Abstract of thesis entitled

“Evidence-Based Clinical Guidelines for Pressure Ulcer Prevention in Elderly Patients”

Submitted by

Wong Siu Ling

for the degree of Master of Nursing
at The University of Hong Kong
in July 2012

Older adults are particularly vulnerable to the development of pressure ulcers (PUs) as a result of skin changes and reduced mobility (Knox, Anderson & Anderson, 1994; Russell et al., 2003). This is associated with diminished quality of life, longer hospitalisations and increased morbidity and mortality (Margolis et al., 2002). In view of the high incidence of PUs (grade 1-4) occurring in elderly patients in acute care, a systematic review of related studies was conducted in August 2011. The optimal frequency and methods of repositioning are described in the literature. With well-designed implementation and evaluation plans, the proposed repositioning guidelines are likely to reduce the incidence of PUs (grade 1-4), while in turn lessening the healthcare burden and preserving patients’ quality of life.
Pilot testing, a trial run to test the feasibility of the innovation, will be carried out in the proposed medical ward, and training provided to all staff before the intervention. To proceed with the change, the intervention must be cost-effective and beneficial to all stakeholders. Outcome evaluation determines the number of goals achieved by the innovation and to what degree, and is very important (Melnyk & Fineout-Overholt, 2005). The PU incidence (grade 1-4) is expected to be different after the implementation of the innovation.
Evidence-Based Clinical Guidelines for Pressure Ulcer Prevention in Elderly Patients

by

Wong Siu Ling

B.N. (H.K.U.)

A thesis submitted in partial fulfilment of the requirements for the degree of Master of Nursing at The University of Hong Kong.

July 2012
Declaration

I declare that this thesis represents my own work, except where due acknowledgement is made, and that it has not been previously included in a thesis, dissertation or report submitted to this University or to any other institution for a degree, diploma or other qualification.

Signed.................................................................

WONG SIU LING
Acknowledgements

First and foremost, I would like to take this opportunity to thank my dear supervisor, Dr Marie Tarrant, for her patience, encouragement, expert advice and guidance throughout these two years of the Master’s course. Without her support, I could not have accomplished the writing of this dissertation. Her sincerity and attitude to work are the kind that I most respect - she is a bright light, guiding me along the road to success.

I am also grateful for the valuable support and teaching of Professor Agnes Tiwari and Dr Daniel Fong in the translational nursing research course. Their teaching and dedication to work have really inspired me. I would like to extend further thanks to my dear classmates, Frances Li, Yu and Mei Ling. Our friendship has been built up throughout these two years of study, as we have gone through the happiest times at HKU.

Last but not least, I would like to offer my deepest gratitude to my family, especially my mother, for the selfless support and love they have brought to my life.
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Chapter 1  Statement of the Problem

‘Pressure ulcers are serious complications of hospitalisation that need to be prevented whenever possible’ (Vanderwee, Grypdonck & Defloor, 2005, p.262). Pressure ulcers (PUs), also known as pressure sores, decubitus ulcers or bed sores, are areas of localised damage to the skin and underlying tissue caused by pressure, shearing forces or friction (McInnes, Cullum, Bell-Syer, Dumville & Jammali-Blasi, 2010; Vanderwee et al., 2005). They usually occur over bony prominences such as the base of the spine, hips and heels and primarily in individuals with reduced mobility (Margolis, Bilker, Knauss, Baumgarten & Strom, 2002). Their incidence rates range from 0.4% to 38% in acute care, 2.2% to 23.9% in long-term care and 0% to 17% in home care (Reddy, Gill & Rochon, 2006; Lyder, 2003). Most often, the presence of PUs is a marker of a poor overall prognosis (Reddy et al., 2006). It is associated with diminished quality of life, longer hospitalisations and increased morbidity and mortality (Margolis et al., 2002). In the United States, treatment costs are currently estimated to be more than one billion dollars a year (Fogerty et al., 2008; Kim, Ho, Wang & Bogie, 2010; Margolis et al., 2002). Costs associated with the care of PUs were the third highest after those for cancer and cardiovascular diseases (Reddy et al., 2006). Without a doubt, these adverse health and financial outcomes highlight
the value of PU prevention.

Older adults are particularly vulnerable to the development of PUs as a result of skin changes and reduced mobility (Knox, Anderson & Anderson, 1994; Russell et al., 2003). Patients older than 70 with non-healing PUs have a four- to six-fold increased risk of death (Russell et al., 2003). Meanwhile, the cumulative incidence of PUs of grade II severity or above can be as much as 12.9% in elderly patients hospitalised for periods of up to eight weeks for an acute event (Thomas, Goode, Tarquine & Allman, 1996), which implies that implementation of an effective prevention strategy is especially important in this population (Bourdel-Marchasson et al., 2000).

Regular repositioning involves ‘moving the individual into a different position to remove or redistribute pressure from a particular part of the body’ (Moore, Cowman & Conroy, 2011, p.2634). It prevents PUs by reducing exposure to prolonged pressure and shearing forces (Vanderwe, Grypdonck & Defloor, 2007; Krapfl & Gray, 2008). Frequent repositioning has long been recognised and recommended as an important and effective preventive measure against PUs (Krapfl & Gray, 2008).

**Background to the Problem**

In clinical practice, repositioning is often recommended as an important
strategy in the prevention of PUs (Moore et al., 2011). The two-hourly turn is ‘a ritualistic practice that has become firmly embedded into nursing culture’ (Young, 2004, p.88). The Panel for the Prediction and Prevention of Pressure Ulcers in Adults (AHCPR) suggested repositioning at least two-hourly (Vanderwee et al., 2007). The European Pressure Ulcer Advisory Panel (EPUAP) did not comment on the necessary turning interval, but stated that the frequency of repositioning should be consistent with overall goals (Defloor, De Bacquer & Grypdonck, 2005; Vanderwee et al., 2007). Knox et al. (1994) compared the effects of one-, one and a half- and two-hour turning intervals on changes in skin surface temperature, interface pressure and colour. Findings showed that the greatest increase in skin surface temperature occurred at the end of the two-hour turning interval and at the trochanters (Defloor et al., 2005; Knox et al., 1994). The authors therefore concluded that ‘the traditional two-hour turning interval may be detrimental to the skin integrity of older adults’ (Knox et al., 1994, p.56). However, the results have been challenged on the grounds of the limited sample size.

Certain postures reduce pressure and shearing forces, and are to be preferred. Colin, Abraham, Preault, Bregeon and Saumet (1996) compared the effects of the 30° and 90° laterally inclined positions on the cutaneous oxygen supply to the skin in 20 healthy volunteers. A dramatic impairment of oxygen supply to the
skin was found in the 90° laterally inclined position but not in the 30° tilt position. Defloor (2000) measured the interface pressures in ten different positions on two different foam mattresses in a laboratory setting. The lowest contact pressures were found in the 30° tilt position (Defloor, 2000; Moore et al., 2011; Vanderwee et al., 2007; Young, 2004). However, the efficacy and practicality of using the 30° tilt position in medical inpatients can be questioned (Young, 2004).

Despite consistent clinical recommendations that repositioning is an effective intervention for PU prevention, the optimal frequency and techniques for repositioning remain unclear (Krapfl & Gray, 2008; Moore et al., 2011). These recommendations are often based on experts’ opinions. Repositioning is highly labour-intensive and thus expensive (Vanderwee et al., 2007). Xakellis, Frantz and Lewis (1995) found that repositioning was the most costly intervention of all. It took three and a half minutes on average to change a patient’s position, which produced a mean cost of $2.98 (€2.56) per patient per day (Xakellis et al., 1995). Changing from two- to four-hourly turning would save 19.5 minutes per patient per day (Defloor et al., 2005). Given the substantial costs and burden of repositioning two-hourly, it is important to explore this intervention in detail, and only to use it in the case of patients most likely to benefit (Rich et al., 2011).
Need for Intervention

Patients and relatives in a private hospital usually have high expectations of the services they are paying for. As consumers become more knowledgeable about illness care, health promotion and the consequences of medical errors, they are more assertive about their rights to competent and prudent care (Lenburg, 2005). It is essential to develop practice guidelines based on the best evidence, especially at times of an explosion in the public’s knowledge.

In my ward, it has long been our practice to reposition patients every two hours on a pressure-reducing mattress, which may not be scientific and may be in conflict with current literature. Some patients find it too disturbing or too tiring (Defloor et al., 2005; Vanderwee et al., 2007). The repositioning technique is inconsistent too. Without a doubt, implementation of the evidence-based guidelines for repositioning is urgently needed. Evidence-based practice (EBP) provides good guidance for nursing practice and has the potential to improve the quality of nursing care (Brancato, 2006). Since a shortage of nursing manpower is a serious problem worldwide, turning every four hours instead of every two would be far more feasible in practice, resulting in significant savings in cost and effort and making the care more affordable (Defloor et al., 2005; Brancato, 2006). The patient’s night rest would be less disturbed too (Defloor et al., 2005).
Significance of the Problem

The increasing proportion of elderly people in the population is an
ever-increasing burden for the publicly funded healthcare system in Hong Kong.

One major consequence is the increasing demand for access to effective
healthcare services (Mak, Woo, Bowling, Wong & Chau, 2011). As the elderly
population is growing, PU incidence is likely to increase too (Russell et al., 2003).

As in other countries, the government healthcare budget in Hong Kong is unable
to keep up with the demand (Mak et al., 2011). By adopting the best practice of
repositioning, there is a potential to reduce PU incidence and thus medical costs.

