshops may provide opportunities to be with others, decreasing isolation that they feel in their relationship with the world.

4. Final Considerations

The change in the life of the person who takes care of the elderly with dementia is remarkable. The disease is complex and demands changes, not only in the life of the elderly but in the entire field that surrounds him. This requires the family caregiver to develop a broader view of the situation to avoid compromising his own life. We found that even with technical information about the disease, the family caregiver is emotionally vulnerable, carrying intense psychological distress because of the feeling that the care provided is never enough.

It is noteworthy how family relationships are affected by a significant transformation in the relational patterns of loss of communication and dialogue that leads to aggression and becomes expressed emotion providing material for behavioral changes among members. There is a loss of creative capacity that blunts emotions: some members begin to isolate themselves or seek distance to avoid contact with the heartbreakingpain of seeing the demented elderly. The production of a defensive shell that prevents the expression of affection is observed and all activities are conducted on an automation mode.

The study presented immediate contributions to the extent that the interviewees were directed to psychological care and followed up with scheduled therapeutic monitoring. Thisincreasedthe number of assisting consultations and also provided an extra day of assistance to caregivers and required an extra psychologist in the service. It is noteworthy that theservices are provided by voluntary professionals. This is an issue that needs to be reconsidered. There is a real need for a supporting network for health promotion, which includes local service and improved conditions of home visits to bedridden elders.

The development of a booklet that can help the caregiver to identify aspects related to the Alzheimer's disease is possible based on the results of this study; from possible behavioral changes to the bio-psychological alterations that can guide the caregivers. In addition, this booklet could facilitate the understanding of the disease and aid the dialogue with the health professionals who do not know the elderly's involvement, and sometimes are late in recognizing signs of depression and the early presentation of Alzheimer's disease.

The booklet may be composed of information that allow identifying behavioral changes that can be expected in the progression stages of Alzheimer's disease, alterations arising from depression in the elderly, the importance of home dialogue, guidance on the support the family caregiver needs to stay healthy, and information on the main organs that promote actions for the caregiver and family.

The difficulty in identifying people available to participate was onelimitation; some caregivers had no one to leave the elderly with.

5. Conclusion

We conclude that mental and physical illness may occur in caregivers who perceive that they do not have time to take care of themselves because of the many responsibilities they have assumed in taking care of elders with Alzheimer's.

References

[1] Seima, M.D. and Lenardt, M.H. (2011) The Burden of Family Caregivers of Elderly with Alzheimer's. *Texts & Contexts* (Porto Alegre), **10**, 388-398. http://www.redalyc.org/articulo.oa?id=321527169015

[2] Mazza, M.M.P.R. and Lefèvere, F. (2004) A Instituição asilar segundo o cuidador familiar do idoso. *Saúde e Sociedade*, **13**, 68-77.

[3] Ribeiro, J.P. (2011) O conceito de mundo e de pessoa em Gestalt-terapia: revisitando o caminho. Summus Editorial, São Paulo.

[4] Moustakas, C. (1994) Phenomenological Research Methods. Sage, Califórnia.

[5] Fukumitsu, K.O. (2013) O processo de luto do filho da pessoa que cometeu suicídio. Tese (Doutorado em Psicologia Escolar e do Desenvolvimento Humano)—Instituto de Psicologia, Universidade de São Paulo, São Paulo. http://www.teses.usp.br/teses/disponíveis/47/47131/tde-04072013-143625/

[6] (2007) O Ciclo do Contato: Temas básicos na abordagem gestáltica. 4th Edition, Summus, São Paulo.

[7] Polster, E. and Polster, M. (2001) Gestalt-Terapia Integrada. Summus, São Paulo.

[8] Borghi, A.C., Castro, V.C., Marcon, S.S. and Carreira, L. (2013) Sobrecarga de familiares cuidadores de idosos com Doença de Alzheimer: Um estudo comparativo. *Revista Latino-Americana de Enfermagem*, **21**, No. 4.

[9] Silveira, T.M. and Peixoto, P.T.C. (2012) A Estética do Contato. Arquimedes Edições, Rio de Janeiro.

[10] Perls, F.S. (2002) Ego, Fome e Agressão: uma revisão da teoria e do método de Freud. Summus Editorial, São Paulo.

[11] (1985) Gestalt-Terapia: Refazendo um caminho. 2nd Edition, Summus, São Paulo.

[12] Guedes, A.C. and Pereira, M.G. (2013) Sobrecarga, enfrentamento, Sintomas Físicos e Morbidade Psicológica em Cuidadores Familiares Dependentes Funcionais. *Revista Latino-Americana de Enfermagem*, **21**, 935-940.

[13] Yontef, G.M. (1998) Processo, Diálogo e Awareness: Ensaios em Gestalt-Terapia. 3rd Edition, Summus, São Paulo.

[14] Viscott, D. (1982) A Linguagem dos Sentimentos. Summus, São Paulo.

Open Journal of Nursing, 2016, 6, 342-352
Published Online April 2016 in SciRes. http://www.scirp.org/journal/ojn
http://dx.doi.org/10.4236/ojn.2016.64036

Mothers' Knowledge, Beliefs, and Practices on Causes and Prevention of Anaemia in Children Aged 6 - 59 Months: A Case Study at Mkuranga District Hospital, Tanzania

Evelyine B. Ngimbudzi[1,2], Alice M. Lukumay[1], Agnes W. Muriithi[1], Khairunnisa A. Dhamani[1], Pammla M. Petrucka[3,4*]

[1]The Aga Khan University, School of Nursing and Midwifery, Dar es Salaam, Tanzania
[2]Mkuranga District Hospital, Mkuranga, Tanzania
[3]College of Nursing, University of Saskatchewan, Regina, Canada
[4]Academics without Borders Volunteer with Aga Khan University, School of Nursing and Midwifery, East Africa
Email: *pammla.petrucka@usask.ca

