ACCEPTANCE AND USABILITY OF A WEB-BASED MEDICATION MANAGEMENT SYSTEM AMONG NURSES IN A PILOT TELEHEALTH HOSPITAL

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INTRODUCTION

Recently, technology in the realm of health care industry especially in the hospital are continuously arising to keep on the demands of health care delivery system. One of the demands that is set on nurses is the skill on implementing medication administration process.

In promoting medication safety, modernization of competent control system are needed (Krishna, Kumar-Singh, Goel, Singh, Guta, Anesar and Bhardwaj, 2015). The introduction of the web based medication management system into hospital work flow raises medication safety concerns that promotes patient safety. Usability and Acceptance among nurses are also considered as a factor to make the web based medication management system work as what it was intended for.

However, according to Ketikidis, Dimitrovski, Bath, and Lazuras (2012), the application of comprehensive technology to safe medication administration to promote patient safety has proven to have a path with loads of possible risks. Ketikidis, Dimitrovski, Bath, and Lazuras, (2012) also added that one of the risk of applying technology in health care setting is the issue about the level of acceptance in the part of the end users because it would either result in delays or even failure to implement the technology. Another risk to be expected is the issue of usability.

OBJECTIVES

Based on the foregoing studies, the purpose of this paper is to determine the Acceptance and Usability of a Web-Based Medication Management System among Nurses in a Pilot Telehealth Hospital that can be a possible help to promote patient safety.

METHODOLOGY

In this study, the researcher used three (3) designs (mixed method – convergent-parallel) in analyzing the data; these are: a) descriptive- valuative, and b) descriptive-comparative study, and c) Case study approach. The data was gathered through the use of a post study usability questionnaire (PSSUQ) which was scored on a seven - point Likert scale beginning from 1 (strongly disagree); 2 (disagree); 3 (slightly disagree); 4 (neutral); 5 (slightly agree); 6 (agree); and 7(strongly agree) and a questionnaire adapted from the Unified Theory of Acceptance and Use of Technology (UTAUT) model which was scored on a five - point Likert scale like what will be done to the instrument for usability, beginning from 1 (strongly disagree); 2 (disagree); 3 (neutral); 4 (agree);and 5 (strongly agree). Questionnaire about the acceptance of web based medication management was also made and utilize through interview to further expand the results of the study. Furthermore, the study also utilized a partial least square modelling to generate a reliable and valid result so as to compensate for the total number of populations of the study. The study also used partial least square modelling to further enhance the study. In this study, the researcher selected the 26 respondents from a selected telehealth hospital and determined the acceptance and usability of a web-based medication management system among nurses in a pilot telehealth hospital and have them answered the questionnaires. Quantitatively, the study applied purposive census sampling with the following set of criteria: (1) must be a Registered Nurse; (2) Nurses that is assigned in the Emergency Department, Outpatient department, general nursing unit and intensive care unit; and (3) must be a willing participant in the study. Response rate has been reported. Qualitatively, the study adopted the purposive sampling in which the researcher interviewed 5 nurses that was using the system for at least a year. To analyze the data, descriptive statistics (mean, percentage, frequency, standard deviations), ANOVA and T-Test was applied using the SPSS software.