In my ward, approximately, three out of ten critically ill older patients will
develop PUs of grade 1 or higher severity during a hospital stay longer than two
weeks, frequently prolonging hospitalisation. PUs continue to occur at an
unacceptable rate and there remains a clinical need for effective methods of
prevention (Kim, Ho, Wang & Bogie, 2010). Not only do they increase patients’
suffering, but they also represent an overall poor quality of nursing care (Russell
et al., 2003). Instead of blindly accepting tradition and untested theories,
evidence-based clinical guidelines for repositioning should be urgently promoted
and then strictly executed in wards, helping to advance the quality of nursing care
and enhancing the satisfaction of patients as recipients of care (Glanville, Schirm
Research Objectives

A. To conduct a literature search on repositioning
B. To identify the best practice for repositioning
C. To assess whether such best practice can be adopted locally
D. To develop guidelines for repositioning according to the best evidence

Research Question

What is the optimal frequency and what are the best methods of repositioning, in comparison with standard care, to reduce PU incidence?

PICO Components

Patient Population of Interest

➢ Elderly patients at risk of PU development

Intervention of Interest

➢ Different turning intervals and repositioning techniques

Comparison of Interest

➢ Standard care in PU prevention

Outcome of Interest

➢ PU incidence (grade 1 or above)
Chapter 2  Review of Evidence

In this chapter, the selection criteria and methods for including studies for review will be described. Results of the literature search and the overall quality of the selected studies will be presented, using tables of evidence. The resulting data will then be used for developing evidence-based guidelines.

Selecting Studies for Review

Inclusion Criteria

Type of studies.

Studies were limited to randomised controlled trials (RCTs) or other experimental designs that compared various techniques or frequencies of repositioning in the incidence of PUs. Cohort studies that examined the association between repositioning and PU incidence were also included.

Type of participants.

Elderly patients at risk of PU development were included in the review. Three assessment tools, the Braden, Norton and Waterlow scales, were used to assess the PU risk. Manual repositioning was required in the case of the participants concerned.

Type of intervention.

The intervention should consist of different turning frequencies or
methods of repositioning.

**Type of outcome measures.**

Only those studies that measured the primary outcome of interest, PU incidence (grade 1 or above), were included.

**Exclusion Criteria**

Studies dealing with subjects other than elderly patients or interventions other than repositioning were excluded.

**Search Strategies**

A systematic review of four electronic databases was undertaken: (1) PubMed, (2) CINAHL – CINAHL Plus from January 1985 to August 2011, (3) Ovid Medline (R) – from 1948 to August week 2, 2011 and (4) EBM Reviews – ACP Journal Club from 1991 to July 2011 in August 2011. The keywords used were: (1) turning, (2) repositioning, (3) elderly and (4) pressure ulcer prevention. The number of studies yielded by each keyword is listed in a table (see Appendix A), combinations of keywords identifying 78 references. There were no restrictions on language or setting. Elimination of duplicate references reduced the number of references to 74.

Only five studies remained for evaluation after the abstract review, including four RCTs (Defloor et al., 2005; Moore et al., 2011; Vanderwee et al., 2007;
Young, 2004) and one cohort study (Rich, et al., 2011), which focused on the
effect of different repositioning frequencies or techniques on the incidence of PUs.

By reference to the inclusion and exclusion criteria (see Appendix B), 69 studies
were excluded. The reference sections of the studies to be included were further
reviewed. However, no other eligible studies were found.

**Methods of the Review**

**Data Extraction**

Data were extracted in the form of tables of evidence, which helped to
examine and categorise data. Characteristics of the studies and interventions are
presented in the Tables.

**Quality Assessment**

Methodology checklists for RCTs (see Appendix C) and cohort studies (see
Appendix D) developed by the Scottish Intercollegiate Guidelines Network
(SIGN) in March 2004 were used for quality assessment (National Health Service,
2011). The internal validity of the selected studies was assessed using these
guidelines. Levels of evidence were rated in accordance with the overall quality
of the studies and the SIGN recommendations (see Appendix E).

**Data Analysis**

Analysis was performed on data related to demographics, research designs,
interventions and study outcomes. The reliability and applicability of data to real life practice were also examined.

**Description of Studies**

**Characteristics of the Studies Included**

The five studies were published between 2004 and 2011. Four of them were RCTs (Defloor et al., 2005; Moore et al., 2011; Vanderwee et al., 2007; Young, 2004) and one was a cohort study (Rich et al., 2011). In the RCTs, the sample size ranged from 46 to 761 participants, and the follow-up periods from one day to five weeks. Funding sources were not mentioned in the case of three RCTs; while one was funded by a Health Research Board of Ireland Clinical Nursing & Midwifery Research Fellowship (Moore et al., 2011). Rich et al. (2011) was a cohort study, in which data were collected between 2004 and 2007 in one of nine Maryland or Pennsylvania hospitals. Participants in all five studies were elderly patients at risk of PU development, the mean age ranging from 70.1 to 84.4. Three PU risk assessment tools were used in the studies: the Braden, Norton and Waterlow scales. Hospitals (Rich, et al., 2011; Moore et al., 2011; Young, 2004) and geriatric nursing homes (Defloor et al., 2005; Vanderwee et al., 2007) were the major settings. Table 1 gives the characteristics of the five studies.
<table>
<thead>
<tr>
<th>Citation</th>
<th>Design</th>
<th>Participants/setting</th>
<th>Sample size</th>
<th>Follow-up</th>
<th>Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defloor, De Bacquer &amp; Grypdonck, 2005</td>
<td>RCT with 5 arms</td>
<td>11 geriatric nursing home patients in Belgium; 32 participating wards</td>
<td>N: 761</td>
<td>4 weeks</td>
<td>Not stated</td>
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<tr>
<td></td>
<td></td>
<td>Mean age: 84.4</td>
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<td></td>
<td></td>
<td>Mean Braden score: 13.2 (SD 2.36)</td>
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<tr>
<td></td>
<td></td>
<td>Mean Norton score: 10.0 (SD 1.96)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>2-h turning: 63</td>
<td>I: 2</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>3-h turning: 58</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>4-h turning: 66</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>6-h turning: 63</td>
<td></td>
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<tr>
<td>Vanderwee, Grypdonck, De Bacquer &amp; Defloor, 2007</td>
<td>RCT with 2 arms</td>
<td>84 wards of 16 Belgian elderly care nursing homes</td>
<td>N: 235</td>
<td>5 weeks</td>
<td>Not stated</td>
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<tr>
<td></td>
<td></td>
<td>Median age: 87 (IQR 81-92)</td>
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<td></td>
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<td>Mean Braden score: 15.0 (SD 3.09)</td>
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<tr>
<td></td>
<td></td>
<td>122</td>
<td>I:</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>113</td>
<td>C:</td>
<td></td>
<td></td>
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<tr>
<td>Young, 2004</td>
<td>RCT with 2 arms</td>
<td>The medical directorate of an acute district general hospital</td>
<td>N: 46</td>
<td>1 night</td>
<td>Not stated</td>
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<tr>
<td></td>
<td></td>
<td>Mean age: 70.1 (I); 70.5 (C)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Mean Waterlow score: 20 (I, C)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>23</td>
<td>I:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>23</td>
<td>C:</td>
<td></td>
<td></td>
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<tr>
<td>Moore, Cowman &amp; Conroy, 2011</td>
<td>RCT with 2 arms</td>
<td>12 hospital settings of the long-term care of the older person in the Republic of Ireland</td>
<td>N: 213</td>
<td>4 weeks</td>
<td>A Health Research Board of Ireland Clinical Nursing &amp; Midwifery Research Fellowship</td>
</tr>
<tr>
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<td>Aged 80 or older: 65%; Braden scores:</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Chair-fast: 87%; Very limited activity: 77%</td>
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<tr>
<td></td>
<td></td>
<td>99</td>
<td>I:</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>114</td>
<td>C:</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Mean Braden score: 14.0 (SD 1.7)</td>
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<tr>
<td></td>
<td></td>
<td>At least 2 hourly: 139</td>
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<tr>
<td></td>
<td></td>
<td>Less than 2 hourly: 130</td>
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</tbody>
</table>
Characteristics of Interventions Included

