

# Assessment of nursing knowledge and wound documentation following a pressure ulcer educational program in a long-term care facility: a capstone project

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## Abstract

**Objective:** To assess nursing knowledge and quality wound documentation following an evidence-based pressure ulcer educational program (EduP) in a long-term care facility.

**Methods:** An evidence-based EduP was developed and 10 registered nurses (RN) and licensed practical nurses (LPN) from a long-term care facility in northeastern New Jersey were selected. Two pressure ulcer and wound documentation educational sessions were held and given four weeks apart. Participants completed a pre-test and post-test for each EduP. Data collected via retrospective chart audits on three separate occasions (baseline, fourth week and eighth week) on patients with pressure ulcers and non-pressure ulcers to determine the impact of an EduP on quality documentation.

**Results:** Participants' level of nursing knowledge increased significantly following each EduP. Also, based on the chart audits, the quality of nursing documentation in wounds increased considerably after each EduP. There was an indication that participants retained information presented from educational session one to educational session two. Additionally, the description of pressure ulcer characteristics documented by the participants for every wound improved for elements size (59.5% to 82.7%), exudate (43.9% to 70.5%) and tissue type (42.7% to 63.1%).

**Conclusions:** The pressure ulcers EduP was shown to increase nursing knowledge and improve comprehensive wound documentation of pressure ulcers in a long-term care facility. Findings will assist nurses to use evidence to accurately document pressure ulcer changes to assure federal guidelines are met and also improve patients' outcomes and their quality of life.

*Keywords:* Pressure ulcers, wound documentations, pressure ulcer program, nursing wound documentations, nursing knowledge.

## Introduction

Skin integrity is often recognised as a quality indicator of nursing care in long-term care facilities and yet pressure ulcers continue to occur and pose significant problems for

the American health care system<sup>1</sup>. In addition to individual impact, there are increased health care costs associated with having a pressure ulcer. The estimated annual cost of treating pressure ulcer in long-term care settings was estimated to be as high as US\$355 million<sup>2,3</sup>. Additionally, the prevalence of pressure ulcer in long-term care facilities range from 2.3% to 28% in the United States<sup>3,4</sup>, while the national prevalence of Stages I to IV ulcers ranges from 3% for low-risk residents to 13% for high-risk residents<sup>5</sup>. The cost of pressure ulcer treatment is 2.5 times higher than pressure ulcer prevention, thus nursing goals should be geared towards prevention<sup>6</sup>. In order to achieve pressure ulcer preventative goals, nurses should properly identify pressure ulcers and document all elements (aetiology, size, exudate, tissue type, periwounds, treatment used, pain addressed, offloading devices used and direction of healing)

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of the ulcer to monitor and track its progress<sup>7</sup>. Measures to prevent, repair or heal skin loss demonstrate the concurrence of nursing knowledge, critical thinking and caring skills<sup>8</sup>; consequently, the spotlight on increasing nursing knowledge and comprehensive documentation to reduce pressure ulcer-related complications and improve preventative strategies has become important for health care organisations. For this reason, the purpose of this project was to assess nursing knowledge and quality wound documentation following an educational program (EduP) on pressure ulcers in a long-term nursing care facility. Furthermore, this pilot study aimed to determine if implementation of an annual assessment of nursing competencies in pressure ulcers and comprehensive wound documentation would be appropriate in this long-term care setting.

## Scope of the problem

Pressure ulcers are areas of localised tissue destruction produced by the compression of soft tissue over a bony prominence and an external skin surface for a prolonged period of time<sup>9</sup>. Exposure of the tissues to prolonged pressure in excess of capillary pressure inhibits circulation and limits normal exchange of oxygen and other substances, thus resulting in cellular metabolism disruption and ultimately tissue destruction<sup>10</sup>. Pressure ulcers are staged from I through IV to categorise the degree of damage observed<sup>9</sup>. Pressure ulcers are considered among the eight preventable conditions as identified by the Centers for Medicare and Medicaid Services (CMS)<sup>5</sup>.

The Wound Ostomy and Continence Nurses (WOCN) Society estimated that more than two million persons in the United States develop pressure ulcers each year<sup>11</sup>. In long-term care facilities, the incidence rate is between 2.2% and 23.9%<sup>3,11</sup>. In addition, the average cost per hospital admission for patients who developed Stages III or IV pressure ulcer has been reported to US\$43,180 per case<sup>12</sup>. Unfortunately, pressure ulcers result in longer hospital stays for the patient and significantly greater health care costs for both the individual and society. The CMS has listed pressure ulcers as a preventable adverse event and targeted for reduced reimbursement at a higher rate for treatment of serious hospital-acquired pressure ulcers. The American Nurses Association has established that exemplary skin care is a nurse-sensitive outcome measure and is commonly used as a quality indicator for nursing care<sup>13</sup>. Therefore, nursing knowledge and the ability to prevent pressure ulcers have become a priority issue in long-term care facilities. The Joint Commission identified that reduction of health care-associated pressure ulcer development as a 2007 National Patient Safety Goal<sup>14</sup>. In addition, reducing unintentional iatrogenic harm

such as pressure ulcers was established by the Institute for Healthcare Improvement as a result of the 5 million lives Campaign initiatives<sup>15</sup>. Several studies have indicated that nurses demonstrate an overall basic knowledge of pressure ulcers and its assessment but deficits still exist in specific areas such as correct staging, and comprehensive wound documentation<sup>16</sup>. Additionally, serious documentation gaps, such as lack of data and/or nonspecific comprehensive existing information<sup>17,18</sup> may impede the care process.

Studies have demonstrated that pressure ulcer prevention programs have decreased prevalence of pressure ulcers in the long-term nursing homes<sup>19,20</sup>. Current practice guidelines have developed as important resources to execute evidence-based practice in day-to-day practices to advance patient care and outcomes<sup>21,22</sup>. Through EduPs, preventative methods can be reinforced<sup>23</sup>. However, it is understood that even in the most ideal conditions, some patients can still develop an ulcer, even sometimes in a matter of hours. Therefore, it is more critical for nurses to have the knowledge to correctly assess for pressure ulcers during their regular skin checks and document all elements of wounds<sup>7,24,25</sup>. Given the current and projected burden that wound-related complications has placed on today's public health and economy<sup>26</sup>, it is important to objectively revisit the investment needs in education of wound care<sup>27</sup>. Jones, Burger, Piraino and Utley examined the effect of a pressure ulcer prevention program on prevalence and incidence of pressure ulcer and found that the key factor in decreasing skin breakdown was nursing staff education and with ongoing reinforcement<sup>28</sup>. In their study, Hayes, Wolf and McHugh concluded that pressure ulcer education in yearly staff development programs may significantly decrease pressure ulcer prevalence and incidence<sup>20</sup>. It further confirms the need for health care institutions to provide programs that target nursing educational needs to help increase their knowledge and improve their wound documentation. Therefore, the purpose of this pilot program is to assess nursing knowledge and quality wound documentation following an evidence-based pressure ulcer EduP in a long-term care facility.

