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The effectiveness of "I PASS The BATON" model in improving nursing handover at a university hospital in Vietnam

Anh Tu Thi Truong[a], Anh Thuy Thi Nguyen[b], Huong Thi Pham[c], Anh Minh Thi Nguyen[d], Phuong Thu Thi Pham[e], Linh Thuy Khanh Tran[e], Truc Thanh Thai[ef*]

[a]*Department of Plastic and Cosmetic Surgery, University Medical Center, Ho Chi Minh City, Vietnam;*
[b]*Department of Proctology, University Medical Center, Ho Chi Minh City, Vietnam;*
[c]*Department of Emergency, University Medical Center, Ho Chi Minh City, Vietnam;*
[d]*Department of Urology, University Medical Center, Ho Chi Minh City, Vietnam;*
[e]*University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam;*
[f]*Department of Training and Scientific Research, University Medical Center at Ho Chi Minh City, Vietnam.*

Abstract: *Introduction*: Nursing handover is an important process in hospital care where information and responsibilities are transferred from one nurse to another to ensure continuity of care and safety of patients. However, evidence of the effectiveness of using standardized nursing handover approaches, particularly in resource-limited countries, is scarce. This study was conducted in order to evaluate the change in handover practice through the "I PASS the BATON" model in a university hospital in Vietnam and identify factors contributing to the effectiveness of this model. *Material and methods:* We provided handover training for nurses in the Emergency Department using the "I PASS the BATON" model and evaluated their application right after the course and one month after the course. *Results*: The consistency of the handover skill among participating nurses remained high one month after applying the model in the routine care at the hospital. Overall, the mean score achieved after training was high and remained unchanged after one month. However, significant and marginally significant improvement was found in some components one month after the course including the Action and Timing. In contrast, the Next component decreased over time. Evaluation of nurses' perceptions about the model were assessed using the Health Belief Model which revealed that perceived susceptibility and seriousness were at the moderate level and significantly decreased after one month. In contrast, perceived benefits and barriers were at a high level and remained unchanged after one month. *Conclusions*: The "I PASS the BATON" model was effective in improving nurses' handover skills and practices.

Keywords: I PASS the BATON, nursing handover, university hospital, Vietnam.

1. INTRODUCTION

Nursing handover is an important process in hospital care where information and responsibilities are transferred from one nurse to another to ensure the continuity and the safety of

patients. To do this effectively, a wide range of strategies have been proposed including using pre-defined nursing handover forms. For example, Xiang-Jun and Yin-Ping (2016) evaluated the use of nursing handover forms and revealed that such forms contributed significantly to the

reduction in nursing errors, treatment-related issues, the delay or missed medication/blood tests, pressure ulcer rate, inappropriate care and the rates of falls [14]. However, to ensure the accuracy of the information, improve the effectiveness, minimize errors of nurses, and to achieve effective nursing handover, such forms should be standardized and take into account the differences in clinical settings, patients, and diseases [9].

Instead of using handover form, other standardized models with key steps for nursing handover have been created and used worldwide including the "I PASS the BATON" model. The goal of "I PASS the BATON" is to ensure the continuous care and safety of patients, minimize errors in the process, enhance communication between nurses, improve responsibility and team working, as well as the relationship between nurses, encourage patients and their relatives to participate in care, reduce anxiety and feelings of abandonment of patients and their families during handover time, and to increase cooperation and knowledge of patients in self-care [1]. Thomas and Patrica (2012) revealed significant improvement in clinical practice before and after applying the "I PASS the BATON" model [13]. The model has also been shown to be less time-consuming and to improve the overall satisfaction of both nurses and patients. However, little is known about the feasibility and effectiveness of this model in resource-limited countries like Vietnam.

Furthermore, nurses need to be assisted and trained to change their behaviors toward the new model in their routine practice at hospitals. In order to achieve a sustainable, effective health education, it is vital to understand their belief toward their application of the new model [8]. This is because the belief is proven to be a key factor contributing to the development of individual characteristics which in turn form and modify individuals' behavior [6]. The Health Belief Theory is a reliable measurement and widely used to determine the relationship between people's belief and their behaviors. This theory has also been used to assess the effectiveness of interventions targeting changing health behaviors.

In Vietnam, some hospitals are using handover tools such as the Situation, Background, Assessment, Recommendation (SBAR) tool. For other hospitals, including teaching hospitals, nursing handover is usually performed verbally and nurse handover report forms. However, these tools and forms have not been standardized and validated. Research about nurse handover is scarce, the effectiveness of these approaches is unknown. Given the high rate of nursing handover errors reported in previous studies [13], this study aims at evaluating the change in handover practice using the "I PASS the BATON" model in a university hospital in Vietnam and identifying factors contributing to the effectiveness of this model including nurses' belief toward applying the new model in their clinical practice.