Effects of different turning intervals (Defloor et al., 2005; Vanderwee et al., 2007) and repositioning techniques (Young, 2004; Moore et al., 2011) on the incidence of PUs were investigated by the four RCTs. The primary outcome of interest was the incidence of PUs: grade 1 or above (Defloor et al., 2005; Young, 2004; Moore et al., 2011), grade 2 or above (Vanderwee et al., 2007; Rich, et al., 2011). The control group received standard preventive care: repositioning four-hourly on a pressure-reducing mattress (Vanderwee et al., 2007), using preventive measures such as water mattresses, alternating mattresses, sheepskins and gel cushions (Defloor et al., 2005), repositioning using 90° side-lying position (Moore et al., 2011; Young, 2004). The effect of various combinations of turning and pressure-reducing mattresses was examined in one of the RCTs (Defloor et al., 2005). The only cohort study examined the association between frequent repositioning and PU incidence. Patients in the study were classified by repositioning frequency on day of baseline visit: repositioning at least two-hourly (n=139) and repositioning less frequently (n=130). Table 2 shows the characteristics of these interventions.
<table>
<thead>
<tr>
<th>Citation</th>
<th>Design</th>
<th>Intervention and control</th>
<th>Outcome measures</th>
<th>Results</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defloor, De Bacquer &amp; Grypdonck, 2005</td>
<td>RCT with 5 arms</td>
<td>I: Turning 2-hourly on SI Turning 3-hourly on SI Turning 4-hourly on VE Turning 6-hourly on VE C: Standard preventive care</td>
<td>Incidence of PU (Grade 1 or above)</td>
<td>Non-bleachable erythema: 42.4% - 47.6% PU lesions: 3% - 24.1%</td>
<td>Turning 4-hourly on a pressure-reducing mattress resulted in a 85% reduction of PUs</td>
</tr>
<tr>
<td>Vanderwee, Grypdonck, De Bacquer &amp; Defloor, 2007</td>
<td>RCT with 2 arms</td>
<td>I: Repositioning alternately 2 hours in a lateral position and 4 hours in a supine position C: Repositioning every 4 hours</td>
<td>Incidence of PU (Grade 2 or above)</td>
<td>16.4%</td>
<td>No significant difference between the two turning protocols in the incidence of PU (P value: 0.40), location (P = 0.19), severity (P = 0.65) and the time to develop PUs (P = 0.28, d.f. = 1, Log rank test = 1.18).</td>
</tr>
<tr>
<td>Young, 2004</td>
<td>RCT with 2 arms</td>
<td>I: Repositioning using the 30° tilt position C: Repositioning using the 90° side-lying position</td>
<td>1. Incidence of PU (non-bleaching erythema) 2. Feasibility of using 30° tilt position with medical in-patients</td>
<td>Non-bleaching erythema: 13% Difficulty with repositioning: 87%</td>
<td>No significant difference between the groups in the incidence of nonbleaching erythema (P &gt;0.05). 87% of subjects experienced difficulty in maintaining the 30°tilt position (P &lt;0.05).</td>
</tr>
<tr>
<td>Study</td>
<td>Design</td>
<td>Interventions</td>
<td>Main Outcomes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-----------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Moore, Cowman & Conroy, 2011               | RCT with 2 arms | I: 30° tilt, 3-hourly reposition  
C: Repositioning 6 hourly, using 90° lateral rotation. | Incidence of PU (Grade 1 or above)  
3%  
11%  
67% reduction in PUs |
| Rich et al., 2011                          | Cohort          | Repositioning at least 2-hourly  
Repositioning less than 2-hourly | 1. Incidence of one or more new PU(s) stage 2 or above  
2. Degree of adherence to the turning protocols  
Repositioning at least 2 hourly: 12%  
Repositioning less than 2-hourly: 10% | No association between frequent repositioning and lower PU incidence |
Results of Review

Effects of Interventions versus Usual Care

Repositioning frequency.

Standard care referred to preventive nursing care based on the clinical judgement of the nurses that did not include turning, and the use of PU risk assessment tools (Defloor et al., 2005). Defloor et al. (2005) found that turning every four hours on a pressure-reducing mattress resulted in a 85% reduction of PUs in comparison with standard care. The number of PU lesions (grade 2 or above) in at-risk patients decreased from 14.3% to 3.0% compared with the two-hour interval group (Defloor et al., 2005). More frequent turning on a pressure-reducing mattress was not supported by evidence (Vanderwee et al., 2007). Vanderwee et al. (2007) found that repositioning alternately two hours in a lateral position and four hours in a supine position on a pressure-reducing mattress did not lead to fewer PUs in comparison with repositioning four-hourly. There was no significant difference between the two turning protocols in the incidence, severity, location and time to develop of PUs (Vanderwee et al., 2007). On a standard hospital mattress, turning every two hours resulted in a lower PU incidence than turning every three hours. The incidence rate was 14.3%
compared with 24.1% in the three-hour turning group. In contrast with the above results, Rich et al. (2011) found no association between frequent repositioning and lower PU incidence.

**Repositioning method.**

Repositioning every three hours, using the 30° tilt position, was found effective in decreasing PU incidence in one of the RCTs (Moore et al., 2011), where the position resulted in a 67% reduction in PUs (grade 1 or above) compared with usual care. The incidence rate was 11% in the control group and 3% in the experimental group (Moore et al., 2011). Despite this, a contradictory result was found by Young (2004). On an intention-to-treat basis, 13% in the experimental group and 9% in the control group developed non-blanching erythema (Young, 2004). The difference was not statistically significant (p>0.05). The study also investigated the feasibility of using the 30° tilt position with medical in-patients, and found that 87% of subjects experienced difficulty in adopting and maintaining it (Young, 2004).

**Effective versus Ineffective Interventions**

Defloor et al. (2005) and Vanderwee et al. (2007) found that turning every four hours on a pressure-reducing mattress was effective in decreasing the incidence of PUs in comparison with standard care or with other turning schemes.
which involved turning every two or three hours on a standard institutional mattress and turning every six hours on a pressure-reducing mattress. More frequent turning on a pressure-reducing mattress was not supported by evidence and could not be considered as a more effective way of PU prevention (Vanderwee et al., 2007). Meanwhile, Rich et al. (2011) produced an opposite result: that frequent repositioning (at least two-hourly) was not associated with lower PU incidence (Rich et al., 2011). Although repositioning was widely accepted as standard care for PU prevention, there was limited adherence to the recommended frequent manual repositioning. Patients at high risk of PUs were repositioned at least two-hourly on only 53% of days (Rich et al., 2011).

Inconsistent results were also found in the techniques of repositioning. Two of the RCTs studied the effect of the 30° tilt position on the incidence of PUs. The combination of that position and three-hour turning was shown to be effective in only one of the studies (Moore et al., 2011). The feasibility and practicality of using the 30° tilt position in an elderly population was questioned in one RCT (Young, 2004).

**Quality Assessment**

In the following section, the internal validity and overall quality of the five studies will be examined and discussed, using the methodology checklists and
recommendations of SIGN (National Health Service, 2011). Tables 3a and 3b show the internal validity assessment of the studies.
<table>
<thead>
<tr>
<th>Citation</th>
<th>Clearly focused question</th>
<th>Random allocation</th>
<th>Adequate concealment</th>
<th>Double blinding</th>
<th>Groups comparable</th>
<th>Only difference: treatment</th>
<th>Valid measurement of outcomes</th>
<th>Drop-out rate</th>
<th>Intention to treat analysis</th>
<th>Comparable results from all sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defloor, De Bacquer &amp; Grypdonck, 2005</td>
<td>++</td>
<td>++</td>
<td>-</td>
<td>NA</td>
<td>+</td>
<td>++</td>
<td>++</td>
<td>I: 2-hr: 3.08% 3-h: 10.77% 4-hr: 1.49% 6-hr: 3.08%</td>
<td>C: 11.28%</td>
<td>NR</td>
</tr>
<tr>
<td>Vanderwee, Grypdonck, De Bacquer &amp; Defloor, 2007</td>
<td>+++</td>
<td>++</td>
<td>-</td>
<td>NA</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Young, 2004</td>
<td>+++</td>
<td>++</td>
<td>+++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>+</td>
<td>I: 22%</td>
<td>C: 9%</td>
<td>+++</td>
</tr>
<tr>
<td>Moore, Cowman &amp; Conroy, 2011</td>
<td>+++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>+</td>
<td>++</td>
<td>++</td>
<td>C: 4.39%</td>
<td>I: 11.11%</td>
<td>+++</td>
</tr>
</tbody>
</table>

Well covered (+++)  Adequately addressed (++)  Poorly addressed (+)  Not addressed (-)  Not reported (NR)  Not applicable (NA)
| Citation          | Clearly focused question | Groups comparable | Study groups clearly stated | Selection of participants | Drop-out rate | Comparison of full participants | Clearly defined outcomes | Blinding | Outcome assessment | Reliable assessment | Valid outcome assessment | Assessment of prognostic factor | Potential confounder identified | CI        |
|-------------------|--------------------------|-------------------|-----------------------------|---------------------------|---------------|----------------------------------|-------------------------|----------|-------------------|-------------------------|---------------------------------|-------------------------------|-----------|
| Rich et al., 2011 | +++                      | +++               | +++                         | ++                        | -             | -                                | +++                     | -        | -                 | ++                      | ++                              | +                             | ++                    | 0.5-2.4  |

Well covered (+++)  Adequately addressed (+++)  Poorly addressed (+)  Not addressed (-)  Not reported (NR)  Not applicable (NA)
Defloor et al. (2005) investigated the effect of four different turning schemes on the incidence of PUs (grade 1 or above): turning two- or three-hourly on a standard institutional (SI) mattress, and turning four- or six-hourly on a visco-elastic foam (VE) mattress. Computerised randomisation tables and sealed envelopes were used, and the randomisation process was in general adequately addressed. However, it was impossible to blind the nurses for the preventive measure, which might have introduced some bias to the results. To minimise the possible effect of awareness of the treatment regime, compliance with the protocol was closely monitored (Defloor et al., 2005). Drop-out rates ranged from 1.49% to 11.28%, and were at an acceptable level. Limited information about the baseline and mobility characteristics of patients was given, but information such as body mass index (BMI) and incontinence are considered risk factors for PUs and should be taken into consideration. Location of PUs was not stated, although some PUs, such as those developing on heels, might not be related to infrequent turning but to poor supporting devices. Cautions must be observed in interpreting the results. The study provides a medium level of evidence (1+).

Vanderwee et al. (2007) provided evidence on the effect of different turning intervals on the incidence of PUs (grade 2 or above). The purpose of the study was clearly stated. Computerized randomization lists were used for treatment
allocation. The study groups were comparable with each other in respect of baselines and mobility characteristics. All relevant outcomes were measured in a standard and reliable way. The inter-rater reliability (IRR) for the classification of PUs and the Braden scores between researcher and nursing staff and between study nurse and nursing staff was high. However, only 235 patients were included in the study, lower than required. The drop-out rate was not stated. The nursing staff were not blinded to the two turning protocols, as they executed the turning regimes, and observed and recorded the skin condition daily (Vanderwee et al., 2007). In approximately 34% of the follow-up (FU) observations, patients turned themselves from a lateral to a supine position between the turning intervals (Vanderwee et al., 2007). The patients were actually lying in a lateral position for a shorter period than requested, which may have led to underestimation of the effect. The study provides a medium level of evidence (1+).