## Literature review

The purpose of the literature review was to identify the best current evidence in improving pressure ulcer and wound documentation and nursing knowledge. A literature search of studies between 1990 and 2012 was performed within Cochrane library, EBSCO host, CINAHL, Pub-Med, and Medline for the terms, "pressure ulcer education and documentation, nurses", "pressure ulcer program" "nursing knowledge in wounds", and "wound documentations" in long-term care facilities. It is important to note that most of the

articles found addressed prevention rather than assessment or documentation. Studies assessing nursing knowledge and comprehensive wound documentation specific to its elements in a long-term care facility could not be found.

Pressure ulcers are a major burden on patients leading to reduced quality of life, longer days in the care settings, increase cost and even death. In an article entitled, "Human skin wounds: A major and snowballing treat to public health and the economy"<sup>27</sup> highlighted the overwhelming burden of pressure ulcer on the health care society in the United States. The authors stated that US\$25 billion are spent annually on treatment of chronic wounds and societal burden is growing rapidly to increase health care costs as there is an increase in aging population and rise of chronic diseases such as diabetes and obesity worldwide. This article suggested that due to immense economic and social impact of wounds in the society, it is critical to allocate a higher level of attention by directing resources in EduPs to understand the mechanics of wound healing and pressure ulcer management.

Pressure ulcers are now viewed as preventable and unnecessary<sup>29</sup> and, therefore, measures such as: early detection, weekly assessments including staging, measurements, colour, presence of exudate (type of drainage), evidence of healing, as well as pain and treatment are essential. Comprehensive documentation is a prerequisite for patient safety<sup>30</sup>. It is suggested that nursing home staff are often not adequately trained to prevent and or treat pressure ulcers<sup>31</sup> and that most nursing homes even struggle to have best practice in place for treatment of pressure ulcers<sup>32</sup>. Buckland, Scott and Leaper found that nurses in all areas of the care setting lacked the current evidence-based knowledge with regard to pressure ulcers<sup>33</sup>. It has been suggested that not all nursing homes are providing the level of training that is required by nursing and, therefore, allowing the staff to access appropriate training is an important factor to reduce pressure ulcers and improve documentations<sup>32</sup>. Pieper and Mattern assessed the critical care nurses' knowledge of pressure ulcer prevention, staging and description in their study through utilisation of a 47-item pressure ulcer knowledge test<sup>34</sup>. The sample consisted of 75 experienced intensive care nurses (registered nurses; RNs) but only few had read the AHCPR Guidelines on Pressure Ulcer Prevention. The results of the test indicated that significant weakness in understanding the pressure ulcer prevention and risk assessment amongst the staff existed, indicating gaps in their knowledge.

Sendelbach, Zinck and Peterson described a pressure ulcer prevention program in which several interventions were bundled together<sup>35</sup>. These included standardised measurement skills, provider education, and point-of-care

resources for providers, patient/family education, timely nutritional assessment and development of skin day events to increase awareness was development by interprofessional teams of representatives from 10 different hospitals. Following implementation of the program, the authors reported a 33% reduction in pressure ulcer reported to the state of Minnesota, which translated into a potential cost savings of up to US\$430,000. The authors concluded that prevention of pressure ulcers requires vigilant, consistent and inter-professional approaches using evidence-based approaches for prevention and the need to work collaboratively to reduce the number of reportable pressure ulcers.

Pieper, Mikols, Mance and Adams studied nurses' documentation of pressure ulcers as a reflection of their abilities to appropriately recognise of patients' need for change in care based on ulcer presentation<sup>36</sup>. A sample of 167 patients on high or low air loss mattress therapy was scrutinised. The authors reported nursing documentation was significantly incomplete across critical categories and related description; for example, location, staging, healing, size, colour, exudate and odour. The authors suggested that intensive education of the nursing staff was needed.

Pieper and Mott examined nurses' (n=228) knowledge of pressure ulcer prevention, staging and description, utilising a pressure ulcer knowledge test<sup>37</sup>. Results revealed nurses who had recently attended a lecture on pressure ulcers had significantly more knowledge than those that did not. The study did not utilise nonprofessional staff. Subjects also reported they had limited exposure to information about pressure ulcers in nursing school, and were subsequently less prepared to recognise pressure ulcer risk factors, institute preventative strategies, appropriately treat and document thoroughly as a graduate nurse.

Tweed and Tweed reported on intensive care nurses' knowledge of pressure ulcers and the effect of an EduP<sup>38</sup>. An assessment of the nurses' knowledge was conducted prior to the presentation of a pressure ulcer EduP (n=62), two weeks after (n=38) the program and 20 weeks later (n=29). The results indicated an increase in level of knowledge, with the mean score on the assessment test improved from mean 84% to 89%. However, at 20 weeks, the mean score returned to the baseline of 85%. The literature review confirms that knowledge about pressure ulcers, prevention strategies, correct assessment, wound care, and comprehensive documentation are the key to optimal skin integrity and repair.

Jordan-O'Brien explored nurses' quality and nature of documentation in pressure ulcer prevention and management<sup>39</sup>. A descriptive survey and focus group interviews were conducted with retrospective chart audits

over a one-month period. The author reported that n=9 (33%) of patients with a pressure ulcer had a nursing care plan and 47% (n=12) showed evidence of implementation of a nursing care plan in the chart. Patients' records also showed 45% documentation in evaluation of outcomes but 70% had no evidence of pre-positioning and 50% of nutritional interventions in patients with pressure ulcers. The author concluded that pressure ulcer documentation by nurses in prevention and management was inadequate.

Kallman and Suserud studied RNs and nursing assistants' attitudes regarding pressure ulcer prevention, knowledge and practice of risk assessment and documentation<sup>40</sup>. The authors utilised a cross-sectional design and distributed questionnaires to randomly selected facilities (long-term care facilities, assisted livings, and so on) and hospital care settings, yielding a 67% response rate. The finding revealed good knowledge on prevention and treatment of pressure ulcer and positive attitude towards its care. However, only 37% (n=55) agreed with the strategies for pressure ulcer prevention utilised in their nursing units and only 42% (n=36) of RNs reported documenting each pressure ulcer when a high-risk patient is identified. Furthermore, the result revealed that n=49 (32%) of sample who attended

previous education courses on pressure ulcers, achieved significantly ( $p \leq 0.05$ ) better results in knowledge test. The authors further concluded that evidence-based methods are currently available in risk assessment but rarely adopted or used in practice. Therefore, nurses' attitudes towards evidence-based practice are essential and should be taken into consideration for optimal pressure ulcer prevention and management at a facility<sup>41,42</sup>.

