

# 關於內科群組病房護理人員對壓力性損傷通報錯誤的原因分析及提升通報正確率的品質改進計劃

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## 摘要

預防壓力性損傷的發生多年來在護理照護上一直備受關注，本文針對台灣南部一所區域教學醫院作研究，分析其壓力性損傷病患的盛行率、內科群組病房護理人員對壓力性損傷的知識及通報流程作評估。我們還分析了護理人員在壓力性損傷通報上錯誤的原因。經過互動式學習、案例分析、實際操作監測和學員回饋，我們評估了這項品質改進計劃對本院參與研究的208名護理人員的壓力性損傷通報正確率提升的效果，同時也對壓力性損傷病患的預後、護理人力和經濟效益作評估分析。經過本專案介入後，我們發現參與研究的208名護理人員通報正確率由65.3%提升到了88.4%、其維持效果甚至在計劃後的六個月內使通報正確率達93.3%。同時認知測試分數也由73.4分提升到84.2分、通報所需的時間從平均12.5分鐘下降到5.3分鐘、通報所需的護理人力共節省了約56.5小時，也相對應節省約新台幣9,438.8元的護理費用。同時，護理人員對薦椎傷口的照護無論在敷料覆蓋錯誤、敷料黏貼技巧錯誤、大小便染污方面均有大幅度的改善。此外，病患壓力性損傷傷口平均癒合率從計劃介入前的11.9%提升到介入後的25.0%。相信將來以同樣有實證基礎的品質改進計劃可同樣有效地改善其他醫療問題。

**關鍵詞：**護理人員、壓力性損傷通報錯誤、壓力性損傷通報正確率、品質改進計劃

## A Quality Improvement Program to Analyze the Causes of Notification Error and Increase Nurses' Accuracy Rate of Pressure Injury Notification in Medical Group Wards

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## Abstract

Preventing pressure injury has been a nursing concern for many years. This study included a survey of pressure injury prevalence, an assessment of the knowledge and notification process of nurses about pressure injury in medical group wards of a southern Taiwan regional teaching hospital. We also analyzed the causes of notification error of pressure injury. After an interactive learning session, case analysis, practice monitor and

feedback, we evaluated the effect of this quality improvement program to increase nurses' accuracy of pressure injury notification rate of our 208 nursing staffs included in this study, accompanying patient outcome, nursing manpower and economic benefit evaluation. After our intervention, we found nurses' accuracy of notification rate improved from 65.3% to 88.4%, and even with 93.3% in the maintenance period about 6 months after our program. Besides, points of cognition test improved from 73.4 points to 84.2 points, every notification time decreased from 12.5 minutes to 5.3 minutes averagely. We saved nursing manpower about 56.5 hours and cost about NT\$ 9,438.8 for the process of notification. Meanwhile, nursing staff had evident improvement of sacral pressure injury wound care, including decrease of wound dressing error, wound change dressing technique error, stool and urine wound pollution. In addition, we found that the average healing rate of pressure injury wound increased from 11.9% to 25.0%. It is believed that it could also be continuously reiterated for other medical issues that have associated evidence based practices for prevention.

**Keywords: Nursing Staff, Pressure Injury Notification Error, Accuracy Rate of Pressure Injury Notification, Quality Improvement Program**

## I. Introduction

Pressure injury is a complex lesion of the skin and underlying structures caused by prolonged pressure on the tissues or by shearing forces [1]. It is very painful and difficult to treat. Ultimately, it may cause a patient to die. Thus, prevention is an essential concern in all medical institutions [2].

In 1859, Florence Nightingale wrote, "If he has a bedsore, it's generally not the fault of the disease, but of the nursing" [3]. Some regard pressure injury as a "visible mark of caregiver sin" associated with poor or nonexistent nursing care [4]. However, many clinicians believe that pressure injury development is not just the fault of nursing care, but rather a functional breakdown of the health care system [5], e.g. failure in the cooperation and skill of the whole health care team (nurses, physicians, physical therapists, dietitians, etc.). Although pressure injury prevention is a multidisciplinary responsibility, nurses still play a major role during patient hospitalization.