Received 24 March 2016; accepted 25 April 2016; published 28 April 2016

Abstract

Aims: Anaemia in children aged 6 - 59 months is an important public health problem associated with increasing hospital costs, lengths of hospital stay, and development of complications later in life. Due to the significant caregiver roles of mothers, the level of mothers' knowledge, beliefs and practices are important in addressing anaemia in children. This study investigated knowledge, attitudes, beliefs, and practices of select mothers on anaemia and linked these with known factors for anaemia. Methodology: The case study was conducted at Mkuranga District Hospital, Paediatric Ward between December 2014 and April 2015. A cross-sectional design was used to recruit a convenience sample of 40 mothers whose children had a confirmed diagnosis of anaemia (through routine laboratory testing). Results: Within the sample, the majority of children were male (52.5%); aged 6 - 39 months (87.5%); and had a diagnosis of severe anaemia (75.0%) according to the World Health Organization's definition. Over one third (35%) of mothers reported a prior history of anemia in their other children, and the majority (55%) had heard about anaemia prior to their child's hospitalization. Maternal anaemia was reported by 67.5% of mothers. Mothers reported that maternal anemia (17.5%) and feeding practices (32.5%) are known contributing factors to anaemia in children. Mothers reported that anemia could be prevented (55.0%) and cured by herbal preparations (47.5%). In addition, some mothers indicated that anaemia was caused by witchcraft (22.5%) and eating lemons (2.5%). Conclusion: Severe anaemia was high among the studied population which aligned with their hospitalization status. Findings suggested potential

*Corresponding author.

How to cite this paper: Ngimbudzi, E.B., Lukumay, A.M., Muriithi, A.W., Dhamani, K.A. and Petrucka, P.M. (2016) Mothers' Knowledge, Beliefs, and Practices on Causes and Prevention of Anaemia in Children Aged 6 - 59 Months: A Case Study at Mkuranga District Hospital, Tanzania. *Open Journal of Nursing*, **6**, 342-352. http://dx.doi.org/10.4236/ojn.2016.64036

gaps in control and management of anemia in children possibly related to low awareness or incorrect knowledge of the relationship between maternal and child anaemia. The findings also highlighted important cultural beliefs related to anaemia. There is an imperative for culturally and socially appropriate knowledge translation and exchange with mothers in order to impact on the prevention and control of anaemia in children in Tanzania.

Keywords

Anaemia, Children, Tanzania, Maternal Knowledge, Beliefs, and Practices, Culture and Health

1. Introduction

Anaemia, as a disease state, is reflected in the reduced presence of red blood cells and concomitantly a lowered hemoglobin concentration; however, its complexity relates to multiple potential pathophysiological causes ranging from genetic to environmental and inconsistent epidemiological surveillance. It is a borderless public health concern which impacts health, socio-economic status, and preferred futures for those most directly impacted. Despite the potential for intervention and treatment, anaemia has remained a major cause of mortality and morbidities regionally and globally [1].

Globally anaemia affects between one-quarter and one-third of the world's population, although some have estimated at risk populations showing 50% to 80% incidence primarily due to iron deficiency [2]-[5]. In real numbers, the WHO [6] suggests that approximately 800 million women and children are affected globally. A recent estimate of a 38% worldwide prevalence of anemia in pregnant women coupled with greater than 50% of these related to iron deficiency clearly highlights how women and their children are disproportionately affected by anaemia [4]. Anaemia during pregnancy is linked to higher likelihoods of preterm labour, low birth weight, post-natal infection rates, low Apgar scores, and infant/maternal mortality [4] [7]-[9]. The proportion of anaemia is highest in the Africa, with a reported prevalence of 57% in pregnant women (17 million) and 68% in preschool children (84 million) [10]. Kassebaum *et al.* [3] found that anaemia prevalence was highest during the immediate post-natal period followed by ages 1 to 4, which identifies a potential association between pre and post-natal anaemic states. When looking at children specifically, anaemia is not only life threatening and life shortening, but impacts significantly on quality of life potentials. Commonly reported health problems associated with anaemia in children are impaired growth, reduced cognitive ability, and reduced motor development [11]-[13].

According to the WHO [6] [14], anaemia in children aged 6 to 59 months is defined as haemoglobin (Hb) ranging between: 100 - 109 g/L (mild anaemia); 70 - 99 g/L (moderate anaemia); and ≤70 g/L (severe anaemia). Causes of anaemia in children are multifaceted [15] with 50% of the anemia attributed to iron deficiency [15]. Other causes of anaemia in this subset of children are secondary to underlying risk factors, such as malaria, sickle cell disease, and parasitic infections [16]-[19]. In addition, social determinants of health such as food practices and taboos, cultural beliefs, knowledge, and socioeconomic status contribute to anaemia-related disease burden [19]. The social determinants of health influence the health of populations. Although there is no singular listing of the determinants, there are exemplars from WHO (Europe) and Canada including relevant elements such as "availability of healthy food", "food insecurity", "unemployment", "health services", "gender", and "race" [20] [21].

The WHO [6] reported 61% of children aged 6 - 59 months in Tanzania have hemoglobin concentrations of <110 g/L [95% CI: 52, 68] and, of this group, 1.5% had hemoglobin concentrations of <70 g/L [95% CI: 0.7, 2.8] (p. 24). These findings resulted childhood anaemia being ranked as a severe public health concern in Tanzania (p. 24). The Tanzania Demographic Health Survey indicated that estimated prevalence of moderate to severe anaemia in children aged 6 - 59 months is 6% [16]. Overall, it is estimated that 72% of children aged 6 - 59 months are anaemic [22], with anaemia remaining among the top ten causes of hospitalization in children aged under five [16].