Gunningberg conducted a study on effects of an education program on RNs (n=20) on nurses' knowledge of pressure ulcer risk and prevention, nursing documentation and routine use of preventative strategies<sup>43</sup>. A quasi-experimental design with pre- and post-test including documentation audits (n=138) pre- and post-EduP and at eight-month follow-up was conducted. The results showed that nursing knowledge, documentation and routines with pressure ulcer prevention was inadequate before the EduP but improved at eight-month follow-up. The author concluded that the EduP helped to encourage and empower the nurses for practice change.

Gallant, Morin, St-Germain and Dallaire conducted a descriptive correlational study to explore if the relationships among the nurses' level of pressure ulcer knowledge and

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certain nurses' characteristics (such as, sector of activities where nurses worked, perception of their knowledge) and preventative care applied<sup>44</sup>. Nurses' level of knowledge (n=256; 46%) were measured by questionnaires and randomly selected chart audits (n=235). The findings indicated gaps in the level of nursing knowledge and that there is a relation between the level of knowledge and sector of nursing activities where they worked and perception of their own level of knowledge (p=0.05). Also, the results indicated that although virtually all of the nurses (96.88%) indicated on the initial assessment that they assess patients for pressure ulcers, only 25% actually carried out the assessment.

Gunningberg and Ehrenberg carried out a cross-sectional survey to determine the accuracy and quality of nursing documentation of pressure ulcers<sup>45</sup>. Retrospective chart reviewed (n=413) and notes on pressure ulcers (n=59) were audited. The results indicated that the quality of nursing documentation of pressure ulcers were poor and was most evident in Stage I pressure ulcer documentation. The authors concluded that patients' records do not adequately represent reliable data on pressure ulcers and that more attention on quality of clinical data is needed.

The literature review confirms that knowledge about pressure ulcer, its assessment, prevention, wound care, and comprehensive documentation are the key to optimal skin integrity and repair.

## Needs assessment

A nursing and rehabilitation centre, 340-bed, long-term care facility in northeast New Jersey was selected for the program. Several factors influenced the development of this program at this facility. These included the high incidence rate of pressure ulcers (8.2%); inconsistent documentation or understanding of facility pressure ulcer protocol; First Care Providers Company (FCP), who specialise in wound management, weekly recommendations are not always carried out or regularly followed; and when a pressure ulcer is discovered or a current ulcer deteriorates, nurses often incorrectly stage the wound and/or inadequately describe the elements of the wound such as aetiology, wound exudate, tissue type, or pain in patient medical records.

## Evaluation framework: evidence-based model

The evaluation model selected for this project was The Iowa Model for evidence-based practice (EBP). The Iowa Model originated at the University of Iowa in 1994<sup>46</sup>. The Iowa Model is an organisation model for EBP and provides a guide for clinical decision-making and details regarding

implementation of evidence-based practice. The model is unique in that it includes both the nurse practitioner and organisational perspective and is recognised for its simplicity of use by multidisciplinary health care teams<sup>46</sup>.

## Project purpose and objectives

The overall aims of the program were to determine if multiple educational sessions would improve the nurses' level of knowledge in pressure ulcer assessment, as well as improve the quality of wound documentation in a long-term care facility. There are a number of intrinsic and extrinsic factors that influence development of pressure ulcers, and, therefore, assessment, management and documentation of each wound needs to be individualised. This project was conducted to test the hypothesis that an evidence-based EduP on pressure ulcers and wound documentation would increase nurses' level of knowledge and quality of wound documentation. The objective is to provide relevant monthly educational sessions for nurses' for two months and based on this study results, assessing the possibility of implementing quarterly in-services and yearly competencies on pressure ulcers and wound documentation to all nurses at this facility.

A readiness assessment of the long-term care facility was conducted via a survey of all stakeholders, nurses and unit managers. The more the program is accepted and valued, the more likelihood of it being successful in its implementation and outcomes<sup>47,48</sup>. Support for the pilot study was sought out and barriers at the facility included lack of staff, and insufficient time for patient care were identified. Despite these constraints, most nurses and leaders of this facility were willing to learn and change their practices to reflect the evidence-based guidelines.

An agreement between the facility stakeholders and the investigator (Doctor of Nursing Practice student) was obtained. A data retrieval tool was created: 1) Nursing demographics (Appendix A); 2) Chart audit tool (Appendix B); and 3) Pressure ulcer and wound documentation questionnaires (Appendix C). Informed consent was attained from all participants prior to their involvement in the study in agreement with the university's policies. All information collected from the participants or from the medical records was kept confidential and discarded in accordance to the facility's HIPAA policy.

## Sample

A convenience sample of RNs and licensed practice nurses (LPNs) from four specific units consisting of long-term care residents was contacted to pilot the EduP. The first shift nurses including unit managers attended the EduPs. A total of 10 full-time nurses attended two monthly educational sessions

given by the investigator. Study participants completed the demographics and pre-test questionnaires, participated in all educational sessions taught by the investigator and then completed the post-test questionnaire. To control for any bias in the data, nurses were not informed about audits on their wound documentation conducted prior to educational session 1, at four weeks and at eight weeks.

## Methodology

A 340-bed, long-term care facility located in northeastern New Jersey was selected for the pilot program. The target population was RNs and LPNs working with long-term care residents with pressure ulcers. First shift nurses in four long-term care units participated in two educational sessions and their documentation was audited. The steps taken to implement the EduP are summarised in Table 2.

EduPs focusing on pressure ulcers, assessment, prevention, wound management, treatment, and elements of wound documentation were identified as being necessary at the facility. The program team was composed of the administrator, director of nursing, certified wound specialist, vice-president of operations, unit managers and the investigator who played the lead role. The educational format was one hour and 30 minutes in length. Educational sessions were held

once a month for two months. A PowerPoint presentation was presented at each educational session. The relevant topics were based on the Agency for Healthcare Research and Quality (AHRQ) clinical practice guidelines, National Pressure Ulcer Advisory Panel guidelines (NPUAP), and the CMS regulations for pressure ulcer and wound care. The topics discussed in both educational sessions are summarised in Table 3.