RESULTS

A. QUANTITATIVE RESULTS:

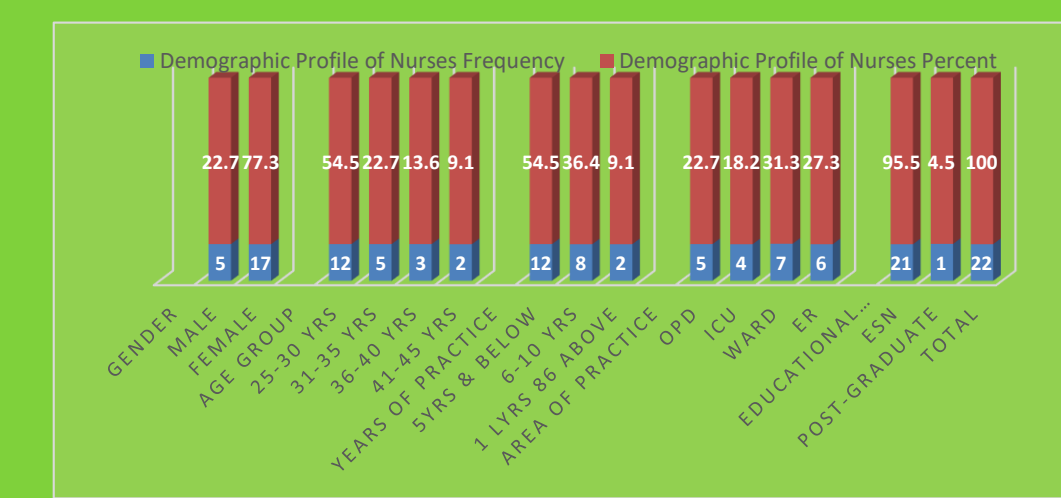**1. Demographic Profile of Nurses:**

Table 1 presents the demographic profile of the nurses. Based on the data, majority of the nurses are female with a total of 17 or 77.3 % and a total of 5 are male nurses or 22.7 %.

2. Respondent's Acceptance of the Web Based Medication Management System in terms of Performance Expectancy, Effort Expectancy, Social Influences and Facilitating Conditions.

Table 2 illustrates the respondent's acceptance of technology. In terms of performance expectancy, it yields an overall mean score of 3.82 which got a standard deviation of 0.66. In terms of effort expectancy, it yields an overall mean score of 3.76 which got a standard deviation of 0.63. In terms of Social influence, it yields an overall mean score of 3.70 which got a standard deviation of 0.77. In terms of Facilitating Conditions, it yield an overall mean score of 3.59 which got a standard deviation of 0.70.

3. Respondents' Perception on the Usability of Technology in the Tertiary Hospital
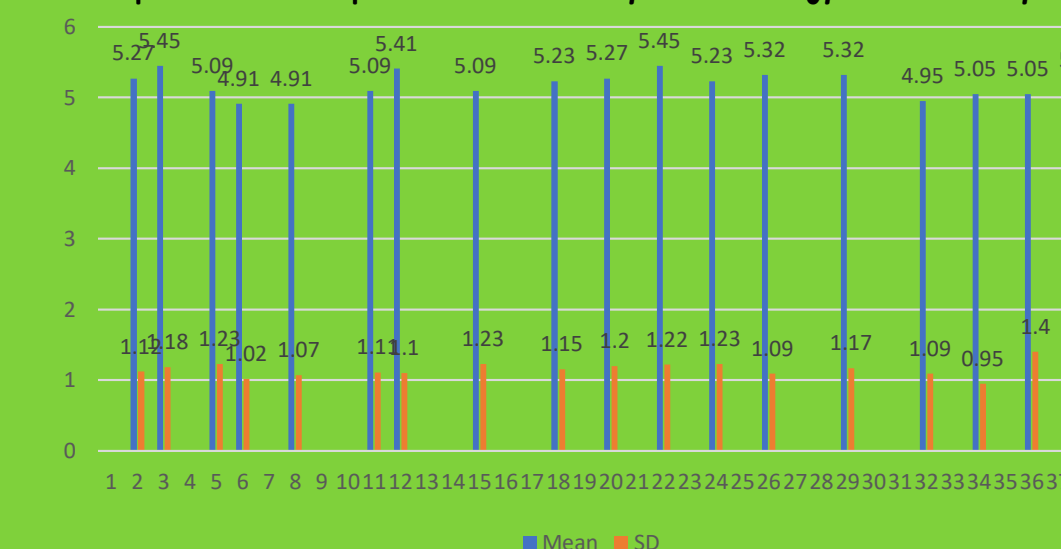

Table 3 illustrates usability of the existing web - based medication management system in a tertiary hospital. In terms of the overall usability of the web - based medication management system, the data got an overall mean score of 5.18 and got a standard deviation of 1.03.

4. Significant Differences on the Usability and Acceptance of the Existing Web Based Medication System based on the Respondent's Demographic Profile.