Identification of high-risk, critically ill patients and proper interventions to prevent pressure injury remains a great clinical challenge. For example, classification system is one method of summarizing certain characteristics of pressure injury, including the extent of tissue damage. Accurate classification aids in determining proper management of the pressure injury. However, classification results of pressure injury would vary in clinical practice, because different nurses may determine different tissue types based on their personal knowledge and clinical experience. In a survey of nurses' wound care knowledge, less than 50 percent of new nurses (fewer than 20 years of nursing experience) feel confident in accurate classification of pressure injury, as compared to 30 percent of the more experienced nurses (more than 20 years of nursing experience) [6].

Skills for pressure injury classification are likely to benefit from systemic interactive learning session, case analysis, practice monitor and feedback. However, no research has reported the topic of using a quality improvement program to analyze the real causes of notification error and increase nurses' accuracy rate of pressure injury notification in the literature. This study aims to solve these problems and assess the patient outcome, effectiveness of manpower and nursing cost saving.

## II. Materials and methods

### 1. Background of our hospital

Our hospital was a southern Taiwan regional teaching hospital. There were totally 414 ordinary beds within ten wards of our medical department, referred as medical group wards. The average occupancy rate was 86.6%. There were one head nurse, five nurse team leaders and sixteen to twenty-seven nurses in every ward and there were totally 208 nursing staff with average seniority about 5.4 years. The nurse–patient ratio was 1:8.8 averagely. The nursing capability graded from low to high were as follows: N0: 43 (20.7%), N1: 43 (20.7%), N2: 67 (32.2%), N3: 40 (19.2%) and N4: 15 (7.2%). There was only one specialized wound-caring nurse in our medical group wards.

## 2. Current process of pressure injury notification

The process of pressure injury notification was performed by the caring nurses through our computerized pressure injury notification system, revised in September 2012. The timing of pressure injury notification included reporting immediately (for new admission patients) and reporting within eight hours (for patients during hospitalization) while pressure injury is noticed or suspected. Nurses evaluated potential pressure injury using Braden scale. The accuracy of notification would be confirmed by nurse team leaders or head nurse. Specialized wound-caring nurse would re-confirm the diagnosis and calculate accuracy of pressure injury notification, implement notification data, establish management plan and follow-up program.

About our notification system, total twenty parameters simply concluded the description of pressure injury location, class, length, width, depth, conditions of wound and adjacent skin, risk factors, time of occurrence, ward of occurrence, and notification ward, etc. However, we specially regard the following six items as our essential quality control index, including (1) pressure injury location, (2) classification, (3) ward of occurrence, (4) ward of notification, (5) time of occurrence, and (6) data based on Braden scale. During the process, photo record of pressure injury is essential and the photos would be uploaded to our database, for treatment effectiveness evaluation and long-term follow-up. One or more parameter notification mistakes of one case within the process would be regarded as one case pressure injury notification error. The percentage of notification accuracy was calculated according to the formula: case number of accurately notified / total case number notified x 100%.

## 3. Strategy to increase nurses' accuracy rate of pressure injury notification

Our quality improvement team included one physician, one specialized wound-caring nurse and two hundred and eight nursing staffs. We spent about ten months (25 January 2016 ~ 15 November 2016) for this quality improvement program. We routinely had group meeting every six weeks. Main topics included schedule evaluation, budget and improvement strategy, difficulties encountered, innovative idea, data analysis, and re-evaluation. This program included into three stages.

### Stage 1 -- Period of Planning

- (1) We planned “pressure injury education and training courses” for our nursing staffs. We focused on Braden scale introduction, clarification of pressure injury classification, risk factor evaluation, differentiation of pressure injury and non-pressure injury by using photo education, clinical experience sharing and feedback, and video recording as repeated education material for nurses. Besides, we proposed to make our assessment guideline of pressure injury and create our portable "pressure injury quality control photo card" (Figure 1) as reference for clinical practice, which was about 21x6 cm in size.
- (2) We evaluated the notified cases of our medical group wards between 25 January 2016 ~ 19 March 2016 and tried to analyze the notification error condition via our “Cause & Effect/Fishbone Diagram” (Figure 2).