Prior to each educational session, a pre-test and post-test with 15 multiple and true/false items were developed based on the presentation content and administered to participants to assess their knowledge and deficits. The participants were given the opportunity for questions and answers at the end of each educational session. In addition, participants' documentation for each wound at the selected units was reviewed and collected before the first educational session as a baseline, then at four weeks and at eight weeks following the educational session. The details of the EduP, goals and data collection time frame are summarised in Figure 1.

## Outcome measures

The pilot program strategies, outcome measures and evaluation process were strategically constructed during the planning phases of the project. The outcome measures

Table 2. Steps to program implementation.

Steps	Details
Introduction	The program was explained to the stakeholders and staff. Approval for the project obtained from the facility stakeholders and Rutgers IRB. Consents for participation and demographics obtained from the participants prior to educational sessions began (September 2011)
Team organisation	A team consists of the investigator, director of nursing, VP of operations, administrators, unit managers and wound specialist to determine the areas of nursing knowledge and documentation insufficiencies in order to tailor the educational material directed towards those deficits.
Pilot project	A two-month pilot study was conducted to determine the practicality of the project and identify any concerns or changes that would further be required (September to November 2011)
Educational sessions	The sample nursing staffs (RNs and LPNs) from first shift were educated in pressure ulcers, with a brief overview of other types of wounds, assessments, prevention strategies, offloading devices, treatment options, and detailed documentation strategies with all elements of wound. Pre- and post-tests were given before and after each educational session to the same group of cohorts (September 2011, October 2011)
Retrieval of data	Pressure ulcers and non-pressure ulcer wound documentation audit from the medical records including nurse's notes, skin assessment sheets, were conducted at baseline – prior to the start (September 2011) of the first educational sessions, then at four weeks (October 2011) and also at eight weeks (November 2011) following educational sessions one.
Implementation	Two-month educational sessions done based on feedback from the team and data collected. Program completed in November 2011.
Evaluation	Outcomes assessed and completed based on the result of the program and shared with the stakeholders for feedbacks.
Dissemination	Determined based on the evaluation of the results.

Table 3. Educational session topics.

Functional components of skin	<ul style="list-style-type: none"> <li>• Layers of skin</li> <li>• Types on wound closures</li> <li>• Primary intention</li> <li>• Secondary intention</li> <li>• Tertiary intention</li> </ul>
<b>Pressure ulcer basics</b>	
<ul style="list-style-type: none"> <li>• Aetiology</li> <li>• Epidemiology</li> <li>• Risk assessment</li> <li>• Signs and symptoms</li> <li>• Extrinsic and intrinsic factors</li> <li>• Prevention</li> </ul>	<ul style="list-style-type: none"> <li>• Stages</li> <li>• Treatments options</li> <li>• Friction</li> <li>• Shear               <ul style="list-style-type: none"> <li>o Deep tissue injury</li> </ul> </li> <li>• Common locations</li> <li>• Offloading devices</li> </ul>
<b>Other types of wounds</b>	
<ul style="list-style-type: none"> <li>• Aetiology</li> <li>• Assessment</li> <li>• Risk assessment</li> <li>• Signs and symptoms</li> <li>• Treatments</li> <li>• Classification</li> </ul>	<ul style="list-style-type: none"> <li>• Venous ulcers</li> <li>• Arterial ulcers</li> <li>• Diabetic ulcers</li> <li>• Neuropathic ulcers</li> </ul>
<b>Elements of wounds</b>	
<ul style="list-style-type: none"> <li>• Aetiology</li> <li>• Location</li> <li>• Size: length x width x depth</li> <li>• Stage:               <ul style="list-style-type: none"> <li>o I-IV</li> <li>o Unstageable</li> <li>o Deep tissue injury</li> <li>o Partial thickness</li> <li>o Full thickness</li> </ul> </li> <li>• Exudate:               <ul style="list-style-type: none"> <li>o Serous</li> <li>o Sanguineous</li> <li>o Serosanguineous</li> <li>o Purulent</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Tissue type:               <ul style="list-style-type: none"> <li>o Granulation</li> <li>o Slough</li> <li>o Eschar</li> </ul> </li> <li>• Periwound and signs of infection</li> <li>• Treatment used</li> <li>• Pain addressed</li> <li>• Offloading devices               <ul style="list-style-type: none"> <li>o Mattresses</li> <li>o Cushions</li> <li>o Booties</li> </ul> </li> <li>• Direction of healing</li> </ul>
Documentation	<ul style="list-style-type: none"> <li>• Importance</li> <li>• When, where and how often</li> <li>• Factors to document</li> <li>• Nutrition</li> <li>• Appropriate referrals</li> <li>• Standards of measuring wounds</li> <li>• Following guidelines</li> </ul>

were directly related to project evaluation process which included: nurses' participation in the pressure ulcer and wound documentation program; participants' wound documentation, scores on the pre- and post-test knowledge questionnaires; and wound documentation chart audits. Pre- and post-tests with 15-item questionnaires were developed and were based on the content in the presentation. Because knowledge was assessed on two separate occasions, the same

set of questionnaires was given. A score of "1" was allocated for each correct answer and "0" if incorrect or nurses failed to answer the question. The total possible score was 15 points. A three-digit identification number was used on the test response sheets, enabling paired analysis while maintaining confidentiality.

A second stage of data collection included chart audits on participants' wound documentation for pressure ulcer and non-pressure ulcer wounds on the four units and was completed before (baseline) and four weeks after administering the first educational session, allowing the nursing staff time to implement the knowledge and skills gained during the session. A third stage of data collection was chart audits on wound documentation, which was completed at the eighth week after the first educational sessions for the purpose of analysing the long-term outcomes of the EduP and its effect on the program aim and objectives.