This study explored the knowledge, attitudes, beliefs, and practices of select mothers with children aged 6 to 59 months with anaemia as these relate to select social determinants of health, such as unemployment (poverty),

food insecurity and gender.

2. Methodology

2.1. Study Setting

The study was conducted at Mkuranga District Hospital between December 2014 and April 2015. As a referral healthcare facility, Mkuranga District Hospital has five wards with an inpatient capacity of 115. Participants were recruited from the 33-bed paediatric ward. The ward receives patients from dispensaries and health centers across the district and, on a case by case basis, from nearby districts. Inpatient stays on the pediatric ward range from 3 to 5 days for anemia diagnosis with the case dispositions for follow-up to the local dispensaries and/or health centers.

2.2. Study Design and Sampling

The study was a cross-sectional descriptive design. Convenience sampling was used with the following inclusion criterion:

- Mothers in the paediatric ward with children aged 6 - 59 months having a laboratory confirmed diagnosis of anaemia (Hb $\leq$ 100 g/L),
- Voluntarily agreement to participate in the study,
- Admission date corresponded with data collection dates,
- Ability to speak/read and understand Swahili.

2.3. Data Collection and Analysis

Data collection was done in the period from December 2014 to April 2015 using structured closed-ended questionnaires. The instrument was an internally developed tool based on reviewed literature and the researchers' knowledge of the institution and its case complements. The tool development was guided by three main constructs: Knowledge, Beliefs, and Practices. To aid participant understanding, the questionnaires were translated into and delivered in Swahili. Researchers checked the admission book for admitting diagnosis and age of the children. Mothers of children who were screened in (*i.e.*, met the inclusion criteria) were then approached and informed about the study. Once the researchers affirmed mothers' understanding, consent forms and questionnaires were distributed to those willing to participate. For those mothers unable to read and/or write, a researcher assisted them in completing the questionnaire. A total of 40 mothers were surveyed based on the number of willing and available participants during the study period who met the inclusion criteria. The research instrument collected core social and demographic data about the mother/child dyad to augment the chart elements. In addition, the instrument approached the women by asking them for the critical elements related to knowledge, beliefs, and practices, which were subsequently enumerated.

Data entry was done by two researchers. This double independent entry enabled data cleaning and verification in order to identify any missing data and/or incomplete data. Statistical analysis (descriptive level) was done using Microsoft-Excel™ software.

2.4. Ethical Consideration

The study was approved by The Aga Khan University's Ethical Review Sub-committee. Permission to conduct the study at Mkuranga District Hospital was obtained from the District Executive Director's office prior to commencing the study. Participation was voluntary with an informed consent obtained from all participants. Participants who could not read Swahili indicated their willingness to participate by providing their fingerprint after the consent was read to them and any questions were satisfactorily answered.

3. Results

3.1. Characteristics of Study Participants and Households

A total of 40 mother/child dyads who met the inclusion criteria were recruited into the study and their records were reviewed. The chart review was foundational to revealing the health status (*i.e.*, Hg level; co-morbidities) of the mother and children, which was then augmented by the demographic capture during the survey. Demo-

graphics showed that 26 (65%) of the mothers were aged 25 years or more; 28 were married (70%); 24 (55%) had primary school education; and 20 (50%) self-identified as housewives. The majority of the children were male (21 [52.5%]) aged 6-39 months (31 [77.5%]). Three-quarters of the children had severe anaemia, while 10 (25%) had moderate anaemia. In addition to anaemia, 24 (60.0%) children had additional (secondary) diagnosis. Of these 24 children with co-morbidities were identified with the following breakdown: 54.2% (13/24) having malaria while 3 had acute respiratory tract infection (12.5%); 2 had Human Immunodeficiency Virus [HIV] (8.7%); 2 had sickle cell disease (8.7%); and 1 each with burn injuries (4.3%), diarrhoea (4.3%) and kwashiorkor (4.3%). **Table 1** and **Table 2** reveal the demographic characteristics of participating children and mothers.

Table 3 summarizes the characteristics of households and food security profile of study participants. Twenty-one (52.5%) participants were primarily from families with 3 or more children with 14 (35%) reporting previous childhood anaemia involvement. Although almost two-thirds reported having sufficient money to buy food, although approximately two-fifths (42.5%) reported household members having slept hungry in the past.

Table 1. Characteristic of mothers participating in the study (n = 40).

Characteristic		Number/%
Age (years)	15 - 19	4 (10.0)
	20 - 24	10 (25.0)
	25 - 29	17 (42.5)
	30 - 34	6 (15.0)
	35 - 39	1 (2.5)
	40 - 44	2 (5.0)
Marital status	Married	28 (70.0)
	Divorced	3 (7.5)
	Widowed	1 (2.5)
	Not married	8 (20.0)
Level of education	Form I to IV (secondary)	2 (5.0)
	Standard I to VII (primary)	22 (55.0)
	Illiterate	16 (40.0)
Occupation	Business	10 (25.0)
	Farmer	9 (22.5)
	Housewife	20 (50.0)
	Others (livestock keeping)	1 (2.5)

Table 2. Characteristic of children with anaemia (n = 40).

Characteristic		Number of children (%)
Gender	Male	21 (52.5)
	Female	19 (47.5)
Age (months)	6 - 20	16 (40.0)
	21 - 40	15 (37.5)
	41 - 59	9 (22.5)
Anaemia	Moderate (70 - 99 g/L)	10 (25.0)
	Severe (<70 g/L)	30 (75.0)
	Secondary diagnosis	24 (60.0)

Table 3. Characteristics of households of study participants (n = 40).