Young (2004) examined the effect of the 30° tilt position in reducing the incidence of non-blanching erythema, and the feasibility of using that position among elderly in-patients. The purpose of the study was clearly stated. The study groups were similar with respect to the baseline characteristics except that the support surfaces were not standardised, which may have been an important
confounder to results. Randomisation was based on block allocation and sequential opening of sealed opaque envelopes (Young, 2004). The researcher was masked for treatment allocation. Since the drop-out rate was high in the intervention group (22%), caution must be observed in interpreting the results. By adopting an intention-to-treat approach, subjects who could not tolerate the intervention were also included, resulting in a dilution of the study effect. A much larger sample size would have been required to rule out a type II error. A single day of FU for each subject was obviously too short to assess the outcome properly. The time between the causation and external appearance of a PU (grade 2-4) can be three days (Defloor et al., 2005; Vanderwee et al., 2007) though only non-blanching erythema (grade 1) was investigated in this study. The study provides a low level of evidence (1-).

Moore et al. (2011) compared the effect of two repositioning regimens on the incidence of PUs (grade 1 or above): repositioning three-hourly at night, using the 30° tilt position (intervention) and repositioning six-hourly at night, using 90° lateral rotation (control). The purpose of the study was clearly stated. To avoid contamination and increase compliance with the study protocols, cluster randomisation was used. The baseline characteristics of the subjects were poorly addressed, which made it difficult to compare their similarity. Only 213
participants were recruited to the study, lower than required. The cluster sizes were also not balanced. Data were analysed on an intention-to-treat basis. Risk factors were not taken into consideration, which may have biased the results.

The study provides a medium level of evidence (1+).

Rich et al. (2011) was the only cohort study included, and examined the association between repositioning and PU incidence, and adherence to the recommendation for frequent manual repositioning. The purpose of the study was clearly stated. Patients’ baseline characteristics, by repositioning frequency on the day of the baseline visit, were comparable in most aspects. However, randomised trials are required to provide strong evidence. Since information about frequency of repositioning was obtained from patient charts, errors in documentation tended to bias results towards the null. The techniques of repositioning were not recorded. The relatively small sample size limited the power to test the associations of interest. As the study population was limited to hip fracture patients, the results might not be generalisable to other patients at risk of PUs. The study provides a medium level of evidence (2+).

Table 4 shows the overall quality assessment of the studies selected.
<table>
<thead>
<tr>
<th>Citation</th>
<th>Bias minimised</th>
<th>Direction of bias</th>
<th>Overall effect of intervention</th>
<th>Results applicable to target group</th>
<th>Level of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defloor, De Bacquer &amp; Grypdonck, 2005</td>
<td>+</td>
<td>Overestimation. It was not recorded whether or not patients changed positions between intervals.</td>
<td>Yes</td>
<td>Yes</td>
<td>1+</td>
</tr>
<tr>
<td>Vanderwee, Grypdonck, De Bacquer &amp; Defloor, 2007</td>
<td>+</td>
<td>Underestimation. In 34% of the FU observed, patients turned themselves from a lateral to a supine position between the turning intervals.</td>
<td>Yes</td>
<td>Yes</td>
<td>1+</td>
</tr>
<tr>
<td>Young, 2004</td>
<td>-</td>
<td>Underestimation. The drop-out rate of the intervention group was high and an intention-to-treat approach was used, which might result in a dilution of the study effect. One night’s FU would be too short to assess the outcome.</td>
<td>Probably so</td>
<td>Yes</td>
<td>1-</td>
</tr>
<tr>
<td>Moore, Cowman &amp; Conroy, 2011</td>
<td>+</td>
<td>The sample size was much smaller than the power needed, perhaps leading to higher risk of sampling error.</td>
<td>Yes</td>
<td>Yes</td>
<td>1+</td>
</tr>
<tr>
<td>Rich et al., 2011</td>
<td>+</td>
<td>Underestimation. Patients were repositioned at least two-hourly on only 53% of days. No information about repositioning technique. Since data were obtained from medical records, the accuracy of documentation might directly affect the results.</td>
<td>Yes</td>
<td>Yes</td>
<td>2+</td>
</tr>
</tbody>
</table>
Summary and Synthesis

Analysis of the Characteristics of Interventions Reviewed

As mentioned, two RCTs (Defloor et al., 2005; Vanderwee et al., 2007) investigated the effect of different turning intervals on the incidence of PUs, providing a medium level of evidence (1+). Young (2004) and Moore et al. (2011) investigated the effect of different repositionings. Both were RCTs. They provided medium (Moore et al., 2011) to low levels of evidence (Young, 2004). The single cohort study examined the association between repositioning and PU incidence and adherence to the recommendation for frequent manual repositioning (Rich et al., 2011), a study rated as 2+. All study results are directly applicable to the patient group targeted by this guideline.

Analysis of Intervention Effectiveness

Repositioning frequency.

On a pressure-reducing mattress, turning four-hourly is recommended. This is supported by two well-conducted RCTs (Defloor et al., 2005; Vanderwee et al., 2007). More frequent turning on a pressure-reducing mattress did not lead to fewer PUs and could not be considered as a more effective way of PU prevention (Vanderwee et al., 2007). The recommendation is graded A.
Defloor et al. (2005) found that turning two-hourly on a standard hospital mattress resulted in fewer PUs than three-hourly, a result in conflict with another study: Rich et al. (2011) found that frequent repositioning was not associated with lower PU incidence. Since RCTs provide stronger evidence than cohort studies, turning two-hourly on a standard hospital mattress is recommended. The recommendation is graded A.

Repositioning method.

Young (2004) found that repositioning using the 30° tilt position did not reduce the incidence of PUs compared with either 90° or supine positions, a result in conflict with another RCT: Moore (2011) found that repositioning three-hourly at night using the 30° tilt position resulted in lower PU incidence compared with usual care. Both studies were RCTs. Since Moore (2011) provides a higher level of evidence than Young (2004), repositioning three-hourly using the 30° tilt position is recommended. The position was also used in another two studies, Defloor et al., 2005 and Vanderwee et al., 2007. The recommendation is graded A.

Summary of the Evidence

Among the five studies, four were RCTs (Defloor et al., 2005; Moore et al., 2011; Vanderwee et al., 2007; Young, 2004) and one was a cohort study (Rich, et
al., 2011). Consistent results showed that repositioning four-hourly on a pressure-reducing mattress resulted in lower PU incidence and was recommended (Defloor et al., 2005; Vanderwee et al., 2007). On a standard hospital mattress, repositioning two-hourly is suggested (Defloor et al., 2005). Two RCTs investigated the effect of the 30° tilt position on the incidence of PUs (Moore et al., 2011; Young, 2004). Conflicting results were found. Repositioning three-hourly using the 30° tilt position was supported by stronger evidence and was recommended (Moore et al., 2011).

**Implications for Practice**

Repositioning is commonly recognised and recommended as an important and effective preventive measure in the case of PUs (Krapfl & Gray, 2008). As our population is becoming older, sicker and heavier, a growing number of patients can benefit from PU prevention. Adopting the best practice of repositioning has the potential to reduce PU incidence and make care more “affordable” (Brancato, 2006). It helps eliminate nurses’ confusion about current practice and standardises nursing care. Shortage of nursing manpower is a global issue. For many health professionals, there is often a tension between being able to spend time getting to know the patient as an individual and everyday workload demands (Wondrak, 1998). Changing the turning schedule from every
two hours to every four hours results in a significant saving in cost and effort (Defloor et al., 2005), with the added benefit that the patient’s night rest is less disturbed (Defloor et al., 2005). However, the feasibility and practicality of using the 30° tilt position in an elderly population must be further investigated (Young, 2004).

**Conclusion**

Without exaggeration, turning is by far the most expensive intervention for PU prevention (Xakellis et al., 1995). Given the substantial costs and burden of frequent repositioning, it is essential to target this intervention at those patients who are most likely to benefit (Rich et al., 2011). Further studies are needed to confirm the results.
Chapter 3  Implementation Potential

Appropriate utilisation of research findings in real life practice not only advances the quality of nursing care and facilitates nurses’ work (Brancato, 2006), but also increases patients’ satisfaction as the recipients of care (Glanville et al., 2000). In this chapter, the implementation potential of the evidence collected, including the transferability and feasibility of the research findings and the cost-benefits of the innovation, will be examined. The target audience and the proposed setting will also be identified. It is clearly a combination of academic study and experience that has the greatest positive influence on the nursing profession.

Target Audience and Setting

The target population of the innovation consists of elderly patients who are at risk of PU development and who can be repositioned. The PU risk is assessed by nurses’ observation, the patients’ level of mobility and their skin integrity using the Braden scale. Patients under 65 or who are unable to turn are excluded. The proposed setting is a female medical ward in a private hospital, in the heart of Causeway Bay. It has more than 400 beds with over 30 departments providing a comprehensive medical service to the public. There are two medical wards in the hospital and the innovation will be implemented in one of them. A medical
ward is chosen because of the high admission rate of older adults aged 65 or above. On average, there are 10 to 12 new admissions daily. It is estimated that one out of five newly admitted cases meets the inclusion criteria. There are 24 beds in the ward in question, 20% to 25% of which are occupied by critically ill older patients, who need intensive care such as manual repositioning and bed baths. There are nine registered nurses (RNs), eight enrolled nurses (ENs) and seven healthcare assistants (HCAs) in the ward. Repositioning is mainly carried out by nurses and HCAs. It has long been the ward practice to reposition patients two-hourly on a pressure-reducing mattress. Other pressure-reducing devices such as air ripple mattress, pillows and heel protectors are commonly used. All nurses and HCAs will be responsible for carrying out the innovation, and are the target users of the EBP guideline.