## Tools/measures

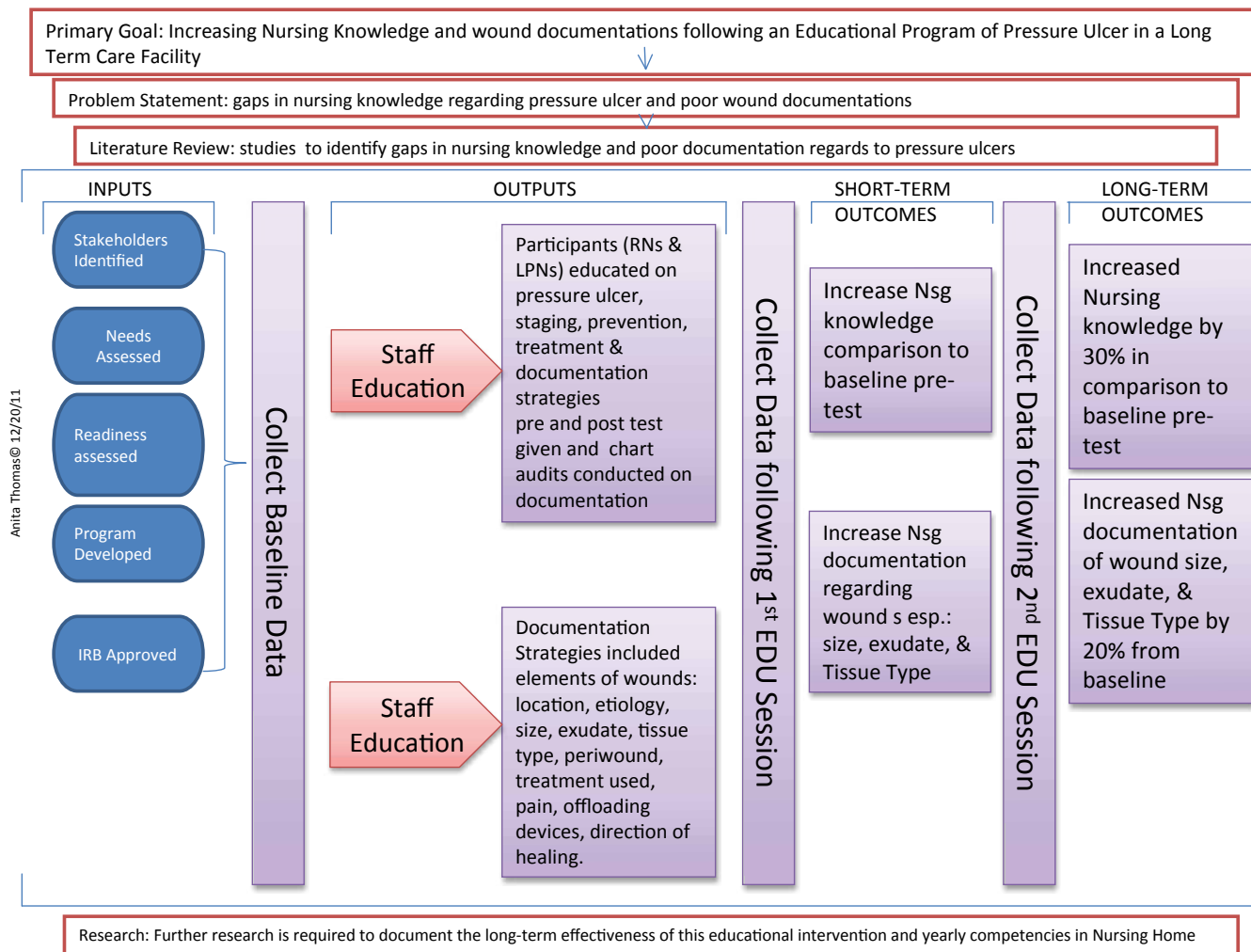
Although collection of data included all characteristics of the wound, for the purpose of tracking elements documented in current wounds, a Pressure Ulcer Scale for Healing (PUSH) tool was used as the framework of assessing nursing documentation to include the elements and characteristics that are most indicative of healing (size, exudate, tissue type)<sup>49</sup>. The PUSH tool was introduced in 1997 by the NPUAP to monitor the healing of Stage II through Stage IV pressure ulcers<sup>49</sup>. The PUSH tool contains three parameters: size; exudate amount; and tissue type. The tool and instructions for use were obtained from the NPUAP 2007 website ([www.npuap.org](http://www.npuap.org)). Studies have demonstrated the PUSH tool's content validity ( $p=0.01$ ) and correlational validity ( $p=0.05$ ) to be a valid instrument for measuring healing in a clinical setting<sup>50</sup>.

A documentation audit on residents with pressure ulcers and non-pressure ulcers assessed, treated and documented by the sample nurses was conducted using the audit tool (Appendix C). Nursing documentation for each wound was measured by placing either "yes", "no", or "n/a" for each of the wound element characteristics that were charted. The sample nurses were unaware that a documentation audit was conducted on their residents with wounds to minimise any early knowledge-based biases on documentations.

## Data analysis

All data analyses were conducted according to a pre-established analysis plan, using the Statistical Package for the Social Sciences (Version 16.0 for Windows, 2010). A retrospective chart audit was used to assess the effects of the educational session on documentation of wound elements

Figure 1. Logic model.



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(especially: size, exudate and tissue type). Descriptive analysis was used to measure pre- and post-EduP knowledge questionnaires and pre-intervention to post-intervention wound documentation audits to answer the questions: 1) was there a significant increase in nursing knowledge regarding pressure ulcer and wound documentation after the EduP?; and 2) was there a significant increase in wound element documentations following the EduP? The mean scores were calculated for all tests using descriptive analysis.

The nurses' attributes such as: education level, years of experience in nursing and previous wound care education within the previous year were also gathered but not included in the analysis in this study.

## Results

### Characteristics of the sample

The demographics of the respondents are provided in Table 4. Ten nurses (100%) from four units attended the presentation of the EduP. All 10 participants completed the first test (baseline pre-test) and post-test education one. Of the 10 who completed the first test and education session one (EduP 1), all 10 (100%) attended education session two (EduP 2) and completed post-test two.

All patients with wounds, pressure ulcer and non-pressure ulcer, at the four units were audited retrospectively during the pilot program. A review of patient records prior to EduP 1 revealed n=50 wounds; following EduP 1 was n=61 wounds; and following EduP 2 was n=51 wounds.

### Effects of the education program

The results indicate that the participants' knowledge about pressure ulcer and wound documentation increased at the end of each educational session. The details of the

participants' test scores as a whole using descriptive analysis are summarised in Table 5. For these nurses, the mean responses score improved after each educational session at time one and at time two: pre-test EduP 1: n=10, m=63.2, SD 17.23; post-test EduP 1: n=10, m=80.2, SD 8.53; post-test EduP 2: n=10, m=92.3, SD 6.13.

The effect size analysis of the change in participants' test scores showed an improvement of over one standard deviation in the mean test score over the baseline period at time one. The test score improvement in these 10 nurses was over two standard deviations over the two-month period.

Retention of nursing knowledge was also evident in the results, with the cohort of nurses scoring higher four weeks post-EduP 1 as a whole compared to the baseline. It is notable that a smaller standard deviation indicates an increase in similarity of responses by these nurses (Table 6).