2. MATERIALS AND METHOD

2.1. Study design

This study was designed as a single group post-test study where we provided training and then tested the participants' performance after the course and one month after the course. This study design was adapted from previous pratice from published studies [2], [5]. However, because the "I PASS the BATON" model had never been used at the study site, we did not include the pretest component. The evaluation one month after the training was also based on the common practice in previous studies in nursing research [2], [5].

The study was conducted in the hospital at a public general teaching hospital within a medical university in Ho Chi Minh City. The hospital has 1,000 beds with 26 clinical departments, 10 subclinical departments, 14 clinical units, and 5 clinical centers. There are more than 1600 nurses and each nurse takes care of approximately 8 to 10 patients on the dayshift and up to 20 patients on the nightshift. The Emergency Department has the highest number of nursing handovers at the hospital. This department receives all types of patients, has 16 beds, 40 stretchers, and a special care room for patients with infectious diseases. There are 13 doctors, 63 nurses, 12 assistant nurses, and 7 medical secretaries forming the staff of this department.

From September to December 2018, we provided handover training for nurses in Emergency Department using the "I PASS the BATON" model and evaluated their application immediately after the course and again at one-month post-course. Sample size was determined by using the formula to compare the difference of two means on one group on two occasions. With type one error of 5% and statistical power of 80%, a mean difference of 0.83 (SD = 0.15) based on a previous study by Thomas (2015), and an anticipated participation rate of 90% after one month, at least 52 nurses were needed. We recruited all nurses within the Emergency Department except the nursing managers. Those who did not attend the training program were excluded from the analysis [12].

2.2. Instrumentation

The practical observations using the Vietnamese version of the "I PASS the BATON" model were evaluated. We employed the forward and backward translations for the use of the Vietnamese version. The original English version was translated into Vietnamese by the first and second authors and translated back into English by two other registered nurses who had degrees of master in the science of nursing, were fluent in English, and were unaware of the original English version. The reversed translation and the original version were assessed by an experienced, senior nurse who had a doctoral degree in nursing from Australia and was a lecturer, and the head of the nursing department at a medical university.

The "I PASS the BATON" model includes ten key components and steps including: Introduction, Patient, Assessment, Situation, Safety, Background, Action, Timing, Ownership, and Next. This model is helpful since nurses can follow these steps and details at each step in nursing handover. Details of these components and steps are available elsewhere [1]. The score of each item in the handover model ranges from 0 to 3 depending on the level of completeness and information to be handed-off. These included 0 if not mention, 1 if less than 50% of the information to be handed off is transferred, 2 if the handed-off information is sufficient from 50% to less than 100% and 3 if hand off 100% information. For example, in the Introduction step, nurses are required to introduce themselves and their role. They have a score of 3 if they introduce both information about themselves and their roles, a score of 2 if only one of these is introduced and a score of 0

if none of these is introduced. The overall score of this model ranges from 0 (no hand-over) to 30 (perfect hand-over).

To ensure the reliability and validity of measuring the practical observation, two researchers conducted independent assessments of each participant and the average of the two results was recorded. In this study, there were no observations where the scores of the two researchers differed by more than 20%.

The self-reported questionnaire included questions about age, sex, qualification, working experience, and perception toward the "I PASS the BATON" model. Questions about participants' perceptions were adopted from the model of Health Belief Theory [3] and evaluated the susceptibility, seriousness, benefits, and barriers. Participants answered these questions through a 7-point Likert type rating system from 1 (totally disagree) to 7 (totally agree). The overall score was the mean score of all items, a higher score indicated a higher level of belief toward the "I PASS the BATON" model. The scale has been shown to have good to excellent reliability and validity in assessing respondents' beliefs [4].

2.3. Procedures

A 90-minute training workshop was conducted by a researcher who had been working at the Emergency Department for more than 20 years, having a clinical instructor certificate and increased knowledge about communication models and handover at the hospital. The workshop covered the concept of nursing handover, consequences of errors of handover, goals, and benefits of using a standardized "I PASS the BATON" handover model. Role-play was also conducted for all participants to practice this model. After the course, participants were asked to complete a self-reported questionnaire. To evaluate the sustainability of knowledge, attitude, and ability to perform the "I PASS the BATON" model, participants were asked to complete a similar questionnaire one month later. Nursing performance handover behaviors were also observed by the researcher and results were documented using the "I PASS the BATON" checklist at baseline and after one month. This study followed the SQUIRE 2.0 checklist.

2.4. Ethics

The study was approved by the Ethical Committee at the University Medical Center (Approval number: 344/DHYD-HDDD). Participation was granted through written informed consent.