**Transferability of the Findings**

**Fit of Intervention in Proposed Setting**

The research findings are transferable, as they fit the target setting and audience. Three of the reviewed RCTs were conducted in long-term geriatric wards (Defloor et al., 2005; Moore et al., 2011; Vanderwee et al., 2007); while one was conducted in the medical wards of an acute district hospital (Young, 2004), where patients and settings were similar to those in the proposed ward. Studies
were mainly conducted in Belgium (Defloor et al., 2005; Vanderwee et al., 2007) or the United States (Young, 2004; Rich et al., 2011). Although none of the studies took place in Hong Kong, the cultural difference is unlikely to be a factor affecting the proposed innovation. In Hong Kong, there are often patients from foreign countries, but the optimal frequency and technique of repositioning should be more or less the same, regardless of the patient’s race or colour.

As in the studies, repositioning is mainly carried out by nurses in the proposed medical ward and they assess patients’ skin condition at each turning episode. Devices such as pressure-reducing mattress, pillows and cushions are commonly used. The findings are in this way transferable to Hong Kong settings.

**Similarity of Research to Target Population**

The two populations were similar in age, PU risk and physical condition. Samples in the studies were all elderly patients at risk of PU development, their mean age ranging from 70.1 to 84.4 (Defloor et al., 2005; Young, 2004; Rich et al., 2011). None had a darkly pigmented skin. The PU risk was assessed by nurses using the Braden (Defloor et al., 2005; Moore et al., 2011; Vanderwee et al., Rich et al., 2011), Norton (Defloor et al., 2005) or Waterlow scales (Young, 2004). The mean Braden score ranged from 13.2 to 15.0 (Defloor, 2005; Vanderwee et al.,
Rich et al., 2011). The Braden scale is a PU risk assessment tool which ranges from 6 to 23; the lower the score, the higher the PU risk (Defloor, 2005; Moore et al., 2011; Vanderwee et al., 2007). They were all medical cases and were able to be repositioned. Although the research population included both male and female patients, this is not considered to be a factor affecting the transferability of the proposed innovation, where only female patients will be concerned.

**Philosophy of Care**

The private hospital in question started its medical mission in 1898, looking after the poor and underprivileged in Wan Chai and Happy Valley. Inspired by the religious values and following the teaching of St. Paul, it continues the healing mission by providing a loving and dedicated service to the sick. The hospital tries at all times to maintain a high standard of service in the prevention, promotion and restoration of health. Without a doubt, quality service and effective care are two essential elements of this private hospital, which is patient-oriented. EBP provides good guidance to nursing practice and has the potential to advance the quality of nursing care (Brancato, 2006) and patients’ satisfaction (Glanville, et al., 2000). The proposed innovation fits the philosophy of care of the target setting. In the ward, many of the nurses are degree holders, and the universities nowadays aim at nurturing students to be
knowledgeable research consumers (Erickson-Owens & Powell Kennedy, 2001).

Nursing EBP is possible with the provision of clear evidence.

**Sufficient Clients to Benefit**

The proposed innovation will benefit a sufficiently large number of patients. Since there are only two medical wards in the proposed hospital, the target ward is always busy. On average, we have to admit five to six new cases in each shift and around one out of five meet the inclusion criteria. For those elderly patients at PU risk, the mean period of hospital stay is two to three weeks. Based on these figures, it is estimated that around 150 to 200 patients can benefit directly from the innovation each year.

**Implementation and Evaluation Time**

It will take approximately four weeks for pilot testing and five months for implementation and evaluation, both of which will be carried out within the patients’ hospital stay. Nurses assess patients in the ward and determine their PU risk using the Braden scale. The proposed innovation starts immediately after admission. Patients’ skin will be assessed at each turning episode, and any changes in skin integrity noted and evaluated. The time between the causation and external appearance of a PU (grade 2-4) can be three days (Vanderwee et al., 2007). ‘Theoretically, pressure ulcers observed before day 4 could have been
caused some time prior to the start of the study’ (Vanderwee et al., 2007, p.63).

In other words, it takes a week or less to evaluate the effectiveness of the innovation for individual patients. The duration of implementation and evaluation is reasonable and appropriate and should be transferable.

**Feasibility**

In the following sections, the feasibility of the proposed innovation will be examined in terms of five aspects: (1) organisation, (2) staff, (3) physicians, (4) patients and (5) the availability of skills and facilities.

**Organisation**

Needless to say, managerial support plays a major role in promoting and supporting the change. Implementation of the proposed innovation is certainly possible as both senior nursing officer (SNO) and nursing officer (NO) of the medical ward warmly support the EBP, and securing approval would not be difficult. The high admission rate and limited workforce may result in stressful workloads and a potential decline in nursing care. But the proposed EBP may work for a better patient outcome, and is supported because it refocuses nursing practice away from routines, tasks and opinion-driven decisions based on experience, theories or tradition on to practices that have been subjected to critical appraisal and are substantiated by evidence (Gagan & Hewitt-Taylor, 2004;
However, EBP is rather new to the hospital in question, and the poor organisational climate in EBP may be a factor hindering the change of practice. Only time and good evidence support will induce better acceptance.

The proposed innovation has been introduced to the current SNO and NO and their responses have mostly been positive. There is freedom to conduct a pilot study, which is important for outcome evaluation and identification of any unexpected obstacles to implementation. Evaluation results will be presented to target users and decision makers at a ward meeting, to encourage a successful outcome.

Staff

Some nursing staff and HCAs on the ward have worked in the hospital for more than 10 years, and will most likely resist the change. The two-hourly turn has become firmly embedded in nursing culture (Young, 2004), while the effectiveness of the proposed EBP guidelines remains uncertain. Nurses’ traditional reluctance to change can be expected as they do not want to bear the risk of change, while the increased workload and paperwork are thought to be another factor. It is important to raise nurses’ awareness of the current problem, and sufficient evidence should be provided to highlight the value of EBP.
Forming a PU team with ward nurses may encourage the free expression of opinions, since open discussion empowers people to change and enhances compliance. It is important to keep this innovation to an appropriate pace and avoid it clashing with other forms of in-house training, to minimise the workload.

Most nursing staff are not equipped with updated information on PU prevention. Training or briefing during working hours is feasible and fully supported by ward staff. The nurse in charge of the practice guidelines will provide training to the PU team, who will then deliver detailed guidelines to all nurses and HCAs in training workshops. To ensure good compliance rates, intervention checks will be carried out by the SNO and NO, the nurse in charge of the practice guideline and the PU team, acting as role models and troubleshooters. Documentation, turning charts, patient kardex etc, will be used to monitor the compliance.

**Physicians**

Doctors are not likely to resist the changes. As EBP works for a better patient outcome, they are usually supportive and cooperative. Their involvement is minimal since repositioning is mainly done by nurses and HCAs. The proposed innovation will not interfere with their current functions and they are therefore less likely to be a source of friction.
Patients

In clinical practice, the two-hourly turn has been firmly established as ‘the standard of care’ for bed-bound patients (Rich et al., 2011), but it is in conflict with the current literature and the proposed innovation. Since repositioning is a charged service in the private hospital, consent must be obtained before providing it. Most likely, patients and relatives will be a source of friction. Although turning four-hourly instead of two-hourly on a pressure-reducing mattress results in a significant saving in cost and effort (Defloor et al., 2005; Brancato, 2006), it is unlikely to be a consideration. In clinical practice, repositioning more frequently than every two hours is often requested by patients and/or relatives in order to reduce PU incidence. Strong evidence and rationale will need to be provided in response to potential complaints. Convincing data aids acceptance, and leaflets or pamphlets may be designed to illustrate both PU trends and the proposed innovation. Also, adopting the EBP will mean the patient’s night rest will be less disturbed (Defloor et al., 2005).

Availability of Skills and Facilities

Devices such as pressure-reducing or air ripple mattresses, pillows and heel protectors are commonly used in the medical ward, and so the required facilities are available, facilitating the implementation of the innovation. Nurses will be
trained in the use of the Braden scale and the EPUAP PU classification system.

The Braden scale is a PU risk assessment scale with six categories: sensory perception, moisture, activity, mobility, nutrition and friction/shear. Nurses will score all the patients in the ward regularly and implement the guideline accordingly. ‘The Braden scale is the most widely tested risk assessment tool currently available’ (Moore et al., 2011, p.2635).

The EPUAP PU classification is a four-stage system (grade 1-4). It ranges from non-blanching erythema of intact skin (grade 1) to full-scale tissue destruction (grade 4) (Moore et al., 2011; Vanderwee et al., 2007). All nurses will be instructed in observing PU(s) using this system. The location, severity and number of PU(s) will be charted and documented, and the data used for outcome evaluation.

Cost-Benefit Ratio of the Innovation

The benefits of the innovation should clearly outweigh its costs before it can be carried out in clinical settings. In this section, the cost-benefit ratio of the proposed innovation will be examined, as will the risks of maintaining current practice.

Potential Risk

Adherence to the proposed practice guideline will not guarantee a successful
outcome in every case. Since the effectiveness and the practicability of using the proposed innovation with an elderly population remains uncertain, there is a risk of a further increase in PU incidence. Some elderly patients may experience difficulty in adopting and maintaining the innovation, and complaints from patients and/or relatives cannot be excluded – bringing a further increase in medical costs, and also in patients’ suffering.

Potential Benefits

Client benefits.