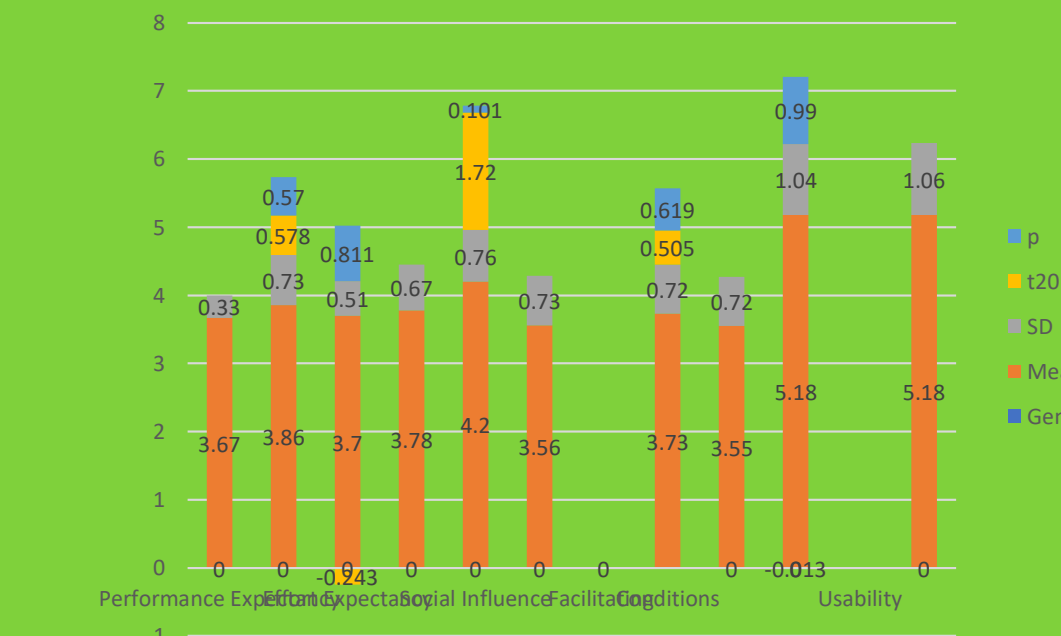**Differences in Perception on Acceptance and Usability of Technology according to Gender**

Table 4.A shows the Gender Differences in Perception on Acceptance and Usability of Technology. The data shows that there are no significant differences with regards to the gender in the respondents' perception on performance expectancy (t20=-0.578, p=.57), effort expectancy (t20=-0.243, p=0.811), social influence (t20=1.72, p=0.101), facilitating conditions (t20=0.505, p=0.619) and usability (t20=-0.013, p=0.99). Therefore, the Null Hypothesis is accepted.

Differences in Perception on Acceptance and Usability of Technology By Area of Practice

Table 4.B shows that There is no significant difference in the mean rating of the respondents with regards to how they perceived the social influence of technology (F=2.904, p=0.089) therefore, the null hypothesis is accepted. Whereas there is a significant difference in the mean effort expectancy (F=12.682, p=0.001), performance expectancy (F=10.063, p=0.003), facilitating conditions (F=4.573, p=0.032), and usability of technology (F=15.525, p=0.001). Therefore, the null hypothesis is rejected. With respect to performance expectancy, mean rating of ICU group is significant different to ER group (p=0.003). ICU group tend to give lower rating on performance expectancy compared to the ER group. With respect to effort expectancy, ICU group mean rating is significantly different to ER group (p=0.003). ICU group tend to give lower rating on effort expectancy compared to ER group. In terms of facilitating conditions, ICU group mean rating is significantly different to Ward group (p=0.03). ICU group tend to give lower rating than ward group. In terms of usability of technology, ICU group mean rating is significantly different to Ward group (p=0.013) and ER group (p=0.004). ICU group consistently have lower rating compared to Ward and ER group.

Differences in Perception on Acceptance and Usability of Technology by Age


Table 4.C shows the Differences in Perception on Acceptance and Usability of Technology by Age. It shows that there were no significant age difference in the respondents' perception on performance expectancy (F=0.777, p=0.522), effort expectancy (F=0.554, p=0.562), social influence (F=2.163, p=0.128), facilitating conditions (F=2.256, p=0.117), and usability of technology (F=1.067, p=0.388). Therefore, the null hypothesis is accepted.