2.5. Data analysis

We used frequency and percentage to describe participants' characteristics, mean and standard deviation to describe the score from practical observations and health perceptions. One sample paired t-test was used to compare the score of practical observations and health perception at the end of the course and one month after the course. Statistical significance level was at $p < 0.05$ and data analysis was conducted using Stata version 14.

3. RESULTS

The majority of participants were female (59.6%) with a mean age of 28.4 (standard deviation = 4.6) years old. Most nurses (57.7%) who participated in this study completed a two-year secondary nursing education and have been working at the hospital for at least 2 years (84.6%) (Table 1).

Table 1: Characteristics of nurses participated in the study

Characteristics	n (%)
Sex	
Male	21 (40.4)
Female	31 (59.6)
Age, (year)	
Mean (SD)	28.4 ± 4.6
< 25	14 (26.9)
25 – 30	25 (48.1)
> 30	13 (25.0)
Qualification	
Secondary nursing education (two years)	30 (57.7)
College nursing education (three years)	3 (5.8)
Baccalaureate nursing education (four years)	19 (36.5)
Working experience, (year)	
Mean (SD)	5.9 ± 4.7
≤ 1	8 (15.4)
2 – 5	22 (42.3)
> 5	22 (42.3)

Table 2: Consistency of skill one month after applying "I PASS The BATION" model

I PASS the BATON	At the end of the course n (%) [†]	One month after the course n (%) [†]	p
Introduction	43 (82.7)	39 (75.0)	0.248
Patient	49 (94.2)	46 (88.5)	0.257
Assessment	49 (94.2)	51 (98.1)	0.317
Situation	38 (73.1)	41 (78.8)	0.439
Safety	38 (73.1)	37 (71.2)	0.827
Background	41 (78.8)	37 (71.2)	0.394
Actions	28 (53.8)	45 (86.5)	<0.001
Timing	43 (82.7)	49 (94.2)	0.058
Ownership	45 (86.5)	45 (86.5)	0.999
Next	44 (84.6)	33 (63.5)	0.022
Total number of complete steps (Mean ± SD) [‡]	8.0 ± 1.5	8.1 ± 1.1	0.680

[†] *Frequency and percentage of complete steps (score of 3 for each step)*
[‡] *Total number of complete steps from 10 steps in I PASS the BATON, ranges from 0 to 10*

Table 3: Nurses' Belief Toward Applying "I PASS the BATON" Model

Perception †	At the end of the course Mean ± SD	One month after the course Mean ± SD	p
Perceived susceptibility	**4.0 ± 1.6**	**3.2 ± 1.6**	**0.006**
My chances of getting handover error are great	4.1 ± 2.0	3.1 ± 2.0	0.004
My handover make it more likely that I will get handover error	4.4 ± 1.8	3.4 ± 1.8	0.003
I feel that my chances of getting handover error in the future are good	4.1 ± 1.7	3.3 ± 1.7	0.015
There is a good possibility that I will get handover error	3.7 ± 2.0	3.2 ± 1.7	0.133
I worry a lot about getting handover error	3.8 ± 1.8	3.1 ± 1.7	0.015
Perceived seriousness	**4.7 ± 1.5**	**4.1 ± 1.4**	**0.013**
The thought of handover error scares me	4.1 ± 2.0	3.6 ± 1.9	0.091
When I think about handover my heart beats faster	4.0 ± 1.9	3.6 ± 1.9	0.140
If I had handover error my career would be endangered	4.7 ± 1.7	3.9 ± 1.6	0.003
My financial security would be endangered if I got handover error	5.0 ± 1.7	4.4 ± 1.5	0.051
If I got handover error, it would be more serious for patient's health	5.8 ± 1.5	5.1 ± 1.5	0.013
Perceived benefits	**5.6 ± 1.3**	**5.5 ± 1.0**	**0.831**
Using of "I PASS the BATON" handover prevents future problem for me	5.7 ± 1.5	5.5 ± 1.2	0.506
I have a lot to gain by using of "I PASS the BATON" handover	5.5 ± 1.4	5.5 ± 1.1	0.936
Using of "I PASS the BATON" handover can help me find missed information	5.6 ± 1.3	5.6 ± 1.1	0.999
If I use "I PASS the BATON" handover I may find missed information before it is discovered by others	5.7 ± 1.3	5.6 ± 1.1	0.586
I would not be so anxious about getting handover error if I use "I PASS the BATON" handover for all patients	5.3 ± 1.6	5.4 ± 1.2	0.733
Perceived barriers	**5.1 ± 1.1**	**4.9 ± 1.1**	**0.258**
Using of "I PASS the BATON" handover is time consuming	5.4 ± 1.3	5.2 ± 1.4	0.301
The practice of "I PASS the BATON" handover interferes with my work.	5.1 ± 1.5	5.0 ± 1.4	0.630
Using of "I PASS the BATON" handover would require starting a new habit, which is difficult	5.8 ± 1.2	5.5 ± 1.2	0.169
I am afraid I would not be able to use "I PASS the BATON" handover	4.2 ± 1.5	4.1 ± 1.4	0.537
Overall	**4.8 ± 1.0**	**4.4 ± 0.8**	**0.019**