Patient records with pressure ulcers and non-pressure ulcers were reviewed retrospectively at baseline, then in four weeks (time 1) prior to EduP 2 and then again in eight weeks (time 2). The wound documentation with elements for each wound showed improvement at time 1 and at time 2 compared to baseline. Wound location was documented by nurses more frequently at baseline and mean score improved post-educational session from 71.0% to 90.6%. On the other hand, offloading devices and direction of healing were documented less frequently but showed greater improvement with an increase of over 28 percentage points post-EduPs (Table 7). The details of the participants' wound documentation for each characteristic element are summarised in Table 8. The changes noted in the frequency of wound elements documented by these nurses indicated the areas of strengths, weakness and gaps in the documentation. The presented data could be used to tailor future EduPs at this facility.

Table 4. Demographics of the participants (n=10).

Sex	Age	Degree	Years of experience	Previous PU education
Male	1 <24	0 Diploma	7 <2	1 Yes
Female	9 25–29	0 AAS	0 3–5	4 No
	30–34	0 BSN	1 6–10	1 Within 1 year
	35–39	2 MS	0 11–15	1
	40–44	2 Postgrad	0 16–20	1
	45–49	2 Other	2 21–25	1
	50–54	3	26–30	1
	55–59	1	>35	0
	60–64	0		
	>65	0		

Table 5. Participants' test scores (n=10).

Test	N	Mean/ standard deviation	Effect size (d) baseline to T1, T2
EduP 1: Pre-test (baseline)	10	63.2/17.23	N/A
EduP 1: Post-test (T1)	10	80.2/8.53	1.2
EduP 2: Post-test (T2)	10	92.3/6.13	2.2

\*The effect size in participant test scores showed an improvement of over one standard deviation in the mean test score over the baseline period at time one. The test score improvement over two standard deviations over the two-month period.

The focused wound element of size (m=19.44, SD 13.2), exudate (m=24.55, SD 7.87), and tissue types (m=18.44, SD 9.30) also improved following the educational sessions compared to baseline, with each improving greater than 20 percentage points (Table 9). The results indicated an increase in wound documentation by these cohorts of nurses as a direct effect of the pilot EduP.

## Discussion

Most researchers agree that pressure ulcers are a significant problem with poor quality of life for patients and increased health care cost. Multiple studies have highlighted the fact that knowledge about pressure ulcers, good assessment skills, the use of prevention strategies, and provision of appropriate

treatments and comprehensive wound documentation is necessary and a duty of each provider as well as essential for health care facilities. With gaps in nursing knowledge and inconsistent documentation of wound care, the opportunity for appropriate wound management and meeting the CMS guidance is necessary. The pilot program implemented was supported and encouraged by the stakeholder of this facility. The result of the pilot study showed an increase in nursing knowledge and wound documentation following educational sessions as evidenced by higher mean scores. This met the study goal. In addition, retention of nursing knowledge was also evident after four weeks post-EduP 1 compared with baseline, which was unexpected. The scores of EduP 2 post-test was also higher than EduP 1 post-test, indicating that nursing knowledge increased substantially compared with their baseline. This further supports the importance of providing nurses with repeated educational sessions, not only to retain knowledge learned but also to increase their overall knowledge level.

Furthermore, this pilot study showed an improvement in overall wound documentation after each educational session. The documentation in elements of the wound characteristics also indicated a considerable increase after each educational session compared to baseline. This confirms that educational sessions targeting wound documentation can increase the quality and frequency of nursing documentation. However, variations in charting all elements of wound documentation still exist. These results support other research findings<sup>38,43,44</sup>. Overall, the pilot EduP implemented increased knowledge and improved the quality of wound documentation. Therefore, providing standardised, evidence-based educational sessions

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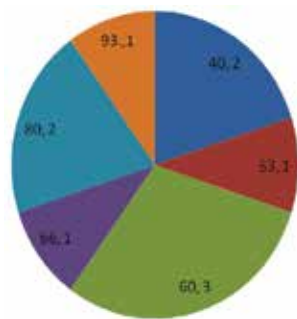
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Table 6. Nursing knowledge retention.

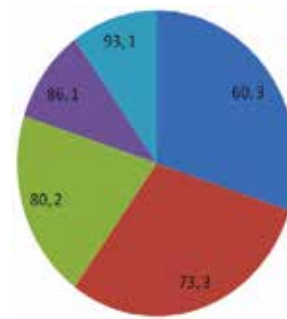
Knowledge retention	Mean	SD
Baseline EduP 1 pre-test	63.20	17.22
EduP 2 pre-test	73.80	11.39

\*Nurses retained knowledge from pre-test EduP 1 to pre-test EduP 2. Acknowledgeable is that smaller standard deviation indicates an increase in similarity of responses by these nurses.

Baseline – Knowledge test scores (%), 15-item test



Month 1 – Knowledge test scores (%), 15-item test



Month 2 – Knowledge test scores (%), 15-item test



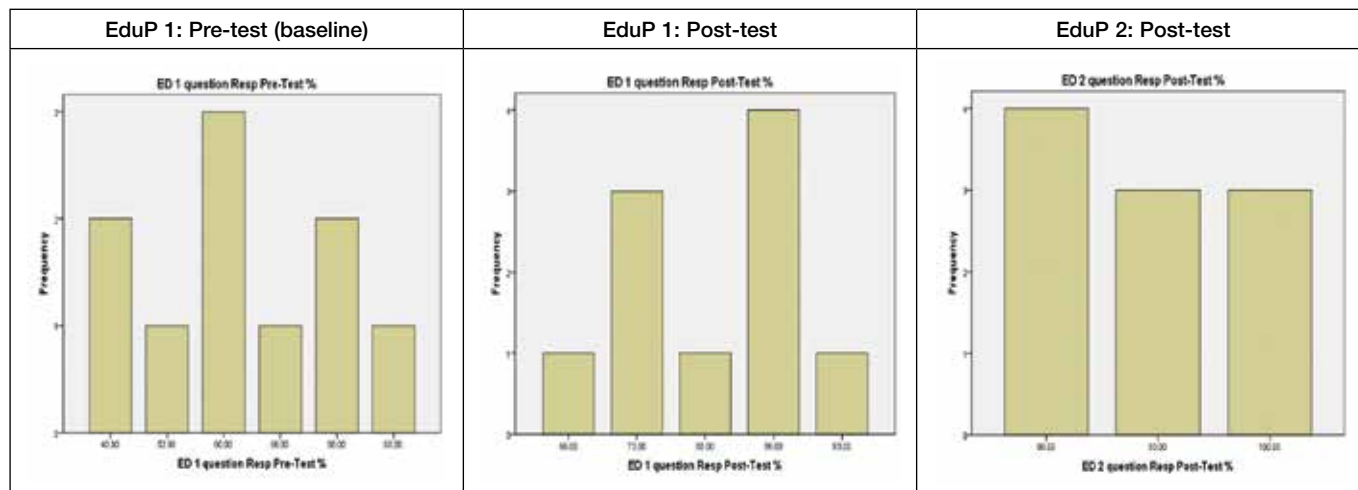
that target these deficits can decrease and eliminate the risk of deficiencies during state accreditation surveys. The incorporation of quarterly nursing educational sessions and the requirement of a yearly competencies assessment in facility-specific policy can increase nursing knowledge, improve wound documentation, increase preventative strategies, and reduce pressure ulcer development, healing time, costs and, most importantly, improve patients' overall quality of life.