### Perception on Acceptance and Usability of Technology according to Years of Practice

Table 4.D shows the Perception on Acceptance and Usability of Technology according to Years of Practice. Table 4.D shows that There was no significant difference in the respondents' perception on performance expectancy (F=0.463, p=0.636), effort expectancy (F=0.892, p=0.426), social influence (F=0.286, p=0.754), facilitating conditions (F=0.571, p=0.574), and usability of technology (F=1.502, p=0.248) when they were grouped according to their years of practice. Therefore, the null hypothesis is accepted

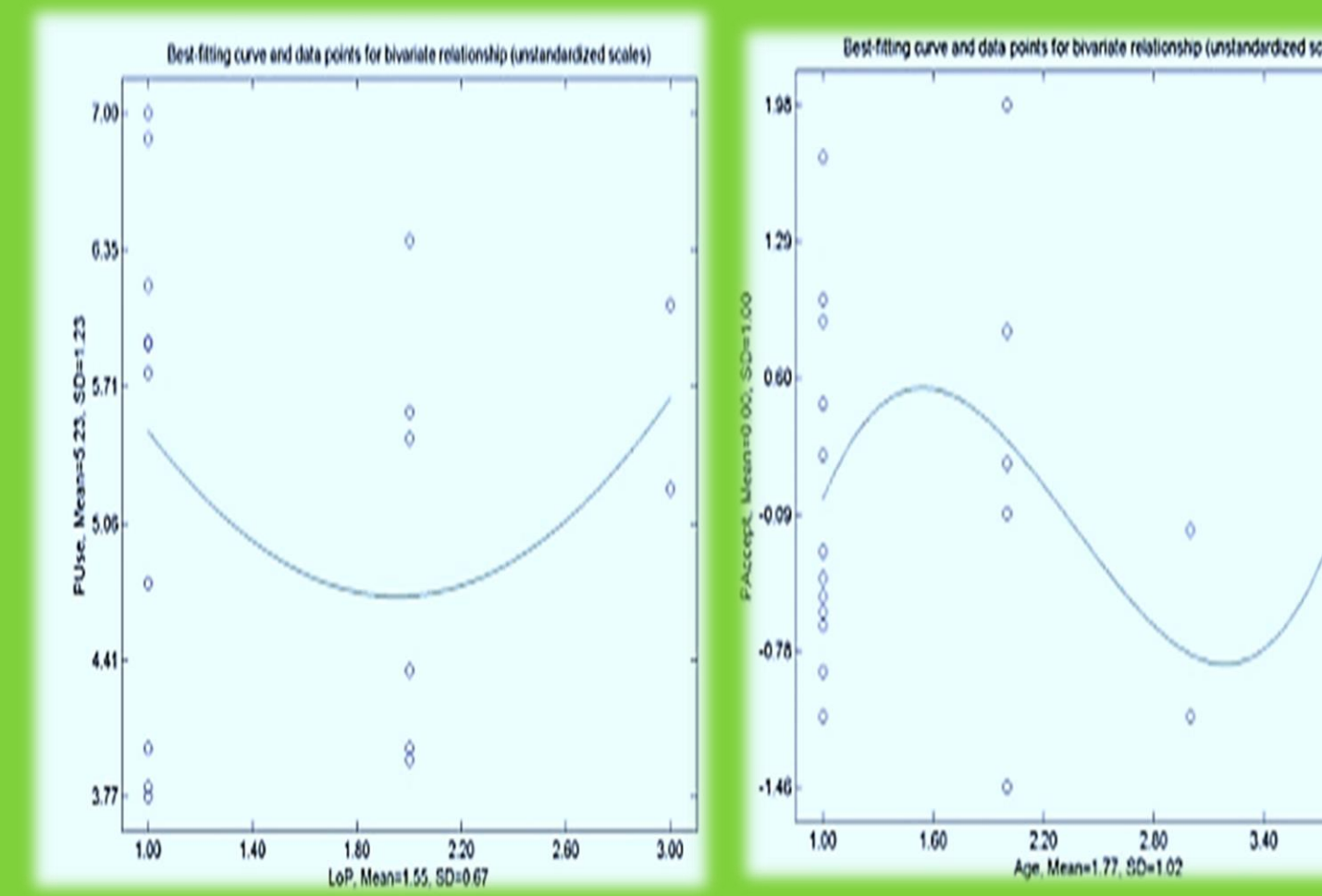### Derived Model for the Acceptance and Usability of the Study.
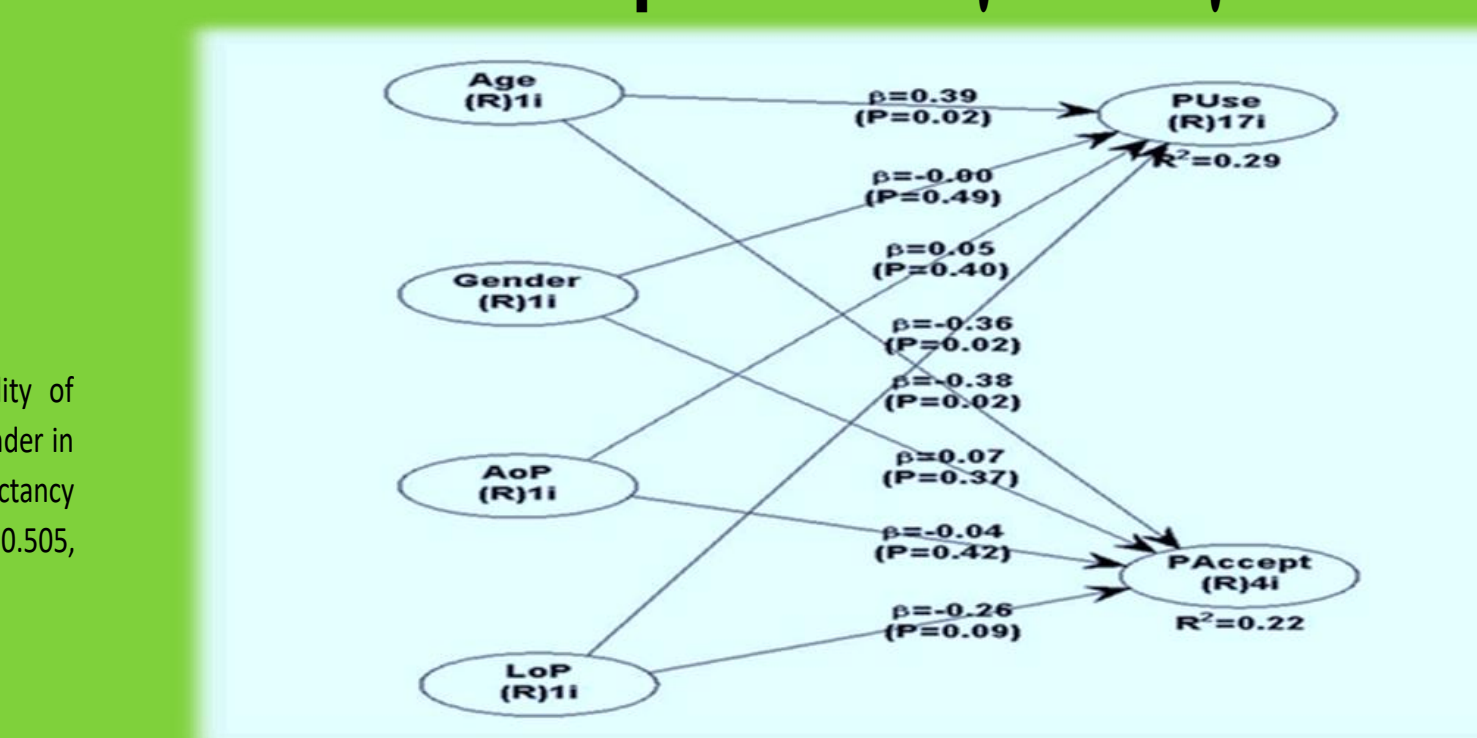
Partial least model for the acceptance and usability of the web-base medication management system