Characteristic		Number of households (%)
Number of children	1 - 2	19 (47.5)
	3 or more	21 (52.5)
History of anemia in other children		14 (35.0)
Number of household members	<5	14 (35.0)
	5 or more	26 (65.0)
Family ever slept hungry		17 (42.5)
Main bread earner	Husband	28 (70.0)
	Self	8 (20.0)
	In-laws	3 (7.5)
	Other (brother)	1 (2.5)
Sufficient household funds for food		25 (62.5)

3.2. Mothers' Knowledge, Beliefs, and Attitudes on Childhood Anaemia

1) Mothers' Knowledge

A slight majority of participants (n = 22; 55%) acknowledged prior knowledge of anaemia, with the majority (n = 32; 82%) reporting the main source of this information as the Reproductive and Child Health (RCH) programs and services. A total of 27 mothers (67.5%) reported a diagnosis of anaemia during pregnancy and had received treatment ranging from oral medications (n = 25; 92.6%) to blood transfusion (n = 2; 7.4%). The major signs and symptoms of anaemia identified as known by the mothers included a range of early (*i.e.*, conjunctiva and palmar pallor) to late (*i.e.*, difficulty breathing and loss of weight) indicators. Further, the mothers indicated that complications of anaemia were seen in the child becoming less active and unable to learn or retain. The most frequently reported causes of anaemia included frequent illness (n = 12; 30.0%), refusal to eat (n = 10; 25.0%), and lack of food at home (n = 9; 22.5%). A small proportion of the participants knew of the connection between maternal anaemia and infant anaemia as well as the link between childhood anaemia and future health conditions. **Table 4** provides a comprehensive breakdown of the maternal knowledge of anaemia.

2) Mothers' Beliefs

Cultural beliefs expressed related to causes of anaemia included witchcraft, local remedies (*i.e.*, herbal preparations), and exclusion of certain foods (*i.e.*, lemons) (see **Table 4**).

3) Mothers' Practices

Of note, only 55% of mothers in this study associated anaemia with feeding practices. Half of the study participants (50%) reported that they were still breastfeeding their children, although a predictable weaning pattern emerged including maize porridge, ugali (a stiff porridge), and beans. As the primary caregivers, most mothers (72.5%) reported three feeds per day. Mothers (65.0%) were the main persons responsible for feeding the child with nearly three-quarters (72.5%) of children being fed three times a day. Health care accessed for anaemia was most frequently an over the counter medication followed by access to services at a dispensary (primary health care) level. Refer to **Table 5** for further consideration of the mothers' practices.

4. Discussion

This survey of mothers of children with anaemia admitted at Mkuranga Hospital showed a slightly larger male representation, with 75% of the children testing as severely anaemic. This latter finding is significantly higher than had been suggested in the reviewed literature, although there continues to be a paucity of relevant epidemiological findings on the prevalence of anaemia. According to national estimates, 27% of children have mild anaemia, 29% moderate anaemia, and 2% severe anaemia [23]. Further, there have been reports of success in reduction of moderate anaemia from 43% in 2004-05 to 29% in 2010 [23]. However, in the population studied,

Table 4. Mothers knowledge and beliefs of anaemia (n = 40).

Knowledge base	Specific content	Number of mothers (%)*
Heard about anaemia before child's admission		22(55.0)
Diagnosed with anaemia in pregnancy		27 (67.5)
Signs & symptoms of anaemia*	Conjunctiva pallor	35 (87.5)
	Palmer pallor	32 (80.0)
	Reduced physical activity	17 (42.2)
	Loss of appetite	16 (40.0)
	Loss of weight	14 (35.0)
	Breathing difficulty	10 (25.0)
	Puffy face	8 (20.0)
Complications of anaemia*	Poor growth	26 (65.0)
	Tiredness	20 (50.0)
	Poor learning capacity	10 (25.0)
	Poor concentration	6 (15.0)
Causes of anaemia in children*	Frequent illness	12 (30.0)
	Refusal to eat	10 (25.0)
	Lack of food at home	9 (22.5)
	Witchcraft	9 (22.5)
	Sickle cell	2 (5.0)
	HIV	2 (5.0)
	Maternal anaemia	1 (2.5)
	Eating lemons	1 (2.5)
	Do not know	2 (5.0)
Maternal anaemia relationship to child's anaemia		7 (17.5)
Anaemia causes problems later in life		15 (37.5)

*Multiple responses were possible.

Table 5. Mothers' practices related to anaemia.

Practices		Number of mothers (%)
Still breastfeeding		20 (50.0)
Foods used during weaning	Maize porridge	38 (95.0)
	Ugali	27(67.5)
	Beans	25(62.5)
	Cassava porridge	15 (37.5)
	Banana stew	14 (35.0)
	Eggs	14 (35.0)
	Vegetable soup	13 (32.5)
	Meat soup	8 (20.0)

Continued

Number of times child is fed per day	2 times	3 (7.5)
	3 times	29 (72.5)
	4 Times	4 (10.0)
	On demand	4 (10.0)
Person responsible for feeding the child	Mother	26 (65.0)
	Others	1 (2.5)
	Self	7 (17.5)
	Siblings	6 (15.0)
First drug given to child	Anti-Malarial	5 (12.5)
	Home remedies	5 (12.5)
	Nothing	9 (22.5)
	Panadol™ syrup*	19 (47.5)
	Panadol™ syrup* and Anti-malarial	1 (2.5)
	Vitamin supplement	1 (2.5)
First place child taken for treatment	Dispensary	19 (47.5)
	Pharmacy	8 (20.0)
	Health Centre	3 (7.5)
	Home remedies	5 (12.5)
	Hospital	5 (12.5)
	Traditional healer	1 (2.5)

*Panadol is an anti-pyretic and analgesic product.

the majority of presented with severe anaemia with an Hb of <70 g/L, which may, in part, be the contributing factor to the current hospitalization (*i.e.*, the sickest require hospitalization). In addition, a high prevalence of maternal anaemia (70.9%) has been identified in the coast region of Tanzania and may be associated with observed escalated prevalence of severe anaemia in children in that region [23]. This observation indicates the need for a longitudinal epidemiological consideration of the potential relationship.