† *Score ranges from 1 (totally disagree) to 7 (totally agree)*

The handover skill among the nurse participants at initiation and one month after the "I PASS the BATON" handover training in routine care at the hospital (Table 2) revealed a high mean score which remained unchanged after one month (M=8.0, SD=1.5 vs M=8.1, SD=1.1, p=0.680). However, significant and marginally significant improvement was found in some aspects of the "I PASS the BATON" one month after the course including Action (p<0.001), Timing (p=0.058). Also, the 'Next' component decreased over time (p=0.022).

Scores of several domains of perceptions (12/19) did not change after one month (Table 3); however, perceived susceptibility and seriousness were at moderate levels at baseline (M = 4.0, SD = 1.6 and M = 4.7, SD = 1.5) and decreased significantly after one month (M = 3.2, SD = 1.6, p = 0.006 and M = 4.1, SD = 1.4, p = 0.013). In contrast, perceived benefits and barriers were at a high level and remained unchanged after one month (p = 0.831 and p = 0.258).

4. DISCUSSION

This study was the first to evaluate the use of the standardized "I PASS the BATON" model for nursing handover at a university hospital in Vietnam. We found that nursing handover practice after receiving training to use "I PASS the BATON" hardover tool was good with high scores

at the end of the course and remained unchanged or even improved after one month.

Findings from our study were consistent with a previous study by Kim, Hur, and Kim (2018) where 55 new graduate nurses were trained to use the SBAR handover model. Improvement in handover competency was statistically significant immediately following their training and again one month after training (7.89 to 9.32, p = 0.001) [10]. However, the score of the Next item decreased significantly one month after training. Nursing care at the Emergency Department is typically urgent and fast. Furthermore, it is difficult for nurses to answer the patient about the patient timeline, plan for care, and discharge plans because they do not have complete information regarding the diagnosis and care plan at the time of the handover. Management of patient flow in and out of the Emergency Department is one of the most important factors influencing the quality of handover [11].

To evaluate the effectiveness of an educational intervention, it is essential to know the participants' beliefs in applying knowledge, skill, and practice after the intervention. We found that the perceived susceptibility and seriousness lessened over the one month period which indicated a positive belief among our participants. For example, in terms of perceived susceptibility, our participants expressed a high level of worry about handover errors at baseline, but a lower level after one month of applying the model. Our finding was consistent to previous studies measuring respondents' belief

in educational interventions [7]. In constrast, our participants were highly aware of the benefits of this handover model in controlling the errors since the score of perceived benefits was high at baseline and remained unchanged after one month. Although there were barriers to the application of the new model such as time consuming and difficulties in adapting a new habit, the perceived barriers may need a longer time period to be overcome.

Our study had some limitations including the small number of nurses recruited from a single department at a university hospital in a big city in Vietnam which may limit our generalizability of the results. Further studies in different settings such as city hospitals, district hospitals, or in rural areas are needed to confirm the effectiveness of "I PASS the BATON" model. Due to the limited resources available, we only evaluated post-training skills and practices. The lack of baseline, pre-training evaluation limited our interpretation regarding the current application of "I PASS the BATON" among nurses in Vietnam. This information is essential to target the need of nurses in different settings and thus to design problem-based training courses using the "I PASS the BATON".

5. CONCLUSION

Overall, the "I PASS the BATON" handover model was effective in improving nurses' skills and practices. Although this effectiveness was documented one month after the training and application in routine care, belief about the model, especially with the existence of many perceived barriers, may need to be strengthened to ensure the sustainability of knowledge, attitude and skills gained. Further studies are needed to validate the "I PASS the BATON" model in different regions, settings, and clinical departments.

AUTHOR CONTRIBUTIONS

Study design: TTTA, NTTA, PTH, NTMA, TTKL, TTT

Data collection: TTTA, NTTA, PTH, NTMA

Data analysis: TTTA, NTTA, TTT, PTTP

Manuscript writing: TTTA, NTTA, PTH, NTMA, TTKL, TTT, PTTP

CONFLICT OF INTEREST

No conflict of interest has been declared by the authors.

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