Fig. 1 Our portable "pressure injury quality control photo card"

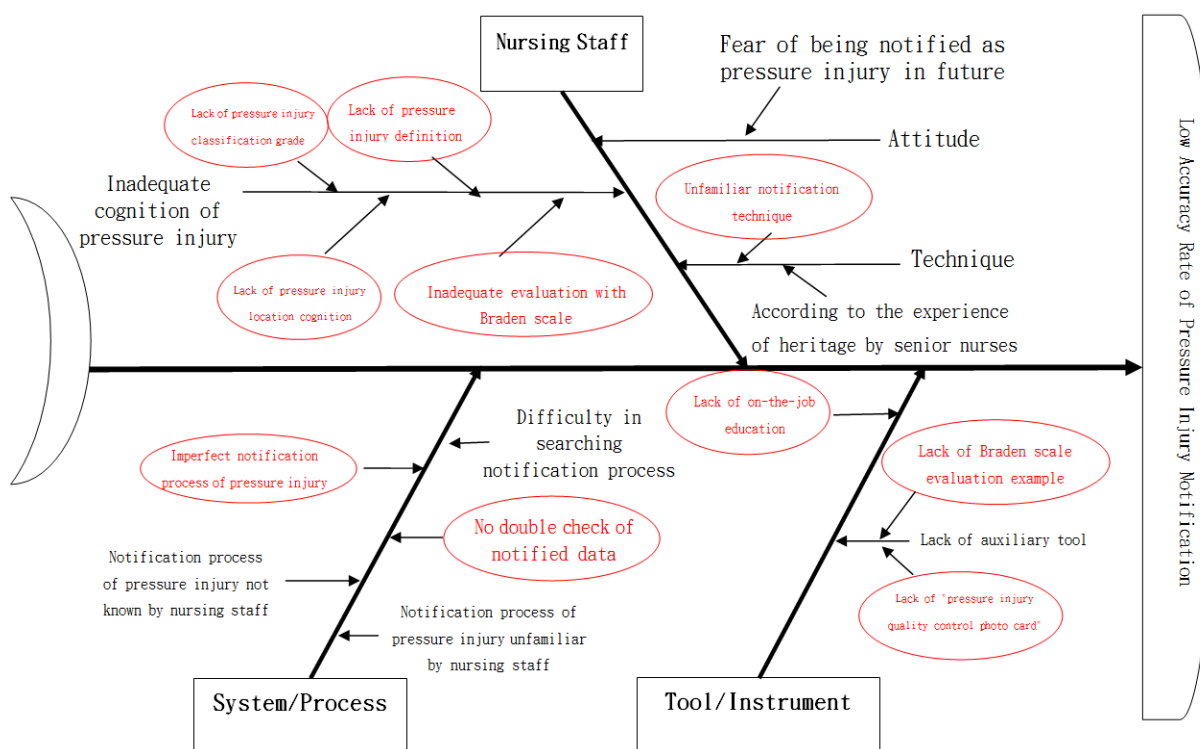


Fig. 2 Our "Cause & Effect/Fishbone Diagram" used to analyze possible causes of pressure injury notification error

**Stage 2 -- Period of Implementation**

- (1) We held several 1-hour on-the-job "pressure injury education and training courses" at different dates for our nurses because they had shift requirements. The topic of "pressure injury education" was held on 19 April 2016, 21 April 2016, 26 April 2016 with average attendance rate about 62.0% (129/208). The topic of "Braden scale assessment" was held on 19 May 2016, 24 May 2016, 31 May 2016 with average attendance rate about 61.10% (127/208). All lectures were introduced our single specialized wound-caring nurse, followed by clinical case teaching, in order the set up a uniform consensus of our nurses.
- (2) We delivered portable "pressure injury quality control photo card" to each nursing staff. Besides, the Braden

scale assessment information and photos, we also added the photos of different diseases, e.g. incontinence contact dermatitis, for differentiation. Nurses could also review the detail information from related video from hospital website.

- (3) We discussed with the nurses of clinical cases when difficulty was encountered. Averagely, our specialized wound-caring nurse spent about 3-4 hours a day on case discussion and practice monitor. Besides, she would gather the feedback from the nurses as references for our team discussion.
- (4) Head nurses and nurse team leaders helped to perform pre- and post-class assessment for nurses of their ward to track the learning effect. For the absentees of our education and training courses, they could download related information from hospital website for self-education and also received post-class assessment.