Reviewed evidence reported a range of complications or co-morbidities with anaemia which variably aligned with the findings of this study. The mothers reported poor growth and cognitive skills as well as tiredness as symptoms which were supported by the research [12] [24]-[26]. According to Black, Quigg, Hurley, and Pepper [27], anemia contributes to reduced IQ results. Further, there was limited awareness of the mothers that maternal anaemia was related to their children's anaemia, despite evidence that shows treatment of maternal anemia during pregnancy improve neonatal outcomes such as prematurity, low birth weight, and neonatal mortality [28] [29]. Maternal anaemia in pregnancy is associated with anaemia in children [30] especially in the first year of life [31]. In a survey done in Ghana in (2003), 80.6% of mothers with anemia also had a child with anemia [32]. Maternal anemia is also associated with increased infant mortality [33]. We did not explore with these mothers their previous pregnancy outcomes (*i.e.*, miscarriages; neonatal mortality) due to the already stressful situation with a severely ill child. In our study, less than a fifth of the mothers reported that maternal anaemia contributed to anaemia in their children. Similar findings were reported in a study done in Indonesia where the majority of mothers did not associate maternal anaemia with their children developing anaemia [34]. Also, some mothers recognized that childhood anemia could have life-long implications for their children which are reflected in the work of Christian *et al.* [35].

The topic of health literacy and knowledge use is a current global opportunity to improve health outcomes.

According to the WHO [36], health literacy extends beyond education and communication for health and truly embraces strategies which improve the capacities and motivations of individuals to access and use information to improve health outcomes. A third of mothers reported a previous anaemic incident with other children and acknowledged gaining prior knowledge primarily through the RCH programs and services. Maternal knowledge included an understanding of the link between maternal anaemia and childhood anaemia, feeding practices, and future health conditions. Maternal beliefs included the potential to prevent and/or cure anaemia with local herbal preparations. A significant number of mothers believed that anaemia could be the result of witchcraft and eating lemons. These findings clearly flag an opportunity to work with mothers on the causes and treatments for anaemia, and to help them avert the recidivism from one child to the next of anaemia diagnosis.

Children are significantly affected by socio-economic dynamics in the family. Though it is argued that employment is a source of empowerment for mothers, this is only true if the mother has some control of her income [23]. In this study, 70% of the mothers were dependent on their husbands to provide food for the family. In Tanzania, though some men involve their wives in deciding the family budget, the most recent demographic survey reported that 45% of the men autonomously decide how the family earnings are spent [23]. This may affect food purchases and focus on healthier foods, again providing direction for future research studies to assess the relationship between purchases and power over resources in predicting anaemia patterns in children. Further, household characteristics impact the health of the family members and influence socio-economic status of the family. Children from large families have increased likelihood of developing nutrition-related health problems [37], such as iron deficiency anaemia. In Tanzania, the average number of household members is five [23]; of note, the majority (65%) of our participants had larger families (5 or >5 household members) and 35% reported prior history of anaemia in their children.

When related to the social determinant of education, there is clear evidence that level of education and knowledge influences health outcomes of children [38]. In our study, 40% of the mothers were illiterate, 55% had primary school education, and only 2% had studied beyond primary education. There is evidence to suggest that children from households where the parents do not have formal education have increased likelihood of developing anaemia [15] [38]. Specifically, one study found that mothers' knowledge of anaemia also influenced child anaemia and other related health practices [34].

Food insecurity, as a social determinant of health, was considered in terms of reported feeding practices, indicators of hunger, and meal frequencies. Feeding practices contribute to anaemia, generally and iron deficiency anaemia, specifically [37]. Although poor feeding practices affects all family members, children under five are most vulnerable [39]. Only 32% of the mothers in this study knew that their feeding practices contributed to anaemia in their child. In addition, almost all (95%) of the mothers preferred maize flour porridge, ugali, and other starches as weaning foods, which Peter, Rumisha, Mashoto, and Malebo [40] indicated are rich in carbohydrates and low in absorbable iron with the exception of fortified foods. A study conducted in Uganda reported that majority of anaemic children were mainly fed with traditional porridge made up of cereals [41]. The authors observed that, although people in Mkuranga engage in fishing activities along the coast, the fish is often sold in order to meet other pressing financial commitments instead of being consumed by the household. These practices, which are often evidence in impoverished settings, lead to inadequate consumption of fish and meat which contributes to higher incidence of iron deficiency anaemia [42]. It is likely that children from households where more meals are available each day are less likely to develop anaemia [15]. The WHO [43] recommends children under 2 years old should be fed at least 4 meals per day and provided additional snacks as required. In Tanzania, 57% of families have 3 meals per day whereas 41% only manage 2 meals per day [23]. In this study, the majority of the mothers (72.5%) were able to feed their children only 3 meals per day, with only 10% reporting feeding their children the recommended 4 meals per day. Some mothers reported difficulties feeding their families with two fifths reporting that the family had slept hungry in the past. This may be indicative of food shortage in the population studied due low social economic status. Similar findings have been reported elsewhere in Tanzania. For instance, food shortage as a determinant of the number of times the family fed was reported in a study done in northern Tanzania where 75% of children are less than 3 times a day [37]. According to the WHO [43] inappropriate household feeding practices, such as inadequate intakes, pose greater health implications than the food unavailability.