Limitations to this project that could affect the conclusions of the findings were identified. The small sample size was one such limitation, resulting in effect sizes that, while showing clinically large effect, such effects may be smaller in larger samples. Another limitation is the fact that the same questionnaire was used for all the tests. This may result in a predisposition to the questions and cause knowledge bias and, thus, modified questionnaires should be utilised. This way, it can be assured that the increase in nursing knowledge is directly linked to pressure ulcer educational sessions rather than prior exposure to the test questions. The short time

period between assessment periods may result in testing bias that may occur from recall between the testing periods, rather than true change in practice. However, subjects would be less likely to remember test questions in yearly competencies and, therefore, utilising the same questionnaire would pose little knowledge bias.

Another restriction was the fact that certified nurse's aides were excluded from this educational session, even though they play an integral part in pressure ulcer management and prevention. In order to fully accomplish a successful wound management and preventative program, it would be ideal for staff who are directly involved to take part in educational sessions and take tailored competencies yearly. It should be noted that well-informed nurses and non-professional staff can promote optimum skin integrity for patients in their units. The stages of pressure ulcer and non-pressure ulcer injury were excluded in the analysis, although they were taught in the educational sessions and, therefore, future studies should include this important aspect of documentation.

Figure 2. Histogram of the pre- and post-tests.



Finally, financial savings as a result of improved nursing knowledge and quality wound documentation directly related to this project were difficult to track. It would be necessary for facilities to link possible cost savings prior to the implementation of such programs. On the other hand, pressure ulcer incidence during this project was reduced to 6.8%, underscoring the success of the pilot project and possible related monetary savings.

### Implications to health care and policy consideration

This program met the CMS compliance guidelines for effective management in prevention and treatment of

pressure ulcers in long-term care facilities<sup>51</sup>. It is acknowledged that staff should be able to identify and differentiate pressure ulcers versus non-pressure ulcers and document all elements of the wound and initiate treatment modalities appropriately<sup>51</sup>.

In as much as health care facilities are being encouraged to improve quality, overall health care costs and patient outcomes, it would be in the interest of the facility to ensure that the new incidence of pressure ulcers is reduced and that developed sores are secondary to condition changes and are unavoidable. This would be an appropriate cost-saving strategy for the facility and for the benefit of the patients.

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Table 7. Frequency of wound characteristics.

Location	Baseline	Post two-month intervention	Changes
Mean	71.0%	90.6%	19.6 percentage points
Standard deviation	12.3	8.9	3.4
Offloading devices	Baseline	Post two-month intervention	Changes
Mean	7.7%	44.5%	36.8 percentage points
Standard deviation	13.2	13.9	0.7
Direction of healing	Baseline	Post two-month intervention	Changes
Mean	10.2%	39.1%	28.9 percentage points
Standard deviation	12.1	9.4	2.7

\*Most documented by nurses at baseline was location and least documented were offloading devices used and direction of healing of the wound.

Table 8. Documentation of all wound element characteristics.

Elements	Baseline (n=50)		T1 (n=61)		T2 (n=51)	
	Mean %	SD	Mean %	SD	Mean %	SD
Location	71.0	12.3	81.2	10.2	90.6	8.9
Aetiology	43.1	18.8	56.9	5.5	64.5	5.8
Size	59.5	20.9	70.7	15.8	82.7	11.4
Exudate	43.9	16.1	59.5	13.5	70.5	14.3
Tissue type	42.7	19.8	53.3	13.9	63.1	14.2
Periwound	15.6	17.0	36.8	16.3	48.77	14.7
Treatment used	59.9	10.3	67.1	9.2	78.6	11.7
Pain addressed	28.6	12.0	42.2	11.6	55.1	7.2
Offloading devices used	7.7	13.2	34.6	13.0	44.5	13.9
Direction of healing	10.2	12.1	30.4	9.4	39.1	9.4

\*All wound element characteristics documented show improvement at each time period post-educational sessions when compared to baseline.

Table 9. Focused wound characteristics.

Size	Baseline	Post two-month intervention	Changes
Mean	59.5%	82.7%	23.2 percentage points
Standard deviation	20.9	11.4	9.5

\*Size improved by >23% post two-month educational program when compared to baseline

Exudate	Baseline	Post two-month intervention	Changes
Mean	43.9%	70.5%	26.6 percentage points
Standard deviation	16.1	14.3	1.8

\*Exudate improved by >26% post two-month educational program when compared to baseline

Tissue type	Baseline	Post two-month intervention	Changes
Mean	42.7%	63.1%	20.4 percentage points
Standard deviation	19.8	14.2	5.6

\*Tissue type improved by >20% post two-month educational program when compared to baseline



Additionally, research could provide credible data for Medicare/Medicaid funding and assist policy makers in decision-making about wound management in long-term care facilities. With improvement in the level of nursing knowledge, wound assessment and management skills, the nurses are able to identify individualised patients' needs and improve outcomes, influencing the potential for policy change.

The outcomes of increased pressure ulcer nursing knowledge and improved wound documentation in this pilot program are anticipated to have an impact on the overall quality of wound care provided at this facility with potential to be utilised as the standards for a competency framework for all long-term care facilities nationally using larger numbers of RNs and LPNs. It is important to advance nursing discipline through research and impact health care policies by providing quality nursing care at bedside.

## Conclusion

With open discussion of pressure ulcers and wound documentation issues, the expected outcome was shown to be a unanimous support for the standardised, evidence-based pressure ulcer and wound documentation educational sessions, giving credibility for yearly staff competencies disseminated throughout the nursing home. The noteworthy outcomes of this program were an increase in pressure ulcer and wound documentation nursing knowledge and an improvement in the quality of wound documentation as a result of repeated educational sessions. In addition, the pressure ulcer incidence rate was also reduced and met the expectations of the CMS guidelines. This pilot program helped to change clinical practice at this setting and was a contributor in improved overall patient outcomes, but based on these findings, further evaluation of the program is needed.