### Stage 3 -- Period of Evaluation

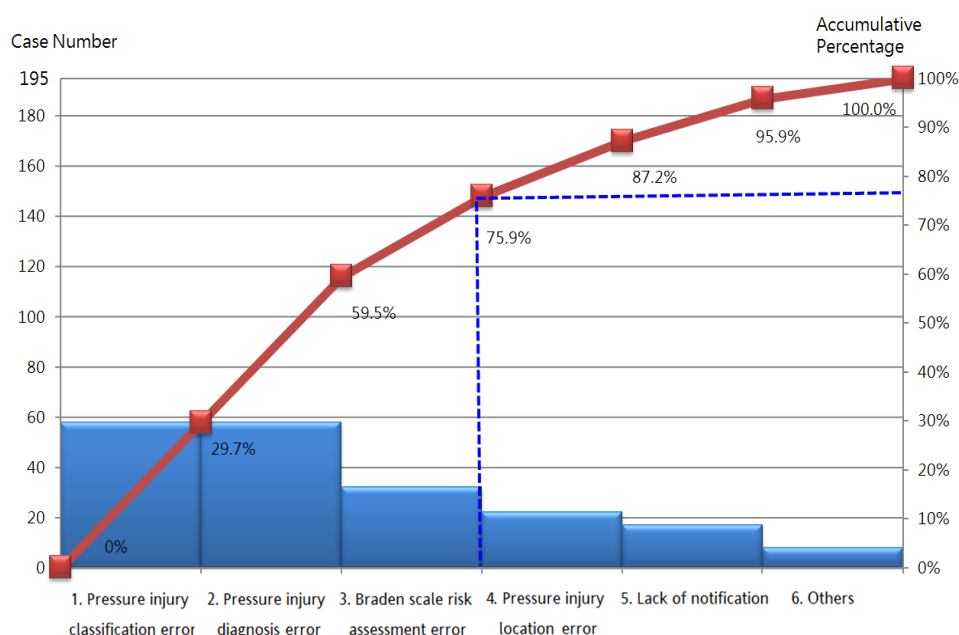
After several education and training courses for nurses, we analyzed the data of pressure injury notification, compared the error rate before and after the education, and even the maintenance period about 6 months after our program. We tried to find out possible causes of notification error and the effectiveness of our quality improvement program.

## III. Results

### 1. Condition of pressure injury notification before quality improvement program

There were 505 cases notified as pressure injury between 25 January 2016 and 19 March 2016. Twenty-four cases were excluded due to patient discharge or transferal to other departments. Among the residual 481 cases visited by our specialized wound-caring nurse, 167 cases were found as notification error with an accuracy rate about 65.3% (314/481). Meanwhile, there were more than one parameter errors in 28 cases and total number of parameter errors was 195. The common errors included pressure injury classification error (29.7%, 58/195), pressure injury diagnosis error (29.7%, 58/195), Braden scale risk assessment error (16.4%, 32/195) and pressure injury location error (11.3%, 22/195) (Table 1). The average time of each case notification by nurses was about 12.5 minutes.

**Table 1 Common notification errors of pressure injury wounds**



Besides, we found the most important causes of nurse notification error included (1) inadequate cognition of pressure injury, (2) imperfect process of pressure injury notification, (3) no double check of notified information, (4) unfamiliar technique during notification process, and (5) lack of auxiliary tool during clinical pressure injury assessment (Table 2).