The final determinant considered in this study was culture. Mothers' cultural beliefs are an important determinant of health outcomes in children. For instance, mothers' belief of the causes of anaemia and traditional treatment for anaemia influences health seeking behaviors and feeding practices [44]. In our study, some moth-

ers attributed anaemia to outside forces (*i.e.*, witchcraft) or foods eaten during pregnancy (*i.e.*, lemons). In studies, mothers believed that eating mangoes, lemons, eggs, or fish would lead to children developing anaemia [32] [44]. In some African settings, eating vegetables is associated with poverty so meals often comprise of culturally accepted foods such as cassava, maize porridge, and ugali. Timely treatment and management of anaemia is also influenced by cultural beliefs. Mkuranga is an area rich in culture and with strong trends towards use of traditional remedies to treat various illnesses before seeking medical attention (Peter *et al.*, 2014). Nearly 50% of the mothers believed that anaemia can be treated using herbal preparations, although only 12.5% mothers gave their child home remedies before seeking medical attention and 2.5% sought the services of a traditional healer before taking their child to a hospital. Though generally there seems to be some acceptance of formal health care at a higher level than in the past it would be important to further study the potential risks and benefits of utilizing both traditional and Western medical practices to address the anaemia challenge.

Limitations of the study

The study involved a small cross-sectional sample; hence, findings are limited in terms of generalizability. The study was conducted in a hospital setting, implying an acute level of the care needs, which may significantly skew the representativeness of severity and intensity of services related to anaemia. It would be desirable to undertake a large replication study, which considers both institutional and community-based anaemia, to correct for this potential limitation. Further, consideration of immediate post-natal anaemic status in the child and mother would be a significant contribution to reducing and/or managing childhood anaemia.

Strengths of the study

Findings from this case study suggest important anaemia-associated factors in the studied population which relate to the social determinants of education, economic status, food insecurity, and culture. It was useful to learn that the mothers sought primary information through the Reproductive and Child Health Centres which is a key learning in strategizing for future anaemia reduction.

5. Conclusion

This study considered the knowledge, beliefs, and practices of a select group of mothers whose children were currently hospitalized due to moderate to severe anaemia. The mothers' beliefs regarding anaemia in their children were frequently informed by cultural beliefs such as witchcraft as a cause of the disease. This finding is important in efforts to address anaemia as practitioners will need to consider these deeply rooted perspectives. Regarding practices, the findings suggested that some practices are cultural/historical (*i.e.*, feeding regimens) but others are health system informed (*i.e.*, medication/treatment regimens). This finding provides an opportunity for providers and policy makers to intervene earlier through earlier information sharing and better health care access for anaemia related conditions. Regardless of the reason for interacting with the women (*i.e.*, sick/well; pregnant/post-partum, etc.), there is an imperative for culturally and socially appropriate knowledge translation and exchange with mothers in order to impact on the prevention and control of anaemia in children in Tanzania.

Acknowledgements

The authors extend special thanks to the mothers for their participation. We would like to thank District Executive Director, District Medical Officer, and Medical Officer in Charge of Mkuranga District Hospital for their cooperation without which the conduct of the study would have been impossible. We extend our gratitude to Medical Officer in Charge of Mkuranga District Hospital for reviewing the paper. We thank the staff of Mkuranga District Hospital Paediatric Ward for their cooperation throughout the study.

References

[1] Lozano, R., Naghavi, M., Foreman, K., *et al.* (2012) Global and Regional Mortality from 235 Causes of Death for 20 Age Groups in 1990 and 2010: A Systematic Analysis for the Global Burden of Disease Study 2010. *The Lancet*, **380**, 2095-2128. http://dx.doi.org/10.1016/S0140-6736(12)61728-0

[2] de Benoist, B., McLean, E., Cogswell, M., Egli, I. and Wojdyla, D. (2008) Worldwide Prevalence of Anaemia 1993-2005. WHO Global Database on Anaemia. World Health Organization, Geneva.

[3] Kassebaum, N.J., Jasrasaria, R., Naghavi, M., Wulf, S.K., Johns, N., Lozano, R., Murray, C.J.L., *et al.* (2014) Asystematic Analysis of Global Anemia Burden from 1990 to 2010. *Blood*, **123**, 615-624. http://dx.doi.org/10.1182/blood-2013-06-508325

[4] Stevens, G.A., Finucane, M.M., De-Regil, L.M., Paciorek, C., Flaxman, S., Branca, F., *et al.* (2013) Global, Regional and National Trends in Hemoglobin Concentration and Prevalence of Total and Severe Anemia in Children and Pregnant and Non-Pregnant Women for 1995-2011: A Systematic Analysis of Population Representative Data. *The Lancet Global Health*, **1**, e16-e325. http://dx.doi.org/10.1016/S2214-109X(13)70001-9

[5] Peña-Rosas, J.P, De-Regil, L.M., Dowswell, T. and Viteri, F.E. (2011) Daily Oral Iron Supplementation during Pregnancy. Cochrane Library: Cochrane Pregnancy and Childbirth Group.

[6] World Health Organization (2015) Global Prevalence of Anaemia in 2011. WHO Press, Geneva.

[7] Noronha, J.A., Khasawneh, E.A., Seshan, V., Ramasubramaniam, S. and Raman, S. (2012) Anemia in Pregnancy—Consequences and Challenges: A Review of Literature. *Journal of South Asian Federation of Obstetrics and Gynaecology*, **4**, 64-70. http://dx.doi.org/10.5005/jp-journals-10006-1177

[8] Brabin, B.J., Hakimi, M. and Pelletier, D. (2001) An Analysis of Anemia and Pregnancy-Related Maternal Mortality. *Journal of Nutrition*, **131**, 604S-614S, Discussion 614S-615S.

[9] Patra, S., Pasrija, S., Trivedi, S.S. and Puri, M. (2005) Maternal and Perinatal Outcome in Patients with Severe Anemia in Pregnancy. *International Journal of Gynecology and Obstetrics*, **91**, 164-165. http://dx.doi.org/10.1016/j.ijgo.2005.07.008

[10] K4Health (2008) Anemia Prevalence, Causes, and Consequences. USAID: Office of Population and Reproductive Health, Bureau for Global Health. Cooperative Agreement #AID-OAA-A-13-00068 with the Johns Hopkins University.