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Appendix A. Demographics of the participants.

Nurse Demographics Questionnaire

ID \_\_\_\_\_

- Please complete each item.
- Please note, data collected here will be held confidential.

<b>Age:</b>	<input type="radio"/> <25 <input type="radio"/> 25-29 <input type="radio"/> 30-34 <input type="radio"/> 35-39 <input type="radio"/> 40-44	<input type="radio"/> 45-49 <input type="radio"/> 50-54 <input type="radio"/> 55-59 <input type="radio"/> 60-64 <input type="radio"/> 65 and over
<b>Sex:</b>	<input type="radio"/> Male	<input type="radio"/> Female
<b>Race:</b>	<input type="radio"/> White only <input type="radio"/> Black/African-American only <input type="radio"/> American Indian/Alaska Native <input type="radio"/> Asian only	<input type="radio"/> Native Hawaiian/Pacific Islander <input type="radio"/> Hispanic <input type="radio"/> Other _____ <input type="radio"/> Multiple races
<b>Year first qualified as a nurse:</b>	<input type="radio"/> 1960s <input type="radio"/> 1970s <input type="radio"/> 1980s <input type="radio"/> 1990	<input type="radio"/> 2000s <input type="radio"/> Other _____
<b>Title:</b>	<input type="radio"/> LPN <input type="radio"/> RN	<input type="radio"/> BSN <input type="radio"/> MSN
<b>Highest Nursing qualification:</b>	<input type="radio"/> Nursing diploma/degree <input type="radio"/> Associates degree <input type="radio"/> Bachelorette degree	<input type="radio"/> Master's degree <input type="radio"/> Postgraduate Certificate <input type="radio"/> Other degree _____
<b>Number of years as a Nurse</b>	<input type="radio"/> <2 <input type="radio"/> 3-5 <input type="radio"/> 6-10 <input type="radio"/> 11-15	<input type="radio"/> 16-20 <input type="radio"/> 21-25 <input type="radio"/> 26-30 <input type="radio"/> >35
<b>Number of Years at N. Vista</b>	<input type="radio"/> <2 <input type="radio"/> 3-5 <input type="radio"/> 6-10 <input type="radio"/> 11-15	<input type="radio"/> 16-20 <input type="radio"/> 21-25 <input type="radio"/> 26-30 <input type="radio"/> >35
<b>Previous Pressure Ulcer Education</b>	Outside N. Vista: <b>Yes</b> <b>No</b> Within 1 year: <b>Yes</b> <b>No</b>	If yes, Length of the program: <input type="radio"/> <1hour <input type="radio"/> 1-2 hours <input type="radio"/> 2-4 hours

Appendix B. Chart audit tool for wound documentation.

Wound Documentation Audit Tool									
Facility: _____									
Reviewer: _____									
Date of Review: _____									
Unit: _____									
<b>Nurses</b>									
<b>Characteristics of a Wound: Yes/No or N/A</b>									
1. Location									
2. Etiology									
3. Size									
4. Exudate									
5. Tissue Type									
6. Periwound									
7. Treatment used									
8. Pain addressed									
9. Offloading Devices used									
10.Direction of Healing									
<b>Characteristics of a Wound: Yes/No or N/A</b>									
1. Location									
2. Etiology									
3. Size									
4. Exudate									
5. Tissue Type									
6. Periwound									
7. Treatment used									
8. Pain addressed									
9. Offloading Devices used									
10.Direction of Healing									

Appendix C. Pressure ulcer and wound documentation questionnaire.

Circle the **BEST** answer:

- 1) Which statement(s) are true about pressure ulcers: 1 point
  - a. They are localised areas of tissue damage
  - b. They tend to occur at bony sites
  - c. They are caused by prolonged pressure
  - d. The patient/resident’s nutrition status affects the development of a pressure ulcer
  - e. All of the above

---

- 2) Which sites are the most susceptible to pressure ulcer development? 1 point
  - a. Sacrum and heels
  - b. Temporal (side) area of the head
  - c. Soft tissue areas
  - d. Abdominal areas
  - e. All of the above

---

- 3) To prevent pressure ulcers from developing, which of the following steps should **NOT** be taken? 1 point
  - a. Routinely observe high-risk bony skin areas
  - b. Turn patient/resident only upon their request
  - c. Minimise pressure
  - d. Keep the skin dry and clean
  - e. Depending on the patient/resident’s condition, encourage physical activity and a balanced diet 1 point

---

- 4) A pressure ulcer can form in:
  - a. Less than 2 hours

- b. 24 hours  
c. 3 days  
d. 1 week  
e. 2 weeks
- 5) How often should the nurse assess and document skin condition? 1 point  
a. Daily  
b. Once a shift  
c. Upon admission and discharge, every shift, and a patient condition warrants  
d. Upon admission and discharge
- 6) What can the nurse do when one of the patients has discolouration of the skin (red, purple, blue) indicating pressure? 1 point  
a. See what happens over the next 24 hours  
b. Let the next nurse know about it. Start a skin care plan  
c. Place the patient on a pressure-reducing surface and explain to the patient and family that the patient needs to limit pressure to the area  
d. B & C from above
- 7) Which of the following repositioning techniques are key in preventing pressure: 1 point  
a. Turning residents/patients at least every two hours while in bed  
b. Repositioning residents/patients confined to a chair at least hourly  
c. Floating heels  
d. Padding between bony areas  
e. All of the above
- 8) What are the layers of the skin? 1 point  
a. Epidermis and dermis  
b. Epidermis, dermis, and subcutaneous  
c. Epidermis and subcutaneous  
d. Dermis and subcutaneous  
e. None of the above
- 9) A wound that extends through the epidermis and part way into the dermis is classified as a: 1 point  
a. Chronic wound  
b. Acute wound  
c. Partial-thickness wound  
d. Full-thickness wound  
e. Stage 3
- 10) If you see multiple colours in a wound bed, you should describe the wound according to the: 1 point  
a. Percentage of these types  
b. List healthy colour you see  
c. Colour most visible  
d. Darkest colour you see

### True or false

Circle the BEST answer:

- 11) A Stage III pressure ulcer is a partial thickness skin loss involving the epidermis and/or dermis 1 point  
a. True  
b. False
- 12) Eschar is good for wound healing 1 point  
a. True  
b. False
- 13) It is important to massage bony prominences to promote circulation and prevent pressure ulcers: 1 point  
a. True  
b. False
- 14) Shear is the force that occurs when the skin sticks to a surface and the body slides 1 point  
a. True  
b. False
- 15) A thin and bright red drainage is described as sanguineous 1 point  
a. True  
b. False