More likely, patients will benefit from the innovation in several ways. Complications deriving from PUs include diminished quality of life, prolonged hospitalisation and increased morbidity and mortality (Margolis et al., 2002). By adopting the best practice of repositioning, there is the potential to reduce PU incidence and thus medical costs and patients’ suffering. Indeed, turning every two hours is the most fundamental intervention for PUs, and has been firmly embedded in nursing culture (Young, 2004). Some patients find it too disturbing and too tiring (Defloor et al., 2005; Vanderwee et al., 2007). Changing the two-hourly turn to four-hourly on a pressure-reducing mattress means that the patient’s night rest would be less disturbed (Defloor et al., 2005). In fact, EBP provides
good guidance for nursing practice (Brancato, 2006). As healthcare consumers, patients are the ones most likely to benefit from the innovation.

**Other benefits.**

Dispelling the traditional image of nurses as doctors’ handmaidens, nurses nowadays act as healthcare providers and educators as well as counsellors. Implementation of the proposed innovation will help to promote EBP in the ward and standardise nursing care, which enhances the nursing profession (Brancato, 2006). In the meantime, nurses will enjoy better job satisfaction when they can see a decline in PU incidence.

**Risks of Maintaining Current Practice**

One risk of maintaining current practice is that PUs continue to occur at an unacceptable rate, representing an overall poor quality of nursing care and adversely affecting the reputation of the profession. ‘Prevention and treatment are not only a cost issue; PUs cause significant patient morbidity and mortality’ (Russell et al., 2003, p.318). Having a well-established reputation and image is very important to a private hospital. The hospital might be notorious for its poor nursing care if current practice were to be insisted on. Admission rates might be reduced, affecting income and profit. Maintaining a high standard of nursing care should be a priority for all nurses. ‘Several studies have shown that manual
repositioning increases healthcare workers’ risk of back pain and musculoskeletal injuries’ (Rich et al., 2010, p.10). It is true that the two-hourly turn is only justified if this intervention is effective.

**Costs**

It has been found that the cost of repositioning accounted for 73% of the total cost of PU prevention (Rich et al., 2010; Xakellis & Frantz, 1996). The labour costs associated with this intervention are certainly considerable (Rich et al., 2010). Given the substantial costs and burdens associated with repositioning, it is therefore important to determine the cost-benefit ratio of the proposed innovation.

The costs of the innovation are minimal compared with the huge cost of PU treatment and the invaluable patient health benefits. Short-term costs include $2,000 for promotion (posters and brochures, for instance), $3,000 for the purchase of 30° cushions and an allowance for staff training workshops. The workshops last for four hours in total (for nurses), and a two-hour training workshop will be provided for HCAs. The cost is calculated using the average hourly wages for nurses and HCAs in the hospital. Assuming the average hourly wages for nurses and HCAs are $200 and $60 respectively, it will take a total of $12,040 to train fourteen nurses and seven HCAs in the ward, a total short-term
cost of $17,040.

The average time required to reposition a patient was found to be 3.5 minutes (Defloor et al., 2005; Xakellis et al., 1995). Changing from two- to four-hourly turning would save 21 minutes per patient per day. If patients are to be turned by one nurse and one HCA each time, it would save $91 per patient per day on the basis of the average hourly wage of nurses and HCAs. For a ward with 24 patients and 20% at-risk patients, there would be a daily saving of $455 and a yearly saving of $166,075. Patients would save $116 per day in respect of the service charge of $29 per turn.
Chapter 4  Evidence-Based Practice Guideline

The best practice should be based on sound evidence. In this chapter, the EBP guideline for PU prevention is developed, focusing on the method and frequency of turning. The aims and objectives of the EBP guideline, target audience and possible outcomes will be discussed in detail.

Guideline Title

Evidence-based clinical guidelines for pressure ulcer prevention in elderly patients.

Aims

The aims of the EBP guideline are to:

- reduce medical costs
- promote EBP in wards and standardise nursing practice
- enhance the role of the nursing profession.

Objectives

The objectives of the EBP guideline are to:

- reduce PU incidence in elderly patients
- advance the quality of nursing care
- raise nurses’ awareness of PUs and the importance of PU prevention.
Target Group

➢ elderly patients at risk of PUs.

Target Users

➢ all nurses and HCAs working with elderly patients.

Intervention and Practice Considered

➢ the optimal frequency and method of repositioning.

Major Outcome Considered

➢ PU incidence.

Recommendations

Recommendations are derived from the evidence reviewed, with the grades of recommendation and levels of evidence provided in accordance with the SIGN system (see Appendix E). Only grade A and B recommendations are included in this guideline.

Recommendation 1.0

Nurses score all patients in the ward every three days, using the Braden scale to assess the PU risk. [A]

➢ ‘The Braden scale is the most widely tested risk assessment tool currently available and the most frequently used in clinical practice’

(Moore et al., 2011, p.2635) (1+).
Each patient was scored at the start of the study and was reassessed every three days using the Braden scale (Defloor et al., 2005; Moore et al., 2011; Vanderwee et al., 2007) (1+).

**Recommendation 2.0**

Patients at risk of PU development should be turned by nurses and HCAs regularly. [A]

- Repositioning is widely recognised and recommended as an important and effective method of PU prevention (Defloor et al., 2005; Vanderwee et al., 2007) (1+).

- Nurses executed the turning protocols. Training and education were provided before intervention (Defloor et al., 2005; Moore et al., 2011; Vanderwee et al., 2007; Young, 2004) (1+).

**Recommendation 2.1**

Nurses assess patients’ skin at each turning episode and record its condition at all pressure points. [A]

- PUs were assessed daily by the nursing staff. They recorded the absence or presence of PUs at each turning episode (Moore et al., 2011; Defloor et al., 2005; Vanderwee et al., 2007) (1+).

- Data on repositioning were collected from the nursing flowsheet (Rich
et al., 2011) (2+).

**Recommendation 2.2**

PUs are categorised according to the EPUAP-classification system. [A]

- PUs were defined using the EPUAP-classification system, a four-stage system ranging from non-blanching erythema of intact skin to full-scale tissue destruction (Defloor et al., 2005; Moore et al., 2011; Vanderwee et al., 2007) (1+).

- The presence and stage of PUs were determined at each study visit by a whole-body skin examination using the EPUAP-classification system (Rich et al., 2011) (2+).

**Recommendation 2.3**

On a pressure-reducing mattress, turning four-hourly in combination with pressure-reducing positions and cushions is recommended. [A]

- Statistically, repositioning every four hours on a visco-elastic mattress significantly reduces the number of PUs (Defloor et al., 2005; Vanderwee et al., 2007) (1+).

- Defloor et al. (2005) showed a 85% reduction of PUs in comparison with standard care (1+).

- ‘Turning more frequently on a pressure-reducing mattress does not
necessarily lead to fewer pressure ulcers and consequently cannot be considered a more effective preventive measure’ (Vanderwee et al., 2007, p.65) (1+).

- Turning four- instead of two-hourly on a pressure-reducing mattress means a significant saving in cost and effort, and is thus far more feasible in practice (Defloor et al., 2005) (1+).

**Recommendation 2.4**

On a standard hospital mattress, turning two-hourly is recommended. [B]

- On a standard hospital mattress, only 10-20% of the body is supported (Defloor et al., 2005).

- Defloor et al. (2005) found that, on a standard hospital mattress, turning two-hourly resulted in a lower PU incidence than three-hourly (1+).

**Recommendation 3.0**

For a lateral turn, the 30° tilt position is recommended. [A]

- In a lateral lying position, the patient was rotated 30° and a pillow placed under the back from the shoulder to just above the pelvis (Defloor et al., 2005; Moore et al., 2011; Vanderwee et al., 2007) (1+).

- Moore et al. (2011) showed a 67% reduction in PUs with the use of the 30° tilt and a three-hourly turning schedule (1+).
**Recommendation 3.1**

A special 30° cushion should be used to support patients in a 30° lateral position.  [B]

- The ordinary pillow was not adequate to achieve a stable lateral 30° position (Vanderwee et al., 2007) (1+).
- A special 30° cushion supports the patient from shoulder to just above the sacrum. The upper arm can rest on the top of this flattened cushion, which provides better support and a more comfortable lateral position than an ordinary pillow (Vanderwee et al., 2007) (1+).

**Recommendation 3.2**

The 90° lateral position should be avoided.  [A]

- ‘The 90° lateral position has been shown to decrease blood flow and transcutaneous oxygen tension to near anoxic levels, and to increase interface pressure’ (Moore et al., 2011, p.2634) (1+).
Chapter 5  Implementation Plan

Making changes in daily nursing practice is not an easy task, as it brings about uncertainty in nurses and thus induces resistance. It is necessary to have an effective implementation and evaluation plan to facilitate its adoption. Pilot testing is useful for revising the guidelines and testing the feasibility and appropriateness of the innovation before large-scale implementation. Many problems can be foreseen and avoided in such a way. In this chapter, the implementation plan for the proposed guidelines will be developed.

Communication Plan with Potential Users

Gaining approval and support from stakeholders is crucial for the organisational implementation of the proposed guidelines (Brick & Stephens, 2003). It is important to identify all stakeholders and communicate with them effectively. A well-planned communication plan is bound to facilitate the success of the innovation.

Identification of Stakeholders

Stakeholders in the innovation include:

1. Decision makers in the target medical ward, including SNO, NO and two deputies-in-charge (DIC)

2. PU team
3. Both RNs and ENs
4. HCAs
5. Doctors
6. Patients
7. Patients’ families

**Communication Processes and Methods**

Top-down communication is the method used to disseminate information within the hospital. As the name implies, it emphasises managerial hierarchy and the methodical transfer of information - that is, ‘the ways by which work organisations are structured, business and other strategic plans are formulated, leadership is established and performed, and organisational activities are controlled’ (Jou & Sung, 1990, p.619-620). Information and/or orders originate from the decision-makers and filter down to the rest of staff and other stakeholders. A communication flow chart is attached in Appendix F.