[11] Chang, S., Zeng, L., Brouwer, I.D., Kok, F.J. and Yan, H. (2013) Effects of Iron Deficiency Anemia in Pregnancy on Child Mental Development in Rural China. *Pediatrics*, **131**, e755-e763. http://dx.doi.org/10.1542/peds.2011-3513

[12] Lozoff, B., De Andraca, I., Castillo, M., Smith, J.B., Walter, T. and Pino, P. (2003) Behavioral and Developmental Effects of Preventing Iron-Deficiency Anemia in Healthy Full-Term Infants. *Pediatrics*, **112**, 846-854.

[13] Madan, N., Rusia, U., Sikka, M., Sharma, S. and Shankar, N. (2011) Developmental and Neurophysiologic Deficits in Iron Deficiency in Children. *The Indian Journal of Pediatrics*, **78**, 58-64. http://dx.doi.org/10.1007/s12098-010-0192-0

[14] WHO (2011) Haemoglobin Concentrations for the Diagnosis of Anaemia and Assessment of Severity. Vitamin and Mineral Nutrition Information System. World Health Organization, Geneva.

[15] Schellenberg, D., Schellenberg, J.R.M.A., Mushi, A., Savigny, D., de Mgalula, L., Mbuya, C. and Victora, C.G. (2003) The Silent Burden of Anaemia in Tanzanian Children: A Community-Based Study. *Bulletin of the World Health Organization*, **81**, 581-590.

[16] Kahigwa, E., Schellenberg, D., Sanz, S., Aponte, J.J., Wigayi, J., Mshinda, H., Alonso, P. and Menendez, C. (2002) Risk Factors for Presentation to Hospital with Severe Anaemia in Tanzanian Children: A Case-Control Study. *Tropical Medicine and International Health*, **7**, 823-830. http://dx.doi.org/10.1046/j.1365-3156.2002.00938.x

[17] National Bureau of Statistics (2013) Tanzania HIV/AIDS and Malaria Health Indicator Survey (THMIS) 2011-12. National Bureau of Statistics, Dodoma.

[18] Korenromp, E.L., Armstrong-Schellenberg, J.R., Williams, B.G., Nahlen, B.L. and Snow, R.W. (2004) Impact of Malaria Control on Childhood Anaemia in Africa—A Quantitative Review. *Tropical Medicine & International Health*, **9**, 1050-1065. http://dx.doi.org/10.1111/j.1365-3156.2004.01317.x

[19] Smith J.L. and Brooker, S. (2010) Impact of Hookworm Infection and Deworming on Anaemia in Non-Pregnant Populations: A Systematic Review. *Tropical Medicine & International Health*, **15**, 776-795. http://dx.doi.org/10.1111/j.1365-3156.2010.02542.x

[20] Braveman, P., Egerter, S. and Williams, D.R. (2011) The Social Determinants of Health: Coming of Age. *Annual Review of Public Health*, **32**, 381-398. http://dx.doi.org/10.1146/annurev-publhealth-031210-101218

[21] Commission on Social Determinants of Health (2008) Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health. World Health Organization, Geneva.

[22] Ministry of Health and Social Welfare (2008) The National Road Map Strategic Plan to Accelerate Reduction of Maternal, Newborn and Child Deaths in Tanzania 2008-2015. Ministry of Health and Social Welfare, Dodoma.

[23] National Bureau of Statistics (2011) Tanzania Household Demographic Survey. National Bureau of Statistics, Dodoma.

[24] Haas, J.D. and Brownlie, T. (2001) Iron Deficiency and Reduced Work Capacity: A Critical Review of the Research to Determine a Causal Relationship. *The Journal of Nutrition*, **131**, 676S-690S.

[25] Stoltzfus, R. (2005) Iron-Deficiency Anemia: Reexamining the Nature and Magnitude of the Public Health Problem. *The Journal of Nutrition*, **131**, 697-701.

[26] Heidkamp, R.A., Ngnie-Teta, I., Ayoya, M.A., Stoltzfus, R.J., Mamadoultaibou, A., Durandisse, E.B. and Pierre, J.M. (2013) Predictors of Anemia among Haitian Children Aged 6 to 59 Months and Women of Childbearing Age and Their Implications for Programming. *Food and Nutrition Bulletin*, **34**, 462-479. http://dx.doi.org/10.1177/156482651303400411

[27] Black, M.M., Quigg, A.M., Hurley, K.M. and Pepper, M.R. (2011) Iron Deficiency and Iron-Deficiency Anemia in the First Two Years of Life: Strategies to Prevent Loss of Developmental Potential. *Nutrition Reviews*, **69**, S64-S70. http://dx.doi.org/10.1111/j.1753-4887.2011.00435.x

[28] Kozuki, N., Lee, A.C. and Katz, J. (2012) Moderate to Severe, but Not Mild, Maternal Anemia Is Associated with Increased Risk of Small-for-Gestational-Age Outcomes. *The Journal of Nutrition*, **142**, 358-362. http://dx.doi.org/10.3945/jn.111.149237

[29] Dibley, M.J., Titaley, C.R., d'Este, C. and Agho, K. (2012) Iron and Folic Acid Supplements in Pregnancy Improve Child Survival in Indonesia. *American Journal of Clinical Nutrition*, **95**, 220-230. http://dx.doi.org/10.3945/ajcn.111.022699

[30] Pasricha, S-R., Black, J., Muthayya, S., Shet, A., Bhat, V., Nagaraj, S., Prashanth, N.S., Sudarshan, H., Biggs, B.-A. and Shet, A.S. (2010) Determinants of Anemia among Young Children in Rural India. *Pediatrics*, **126**, e140-e149. http://dx.doi.org/10.1542/peds.2009-3108

[31] Allen, L.H. (2000) Anemia and Iron Deficiency: Effects on Pregnancy Outcome. *American Journal of Clinical Nutrition*, **71**, 1280S-1284S.