Model fit and quality indices:
Average path coefficient (APC)=0.194, P=0.049
Average R-squared (ARS)=0.252, P=0.046
Average adjusted R-squared (AARS)=0.076, P=0.049
Average block VIF (AVIF)=1.081, acceptable if <= 5, ideally < 3.3
Average full collinearity VIF (AFVIF)=3.149, acceptable if <= 5 ideally <= 3.3
Tenenhaus GoF (GoF)=0.485, small >= 0.1, medium >= 0.25 large >= 0.36
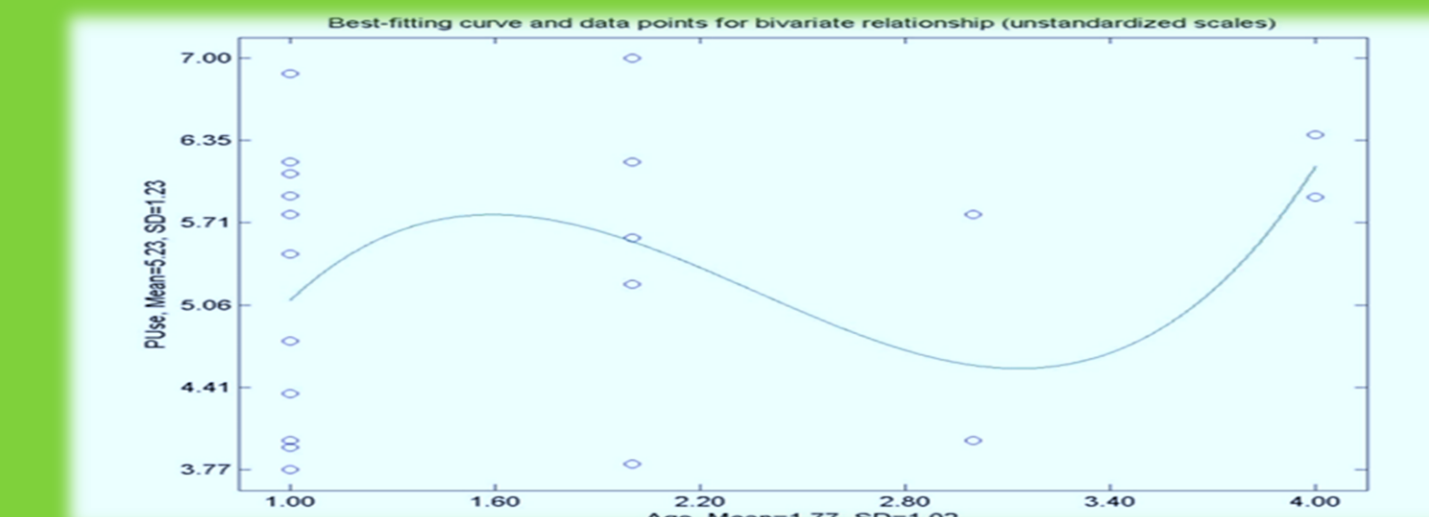
, the perceived usability (PUse) levels vary across the LoP levels (coded 1 to 3). At some range of LoP, the PUse levels tend to get higher as LoP increases; then, at some range of LoP, the PUse tends to get lower as LoP increases.