**Table 2 Common causes of pressure injury notification error and possible solutions**

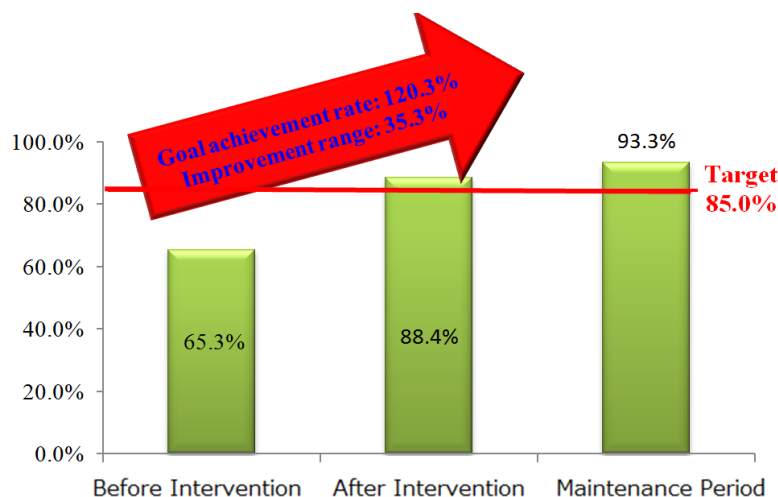
Causes of problem	Items of Solution	Feasibility	Cost	Importance	Total score	Acceptance	Strategy No.
Inadequate cognition of pressure injury	1. Holding training courses for definition, classification and care of pressure injury.	12	12	12	36	◎	1
	2. Integration of pressure injury care into 2-year nursing training course.	8	9	9	26	✕	
	3. Discussion with nursing staff about every mis-notified case.	12	10	9	31	◎	2
	4. Holding Braden scale evaluation training courses	12	11	12	35	◎	3
	5. Making Braden scale evaluation films.	10	10	11	31	◎	4
Imperfect process of pressure injury notification	1. Regular update of pressure injury notification process.	11	10	10	31	◎	5
No double check of notified information	1. Establishment of pressure injury quality control mechanism and check per month.	11	11	12	34	◎	6
	2. Establishment of pressure injury internal quality control mechanism (appointment of ward nursing staff in charge)	8	10	12	30	✕	
	3. Establishment of clinical pressure injury notification nursing quality control check system.	7	8	7	22	✕	
Unfamiliar technique during notification process	1. Making lateral-side human anatomic card with description.	11	12	11	34	◎	7
	2. Correction of common input location errors of pressure injury notification system.	11	12	11	34	◎	5
Lack of auxiliary tool during assessment	1. Making "pressure injury quality control photo card".	12	12	12	36	◎	7
	2. Making Braden scale evaluation tool with guideline.	11	9	11	31	◎	8

PS. According to "3-point Likert scale", strategy with total score  $\times 0.8(39 \times 0.8) = 31$  points or more is regarded as an acceptable method.

## 2. Outcome of pressure injury notification after quality improvement program

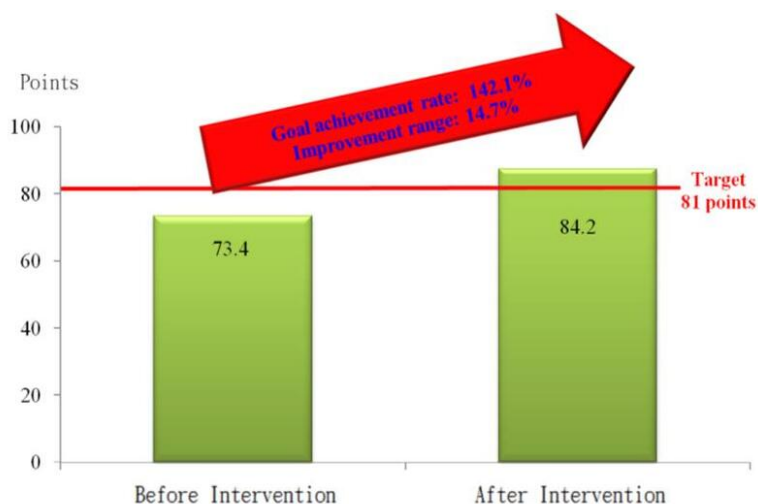
After an interactive learning session, practice monitor and feedback, we found caring nurses' accuracy rate of pressure injury notification improved from 65.3% to 88.4%, and even with 93.3% in the maintenance period about 6 months after our program (Table 3). Points of pressure injury cognition test improved from 73.4 points to

**Table 3 Comparison of pressure injury notification accuracy rate before, after quality improvement program intervention, and in maintenance period**