[32] Abu, B., Louw, V., Dannhauser, A., Raubenheimer, J. and Van den Berg, L. (2013) Knowledge Attitudes and Practices (KAP) Regarding Iron Deficiency (ID) among Mothers in an Anemia Endemic Population in Northern region of Ghana. *Maternal and Child Nutrition*, **3**, 42-55.

[33] Marchant, T., Armstrong-Schellenberg, J., Nathan, R., Abdulla, S., Mukasa, O., Mshinda, H. and Lengeler, C. (2004) Anaemia in Pregnancy and Infant Mortality in Tanzania. *Tropical Medicine & International Health*, **9**, 262-266. http://dx.doi.org/10.1046/j.1365-3156.2003.01178.x

[34] Souganidis, E.S., Sun, K., de Pee, S., Kraemer, K., Rah, J.-H., Moench-Pfanner, R., Sari, M., Bloem, M.W. and Semba, R.D. (2012) Relationship of Maternal Knowledge of Anemia with Maternal and Child Anemia and Health-Related Behaviors Targeted at Anemia among Families in Indonesia. *Maternal and Child Health Journal*, **16**, 1913-1925. http://dx.doi.org/10.1007/s10995-011-0938-y

[35] Christian, P., Khatry, S.K., LeClerq, S.C. and Dali, S.M. (2009) Effects of Prenatal Micronutrient Supplementation on Complications of Labor and Delivery and Puerperal Morbidity in Rural Nepal. *International Journal of Gynecology & Obstetrics*, **106**, 3-7. http://dx.doi.org/10.1016/j.ijgo.2009.03.040

[36] World Health Organization (2009) Background Note: Regional Preparatory Meeting on Promoting Health Literacy. UN ECOSOC. http://www.who.int/healthpromotion/conferences/7gchp/track2/en/

[37] Nyaruhucha, C.N.M., Msuya, J.M., Mamiro, P.S. and Kerengi, A.J. (2006) Nutritional Status and Feeding Practices of Under-Five Children in Simanjiro District, Tanzania, Tanzanian. *Health Research. Bulletin*, **8**, 162-167. http://dx.doi.org/10.4314/thrb.v8i1.14268

[38] Miller, E.M. (2011) Maternal Health and Knowledge and Infant Health Outcomes in the Ariaal People of Northern Kenya. *Social Science and Medicine*, **73**, 1266-1274. http://dx.doi.org/10.1016/j.socscimed.2011.07.009

[39] Onyemaobi, G.A. and Onimawo, I.A. (2011) Anaemia Prevalence among Under-Five Children in Imo State, Nigeria. *Australian Journal of Basic Applied Science*, **5**, 122-126.

[40] Peter, E.L., Rumisha, S.F., Mashoto, K.O. and Malebo, H.M. (2014) Ethno-Medicinal Knowledge and Plants Traditionally Used to Treat Anemia in Tanzania: A Cross Sectional Survey. *Journal of Ethnopharmacology*, **154**, 767-773. http://dx.doi.org/10.1016/j.jep.2014.05.002

[41] Kikafunda, J.K., Lukwago, F.B. and Turyashemererwa, F. (2009) Anaemia and Associated Factors among Under-Fives and Their Mothers in Bushenyi District, Western Uganda. *Public Health Nutrition*, **12**, 2302-2308. http://dx.doi.org/10.1017/S1368980009005333

[42] Bhargava, A., Bouis, H.E. and Scrimshaw, N.S. (2001) Dietary Intakes and Socioeconomic Factors Are Associated with the Hemoglobin Concentration of Bangladeshi Women. *The Journal of Nutrition*, **131**, 758-764.

[43] WHO (2015) Infant and Young Child Feeding Fact Sheet. WHO Press, Geneva.

[44] Agboada, J. (1999) Mothers' Knowledge, Attitudes, Beliefs and Practices Related to Childhood Anaemia in the Kintampo District. Doctoral Dissertation, University of Ghana, Accra.

Call for Papers

Open Journal of Nursing (OJN)

ISSN 2162-5336 (print) ISSN 2162-5344 (online)
http://www.scirp.org/journal/ojn

Open Journal of Nursing **(*OJN*)** is an international peer-reviewed, open access journal publishing in English original research studies, reviews and case reports in nursing. Symposia or workshop papers may be published as supplements.

Editorial Board

We are also interested in: 1) Short Reports—2-5 page papers where an author can either present an idea with theoretical background but has not yet completed the research needed for a complete paper or preliminary data; 2) Book Reviews—Comments and critiques.

Notes for Prospective Authors

Submitted papers should not have been previously published nor be currently under consideration for publication elsewhere. All papers are refereed through a peer review process. For more details about the submissions, please access the website.

Website and E-Mail

http://www.scirp.org/journal/ojn E-Mail: ojn@scirp.org

What is SCIRP?

Scientific Research Publishing (SCIRP) is one of the largest Open Access journal publishers. It is currently publishing more than 200 open access, online, peer-reviewed journals covering a wide range of academic disciplines. SCIRP serves the worldwide academic communities and contributes to the progress and application of science with its publication.

What is Open Access?

All original research papers published by SCIRP are made freely and permanently accessible online immediately upon publication. To be able to provide open access journals, SCIRP defrays operation costs from authors and subscription charges only for its printed version. Open access publishing allows an immediate, worldwide, barrier-free, open access to the full text of research papers, which is in the best interests of the scientific community.

- High visibility for maximum global exposure with open access publishing model
- Rigorous peer review of research papers
- Prompt faster publication with less cost
- Guaranteed targeted, multidisciplinary audience

Scientific Research Publishing

Website: http://www.scirp.org

Subscription: sub@scirp.org

Advertisement: service@scirp.org