Scatter plot between age and PAccept

, the perceived usability (PUse) levels vary across the LoP levels (coded 1 to 3). At some range of LoP, the PUse levels tend to get higher as LoP increases; then, at some other range of LoP, the PUse tends to get lower as LoP increases. Taken together all the data, as shown in Table 5, LoP significantly affects PUse (β=-.365, p<.05, f2=.135) with negative path coefficient. Having a negative coefficient indicates that, on average, the higher the LoP the lower the level of PUse. That is, as the LoP increases the perceive usability tends to get lower. Using the Cohen's (1988) guide, the magnitude of effect of LoP on PUse falls from small to medium (f2=.135) extent.

B. QUALITATIVE DATA ANALYSIS:
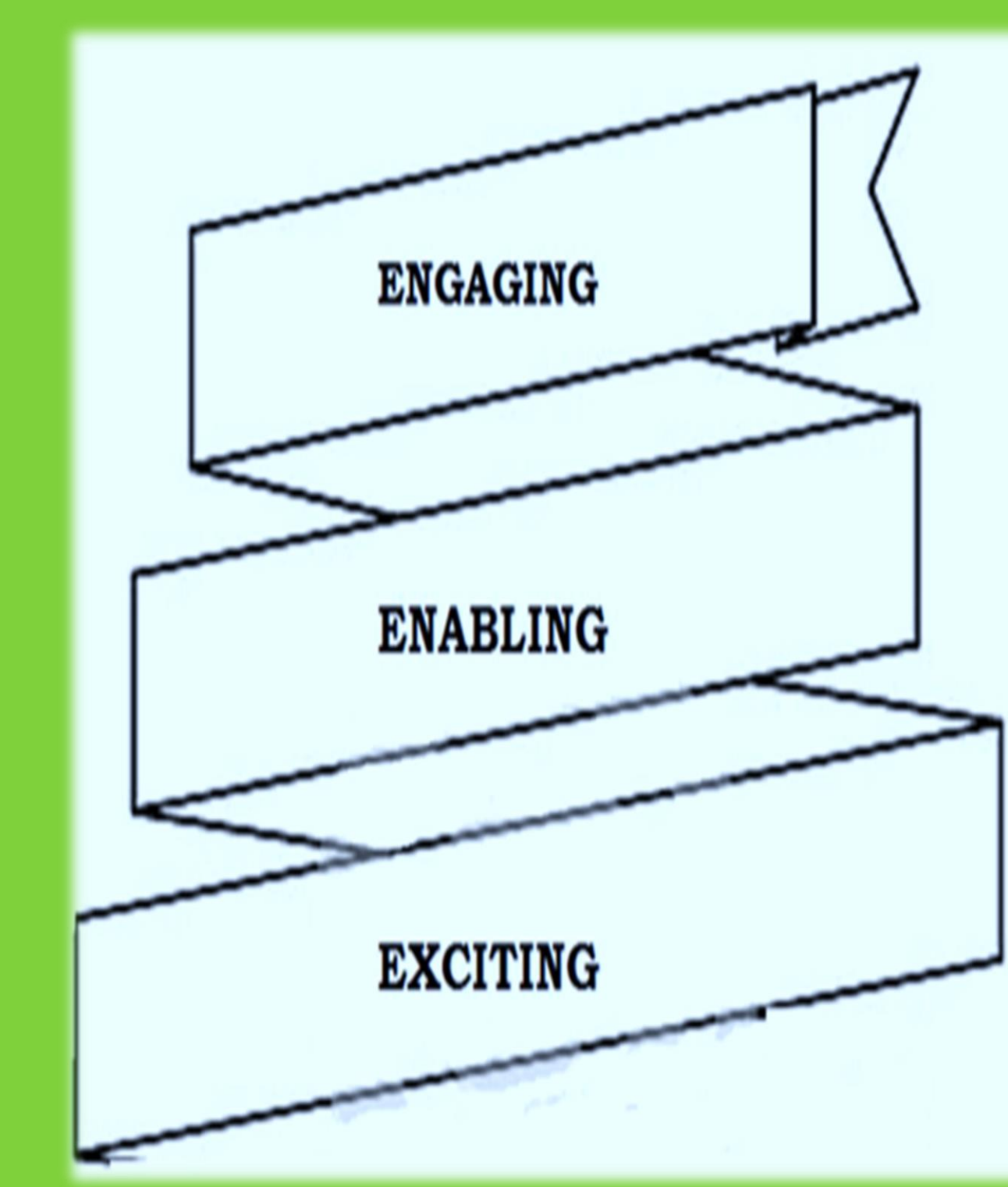
The themes that were derived from the study includes Engaging, Enabling and Exciting. Though the use of a thematic analysis and support from a critical associate, the researcher incorporated the themes with a spiral figure and come up with a vortex to represent the interaction of nurses to the web based medication management system.

SUMMARY

The web based medication management system appeals to nurses regardless of gender, age, and years of practice However in the area of practice, it is found out that the web based medication management system is not that much of appealing specifically in terms of performance and effort expectancy, facilitating conditions and usability.

Based from the model that was emerged from the study, It states that at some range of age, perceived usability of the technology tends to get higher as age increases. Furthermore, it also showed that at some range of length of practice, the higher the length of practice is the lower the perceived usability of the technology may become. Therefore the study concluded that nurses should be given an opportunity to be provided learnings and trainings that can be able to comprehend by nurses of different age groups. Assessment of skills regardless of Length of practice should also be considered when implementing the use of technology.

Additional modules or interface must be implemented to be able to deliver safe medication administration to the patients. Information systems like bar coding and data basing of drugs for every area of the hospital must be implemented to deliver a high level of degree of care to the patients of every health care setting.

The study came up with a simulacrum by using a vortex as a figure and through thematic analysis the study came up with 3 themes: Engaging, which pertains in learning the system; Enabling, which pertains to change in oneself; and Exciting, which pertains to the benefits in using the web based medication management system.

CONCLUSION

The institution should implement more trainings and provide time for all the nurses to be able to get the skill of utilizing the web based medication management system so that they can be more effective and efficient in providing high level of care to every patient while integrating the use of technology in their daily routine