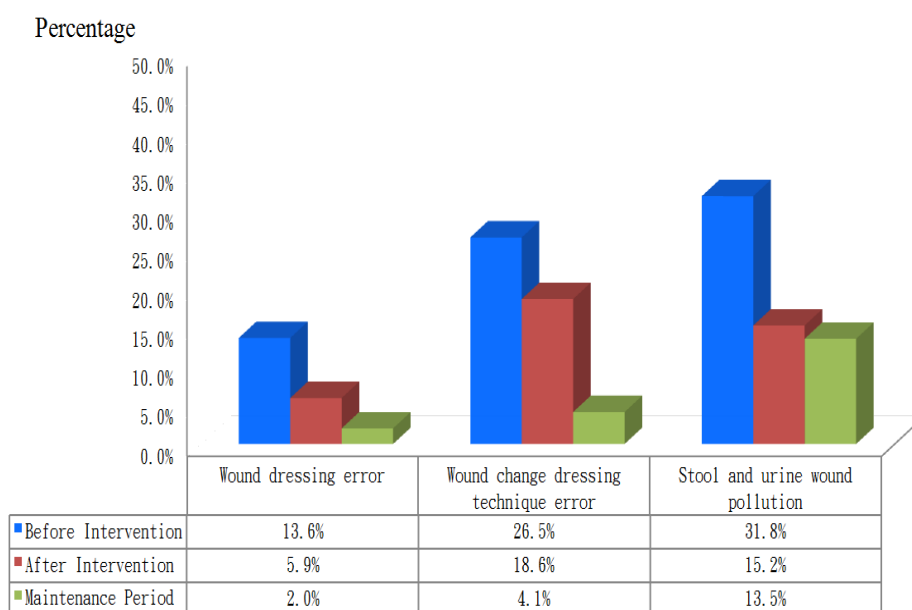


84.2 points (Table 4). Time spending on every pressure injury notification averagely decreased from 12.5 minutes to 5.3 minutes. Totally we saved nursing manpower about 56.5 hours in pressure injury notification process within the study period. We also could save the nursing cost about NT\$ 9,438.8 for the process of notification. Meanwhile, after the intervention of this quality improvement program, nursing staff had evident improvement of sacral pressure injury wound care, including decrease of wound dressing error, wound change dressing technique error, stool and urine wound pollution (Table 5). In addition, we found that the average healing rate of pressure injury wound in our medical group wards increased from 11.9% to 25.0% after intervention.

**Table 4 Comparison of pressure injury cognition test points before and after quality improvement program intervention**



**Table 5 Comparison of sacral pressure injury wound care improvement before, after intervention, and in maintenance period**



## IV. Discussion

Pressure injury remains a serious national health concern impacting cost of care, liability, reimbursement, and quality of life for long-term-care providers and their residents [7]. The National Pressure Ulcer Advisory Panel 2012 monograph examined the trend in pressure injury over the previous decade [8, 9]. Their studies reported that the incidence of pressure injury in critical care ranges between 3.3% and 53.4% and prevalence rates for critically ill patients ranged between 25.1% and 45.5% [8]. Given the aging population, increasingly fragmented care, and nursing shortage, the incidence of pressure injury will most likely continue to rise.

Pressure injury prevention is regarded as a key quality indicator of nursing care. Mc Glynn et al. suggested it as a goal for nationwide quality improvement in 2003. Claiming of pressure injury prevention as a quality indicator is the belief that health providers have the ability and the tools to take effective action [10].

Most medical institutions that use pressure injury risk assessment tools use either the Braden scale or Norton scale, with the Braden scale being the most widely used in the United States. The Braden scale is designed for adult use and includes six subscales: sensory perception, moisture, activity, mobility, nutrition, and friction and shear [11]. The copyrighted tool is available at <http://www.bradenscale.com.braden.pdf>. The scores on this scale range from 6 (high risk) to 23 (low risk), with 18 being the cut score for onset of pressure injury risk. Previous study showed that hospital nurses could accurately determine pressure injury risk 75.6 percent of the time after an interactive learning session on the Braden scale [12]. These preventative measures are relatively simple and should be straightforward to deliver. Thus, at the initial design of our quality improvement program, we expected to raise nursing's sensitivity to earlier preventive measures by using Braden scale.

Pressure injury prevention has been aided by clinical practice guidelines since 1994 [8]. However, these guidelines recommend risk assessment tools be used as an adjunct to rather than a replacement of clinical judgment, principally because the tools could not accurately and reliably predict patients at risk. The chief factor underlying this performance failure is likely to be that the tools are too simplistic [10]. Thus, the U.S. Centers for Medicare and Medicaid Services recommends that nurses consider all risk factors independent of the scores obtained on any validated pressure injury prediction scales because all factors are not found on any one tool [13]. Nurses still need to use their experience, clinical judgment in employing preventive pressure injury care.