**Communication with decision-makers in the target medical ward.**

**Forming an interest group.**

Nurses interested in PU prevention, four or five volunteers, are grouped together. They review the literature and discuss the need for practice change. The feasibility of the innovation, implementation plan and
evaluation plan will be covered during discussion, and revisions made in accordance with nurses’ opinions.

**Obtaining approval from NO and two DICs.**

Gaining managerial support is critical to the success of the innovation (Baernholdt & Lang, 2007; Brick & Stephens, 2003; Bryar et al., 2003). Approval from NO and DICs will be obtained prior to a meeting between the SNO and PU interest group. Existing PU problems and the need for practice change will be highlighted and demonstrated by evidence from the current literature and data of PU incidence. The proposed guidelines are introduced, with both feasibility and cost-benefits stressed.

**Obtaining approval from SNO.**

The PU interest group will then have a meeting with the SNO, a key person who has the ultimate authority to make changes in nursing practice. A proposal, to be prepared in advance, will be a summary of literature reviews, the proposed EBP guidelines, aims and objectives, feasibility and cost-benefits analysis, and implementation and evaluation plans. Potential problems and solutions concerning the innovation will be identified and brought up at the meeting. Powerpoint will be used for presenting certain data and key points.
**Forming a PU team.**

After receiving approval from the SNO, a PU team will be formed, whose members will include the SNO and NO, two DICs, the investigator and the interest group members. Both SNO and NO supervise the PU team and guide the change process. The investigator, two DICs and other team members communicate with other stakeholders. They act as role models and provide feedback to enquiries.

**Communication with the PU team.**

Three compulsory training workshops will be provided for the PU team in the health promotion centre, each lasting for one to one and a half hours. To ensure 100% attendance, the date and time will be negotiated and selected by the trainer and the PU team. The workshops aim at training the trainers and equipping the team members fully with the skills required for training, briefing, auditing, assessment, documentation, data collection and evaluation. They should be a resource for the staff and be recognised as models and trainers of all nurses and HCAs (Strickland & O’Leary-Kelley, 2009). All members should pass the audits. The content of the three training workshops is as follows:
Workshop 1.

Workshop 1 is an introductory course, which lasts for one hour. It aims at introducing the proposed guidelines and advocating the importance of EBP. All team members should understand the innovation well before educating other stakeholders. The information package includes:

- Introduction of PUs and the risk factors
- Literature reviews
- Need for practice change
- Significance of EBP
- Proposed EBP guidelines
- Target users, audiences, feasibility and cost-benefits of the innovation
- Implementation and evaluation plans
- Roles and responsibilities of team members

Workshop 2.

Workshop 2 lasts for an hour and a half, and focuses on practical skills like classification of PUs, documentation and repositioning techniques, with a return demonstration required. The PU team will be audited one by one using a valid audit tool. Documentation charts, such as turning (see
Appendix G) and PU charts (see Appendix H), will be circulated and properly introduced. The content of workshop 2 includes:

- Use of Braden scale
- Repositioning demonstration
- Return demonstration (audited individually by the investigator)
- EPUAP-classification system
- Documentation

**Workshop 3.**

Workshop 3 again lasts for an hour and a half. Details of the implementation and evaluation plans will be covered, and pilot testing carried out in the target medical ward. A booklet guide and a list of frequently asked questions will be provided to the PU team, as all members are preparing to be the trainers of other nurses and HCAs. Training, briefing and auditing skills will be taught in class. The content of workshop 3 includes:

- Implementation and evaluation plans
- Pilot testing
- Appropriate ways to obtain family consent for pilot testing
- Consent form and explanatory letter
Training, briefing and auditing skills

Audit criteria and assessment tools

Data collection and evaluation

Communication with nurses.

Nurses are to be the main users of the proposed guidelines, and their acceptance and compliance directly affect the success of the innovation (Olade, 2003). If nurses feel incapable of evaluating the quality of the research or are unaware of it (Strickland & O’Leary-Kelley, 2009), the PU team will work with them to increase research knowledge and awareness. It is important to communicate clearly with them and ensure adequate understanding of the innovation. Nurses become ‘more confident in the value of research and may become more interested and motivated’ (Strickland & O’Leary-Kelley, 2009, p.169).

Posters and internal emails.

Posters and internal emails will be used to communicate with nurses and other stakeholders, both being convenient and economical methods. Two posters are designed, targeting either health professionals or patients and families. Poster 1 explains the concept of EBP to health professionals, with the proposed guidelines included, supported by sound evidence, raising
nurses’ awareness of the problems of PUs and current repositioning practice.

The poster would be put up in the pantry, tea room, changing room and nursing station.

Poster 2, targeting patients and their families, highlights the cost-benefits and expected outcomes of the innovation, and deals with some common myths about repositioning. It will be posted in patients’ bedrooms, the admission room and corridors.

Comment form.

A comment form will be attached to the detailed guidelines and circulated among nurses, so that they can comment on them directly. These comments will be collected later to assist with revising the guidelines.

Cue card.

A small cue card will be designed and distributed to all nurses, HCAs and other stakeholders, a quick reference about the EBP guidelines, pocket-sized and printed on plastic. Nurses and other stakeholders can keep it in their uniform pockets and use it whenever needed.

Regular ward meetings.

Communication should be interactive (Hirkpatrick, 2001), and so nurses are provided with opportunities to voice their concerns in ward meetings.
To enhance better understanding, the PU team will communicate with them directly. Nurses’ participation is encouraged, increasing their sense of being recognised and reducing resistance to the change. Barriers to nurses’ use of research include ‘lack of motivation, interest and/or incentive’ (Strickland & O’Leary-Kelley, 2009, p.168). Incentives such as refreshments and time off in compensation will be offered. The proposed guidelines will be revised in accordance with their needs.

*Training workshops.*

Three compulsory training workshops are provided by the PU team. Nurses receive the same training package and are all required to pass the audit.

*Communication with HCAs.*

As turning is to be done by both nurses and HCAs, the latter should also be well informed about the innovation. All HCAs will be trained by the PU team at a single (compulsory) workshop, lasting for two hours, and will be required to pass the audit. Contents of this single workshop include:

- Need for practice change
- The proposed EBP guidelines
- Repositioning methods and frequency
- Repositioning demonstration
- Return demonstration (audited one by one by the PU team)
- Implementation and evaluation plans
- Pilot testing

**Communication with doctors.**

The PU team will explain to doctors the need for practice change and doctors’ role in implementation through emails, monthly hospital newsletters, posters and brochures. The proposed EBP guidelines will be introduced and evidence from the literature and data of PU incidence provided. Cooperation from doctors will without doubt be a great advantage (Bryar et al., 2003) and, as EBP works for a better patient outcome, they are usually supportive and cooperative, helping to promote and explain innovations to patients and families.

**Communication with patients and families.**

EBP holds great promise for benefiting key stakeholders - patients, families, doctors, nurses, as well as other healthcare staff and organisations (Ulrich, Berry, Quan & Parish, 2010). As mentioned, turning is a paid service in a private hospital, and for the change to succeed, patient and family support is very important. They should be well informed about the
innovation, for example, its cost-benefits and expected outcomes, so the PU team will communicate with them through monthly hospital newsletters, posters and brochures. Enquires will be welcome and answered via phone, email or face-to-face meetings.

**Sustaining the Change Process**

Ongoing communication and education for stakeholders helps sustain the change process (Rosswurm & Larrabee, 1999). Rewards or incentives are used to recognise and show appreciation for the staff’s efforts, for example, training with CNE points and refreshments offered. Exchanging success stories in ward meetings can be such an incentive. Positive outcomes and feedback from patients or families provide staff with increased job satisfaction, which in turn encourages and reinforces them to sustain the change. Furthermore, an intermediate review of newly emerging evidence will be conducted half-yearly by the investigator, so as to revise the guidelines wherever necessary (Polit & Beck, 2008). To enhance nursing compliance and increase nurses’ awareness, a daily ward round by SNO and NO is suggested. Audits will be carried out by the PU team on a regular basis.
Pilot Testing

Pilot testing is a trial run to test the feasibility of the innovation and to heighten stakeholders’ awareness of the problems of PUs and their prevention before large-scale implementation (Laight, 1996). Through pilot testing, staff will have a better understanding of the EBP guidelines and be more competent in carrying out the innovation.

Objectives

The objectives of pilot testing are to:

- test the feasibility of the guidelines
- assess nursing compliance with, and family acceptance of, the innovation
- determine whether revisions are needed before large-scale implementation
- identify any problems with the intervention to avoid unexpected difficulties throughout large-scale implementation.

Sampling

Pilot testing will be carried out in the target medical ward. Patients’ PU risk will be assessed by nurses at the time of admission using the Braden scale. Each day after 7am, the first eligible newly admitted case will be selected to take part in the testing. The target sample size will be 20 patients, and sampling will take three to four weeks.
Ethical Considerations

The pilot testing will be subjected to ethical approval by the Hospital Ethics Committee (Polit & Beck, 2008). Consent to participate in the testing must be obtained from patients and/or the next of kin on admission, with an explanatory letter which describes the objectives of the pilot testing, risks and benefits, data collection plan, patients’ right to refuse or withdraw and confidentiality (Polit & Beck, 2008). Both Chinese and English versions of consent form and explanatory letter are available. Patients’ privacy is fully protected throughout pilot testing.