Before training, the classification skills of the studied nurses were poor. Based on this study data, we found nurses' accuracy rate of pressure injury notification improved from 65.3% to 88.4%, and even with 93.3% in the maintenance period about 6 months after our program. Besides, points of pressure injury cognition test improved from 73.4 points to 84.2 points. Time spending on every pressure injury notification averagely decreased from 12.5 minutes to 5.3 minutes. We can assume that the description of clinical guidelines about the differential diagnosis from pressure injury provided a positive effect. The effectiveness might be supported by using clear definitions, descriptions and clinical practices. Incorrect differentiation results in inadequate preventive and therapeutic measures, and in suboptimal use of available resources. Meanwhile, care givers should be trained prior to undertaking pressure injury classification. Tissue viability training and unambiguous observation guidelines are important and should be presented at an appropriate level to ensure an adequate adoption of skills in daily practice [14].

If fact, there is no agreement on how frequently risk assessment should be done. There is a common consensus from most pressure injury clinical guidelines to do a risk assessment on admission, at discharge, and whenever the patient's clinical condition changes. The appropriate interval for routine reassessment remains unclear still. Studies by Bergstrom and Braden found that in a skilled nursing facility, 80 percent of pressure injury develop within 2 weeks of admission and 96 percent develop within 3 weeks of admission [15, 16]. Experts believe



that weekly assessments and staging of pressure injury will lead to earlier detection of wound infections as well as being a good parameter for gauging of wound healing [13]. At our hospital, skin integrity is evaluated according to the following criteria. We routinely evaluate the patients at the occasions of admission, transferal to medical group wards, or change in vital signs. During the hospital stay, we evaluate stable patients once per week. For patients with 16 points or less in Braden scale assessment, we evaluate skin integrity every eight hours.

Clinical nurses face many challenges today. Nurses may know that, at times, putting new evidence-based care guidelines into practice can raise additional barriers to the delivery of patient care [17]. The nursing quality management team governing the facilities requires an electronic record for each patient and facility to monitor nursing activity [7]. Staff compliance in executing the guideline is paramount. However, our study revealed that after this quality improvement program, nursing staff had evident improvement of sacral pressure injury wound care, including wound dressing error, wound change dressing technique error, stool and urine wound pollution. In addition, we also found that the average healing rate of pressure injury wound in our medical group wards increased. These suggested that nurses could independently initiate prevention strategies earlier in the patient stay, and more consistently recognizing patients at higher risk for pressure injury development.

In our study, we totally saved nursing manpower about 56.5 hours and related cost about NT\$ 9,438.8 in pressure injury notification process within the study period. However, after popular acceptance, our quality improvement program has the great potential to lessen significant financial burden on healthcare systems, and even to relieve patients suffering the pain and increase quality of life, which are of most significance.

To enable staff members to introduce reliable and sustainable changes, it is useful for them to have a framework to structure improvement efforts and be skilled in improvement methodologies [18]. Quality improvement interventions offer a mechanism of change to the existing structures and implement pressure injury prevention effectively. The best-practice framework developed by Nelson et al. is a useful model of quality improvement interventions that focuses process improvement on four domains: leadership, staff, information and information technology, and performance and improvement [2]. We tried to imitate the elements of his framework in our study. Through our quality improvement program, our members could learn from each other and develop common knowledge. Sharing knowledge across the whole health-care community increased understanding and appreciation of the different arenas and systems. Meanwhile, it can also be reapplied to pressure injury prevention throughout various hospital settings and even has the potential to be applied to other diseases, such as catheter-associated urinary tract infections, surgical-site infections, and ventilator-associated respiratory infections. Of course, reapplication of the framework should begin with the process of modification and follow with support from leadership and involved staff [2].

This study was limited by a small group of nursing staff included. Further investigation should focus mainly on large group, well-controlled, double blinded research studies to verify these results.

## V. Conclusion

Pressure injury prevention is really a nursing intensive task. Our challenge is especially difficult when there is high nursing staff turnover in Taiwan. We established this pressure injury quality improvement program, including internal control by ward unit by head nurse and nurse team leaders, and external monitor by specialized wound-caring nurse. Internalizing these changes from our improvement program throughout the health care system could lead to pressure injury reductions. Besides, this also has positive effect to implement high-risk group early detection, early and proper intervention, and pressure injury care audit, in order to perfect the pressure injury monitor system, revise our notification process and acquire better care quality.

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