Evaluation of Pilot Testing

By means of a process evaluation, outcomes such as the feasibility of the intervention, nursing compliance, patients’ and/or family acceptance of the innovation will be assessed and evaluated. Results obtained from pilot testing can be used to improve the innovation before large-scale implementation. The PU team will present the results in nurses’ ward meetings, where discussing success stories or difficulties will be encouraged. There may well be unexpected problems like materials supply, documentations, time management and misconceptions. After the pilot testing, the PU team will hold a meeting and invite five to ten volunteer stakeholders to discuss their experiences, where both
strengths and weaknesses of the innovation should emerge. Discussion of problems and opinions will be highly appreciated. A formal written report will then be prepared for SNO and NO, to decide whether to adopt, modify or reject the guidelines (Polit & Beck, 2008; Rosswurm & Larrabee, 1999).
Chapter 6  Evaluation Plan

This is perhaps the most important chapter as it illustrates how successful and effective the innovation is according to the outcomes achieved. In this chapter, a detailed evaluation plan will be discussed. The intervention outcomes, nature and number of clients involved, data analysis and criteria for effectiveness will be illustrated.

**Intervention Outcomes**

Without a doubt, the intervention outcomes are determined by its objectives. There is one primary outcome and five secondary outcomes in this innovation. The primary outcome concerns the incidence of PUs, which include grade 1-4 PUs. The secondary outcomes are:

- location and severity of PUs
- nurses’ competence and compliance in assessment, implementation and evaluation
- practicability of the 30° tilt position
- family and patient acceptance of the EBP guidelines
- cost-effectiveness of the innovation
Nature and Number of Clients Involved

Eligibility Criteria

The patient inclusion criteria are as follows:

- aged 65 or more
- at risk of PU development with a Braden score of less than 17
- able to be repositioned
- no PU (grade 1-4) at the time of admission
- expected to stay in hospital for more than three days
- consenting to participate in the intervention

Patients below 65 and/or with darkly pigmented skin and/or unable to be turned are excluded. Nurses would find it more difficult to assess patients’ skin if it is darkly pigmented, especially when classification of PU(s) is needed (if any).

To minimise data collection error, these patients are excluded.

Sample Size Calculation

The literature shows that the incidence of PUs ranges from 0.4% to 38% in acute care (Reddy, Gill & Rochon, 2006; Lyder, 2003). By observation, it is about 30% in the target medical ward. In an endeavour not to underestimate the PU incidence, a conservative figure of 30% is taken as a null value.

With the use of the 30° tilt and particular repositioning schemes, the
reduction in PUs was found to be 85% (Defloor et al., 2005) and 67% (Moore et al., 2011) in two RCTs. To be conservative, an effect size of 67% is chosen. That is, the actual value is 10%. The test for one proportion is used for sample size calculation. A level of significance ($\alpha$) of 0.05 and a power of 80% are chosen. The sample size required would be at least 33 patients. With an attrition rate of 10%, at least 37 patients will need to be recruited. Sampling will take six to eight weeks.

**Data Analysis**

Outcome evaluation is very important, determining the degree and number of goals achieved in the innovation (Melnyk & Fineout-Overholt, 2005). We hypothesise that the incidence of PUs (grade 1-4) will be different after the implementation of the intervention.

**Data Collection and Evaluation**

**Incidence and severity of PUs.**

Patients’ skin will be assessed by nurses at each turning episode (Moore et al., 2011), which will facilitate early identification and treatment of PUs. Nurses will record each turning episode on a documentation chart, with time and position specified. Any changes in skin integrity will be charted too, the number, location and severity of PUs, for instance. PUs will be
classified using the EPUAP four-grade system, which ranges from non-blanching erythema of intact skin (grade 1) to full-scale tissue destruction (grade 4) (Defloor, 2005; Moore et al., 2011; Vanderwee et al., 2007). Nurses are trained in using this system, and the investigator will be informed if a skin breakdown is noted. The PU(s) will then be assessed by a nurse and the investigator. Agreement between the assessors should be reached by comparing the skin condition with the images on the EPUAP grading system (Moore et al., 2011).

A two-tailed z-test will be used to analyse the change in PU incidence (grade 1-4) and the severity of PUs after the intervention. The z-test is chosen because we simply compare the result to a known figure already on the ward prior to the intervention. The two-tailed test is used because the intervention outcome is expected to be non-directional, determining the change in PU incidence, either increase or decrease.

**Nursing compliance and skills.**

Poor nursing compliance and/or skills would without doubt affect the intervention outcomes adversely (Rosswurm & Larrabee, 1999). To reduce non-compliance, regular checkups and reinforcement of guideline adherence will be conducted by the PU team (Melnyk & Fineout-Overholt, 2005).
The team will visit the ward at random times throughout the day and at night to ensure compliance with the repositioning schedule and data collection. Any malpractice or non-compliance will be charted and presented. Areas of noncompliance and the reasons for them will be examined, with the accepted criteria and possible solution(s) provided.

In addition, daily audits will be carried out by the PU team to enhance nurses’ compliance and competence in carrying out the innovation (Charrier et al., 2008). A valid audit tool will be used to guide nursing practice, and all nurses should pass the audit, in which critical points are to be stressed and reinforced.

**Practicability of the 30° tilt position.**

The literature shows that patients altered their position before the next planned repositioning in 34% of the observations (Vanderwee et al., 2007); while 78% subjects experienced problems in adopting and maintaining the 30° tilt position (Young, 2004). They might feel uncomfortable lying in a lateral position (Vanderwee et al., 2007; Young, 2004), and/or the 30° cushion were inadequate to support their back (Vanderwee et al., 2007), and/or they were able to move independently (Young, 2004). Regardless of the reasons, this finding seriously questions the practicality of using the 30°
tilt among predominantly ill older patients (Young, 2004).

Patients’ position change will be observed and charted during daily ward rounds, and the percentage calculated. Patients and/or family, if possible, will be interviewed to see if any discomfort or difficulties are experienced in maintaining the 30° tilt position. Data collected will be used to examine the feasibility of using the 30° tilt in this elderly patient population.

**Patient/family acceptance of the innovation.**

As mentioned, repositioning is a paid service in a private hospital. Acceptance from patients and/or family is especially important, and helps to promote the change. A simple questionnaire has been designed (see Appendix I) and will be distributed to patients and/or family on the day of discharge or the last day of the intervention. To indicate satisfaction levels, a five-point scale is used for the answers to each question, ranging from ‘very satisfied’ to ‘very dissatisfied’ and ‘fully agree’ to ‘disagree completely’. Comments and/or opinions can be given in the box provided.

The results will be recorded and evaluated and the percentage of patients and/or family who support the innovation calculated. Improvements will be made in accordance with the results.
Cost-effectiveness of the innovation.

Costs required to produce the primary outcome will be calculated, which include those for the 30° cushions, training, promotion and labour. To proceed with the change, the innovation must be cost-effective. The analysis shows the value of the intervention that is in the stakeholders’ interest, and will be performed by comparing the achievement of primary outcome with the resource costs associated with the innovation for each patient (Polit & Beck, 2008).

Criteria for Effectiveness

The main objective of the innovation is to reduce the incidence of PUs (grade 1-4) in elderly patients. However, without adequate nursing compliance, the primary outcome will fail to show the effectiveness of the innovation (Kinsman, 2004). Therefore, to consider the innovation effective, the following criteria must be achieved:

- the incidence of PUs (grade 1-4) is less than or equal to 10%
- all nurses pass the audit and acquire skills in assessment, implementation and evaluation
- nursing compliance rate is 80% or above
- the required position is maintained in 70% or more of the observations.
**Conclusion**

In view of the high incidence of PUs (grade 1-4) occurring in elderly patients in acute care, a systematic review of the related studies has been conducted. The optimal frequency and methods of repositioning have been collected from the literature. With well-designed implementation and evaluation plans, the proposed repositioning guidelines are likely to reduce the incidence of PUs (grade 1-4), while in turn lessening the healthcare burden and preserving patients’ quality of life. Pilot testing is a trial run to test the feasibility of the innovation. For the change to proceed, the intervention must be cost-effective and beneficial to all stakeholders. The intervention outcomes will be assessed for the effectiveness of the innovation. The PU incidence (grade 1-4) is expected to be different after the implementation of the innovation.
## APPENDIX A

### Table of Search Results

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<th>Keywords</th>
<th>PubMed</th>
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<th>EBM Reviews - ACP Journal Club 1991 to July 2011</th>
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<td>10691</td>
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<td>5773</td>
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<td>3. (1) or (2)</td>
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<td>3238</td>
<td>16426</td>
<td>723</td>
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<td>4. Elderly</td>
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<td>41286</td>
<td>143999</td>
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<td>7. Eliminating duplicates</td>
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APPENDIX B

Flow Diagram of Included and Excluded Studies

74 citations identified by literature search

58 studies excluded
- 7 Case reports/descriptive studies
- 2 Pilot/preliminary studies
- 1 Dissertation
- 1 No abstract available
- 6 Pressure ulcer (PU) prevalence
- 6 Risk factors
- 3 Nurses’ knowledge/practice
- 6 Outcomes other than PU incidence
- 14 Interventions other than manual repositioning or heel protection
- 5 Assessment tools/methods
- 2 Cost evaluation
- 1 Quality of care
- 1 Burn patients
- 1 Self-turning
- 1 Alopecia
- 1 Heel protectors

11 reviews excluded
- 1 Risk assessment tool
- 7 Interventions other than manual repositioning or heel protection
- 1 Focus on treatment not prevention
- 1 Rationale for therapeutic positioning

5 studies remained for evaluation

4 RCTs

1 Cohort study
### METHODOLOGY CHECKLIST 2: CONTROLLED TRIALS

**SIGN**

Study identification  
*Include author, title, year of publication, journal title, pages*

<table>
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<th>Guideline topic:</th>
<th>Key Question No:</th>
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</table>

**Before** completing this checklist, consider:

1. **Is the paper a randomized controlled trial or a controlled clinical trial?** If in doubt, check the study design algorithm available from SIGN and make sure you have the correct checklist. If it is a controlled clinical trial questions 1.2, 1.3, and 1.4 are not relevant, and the study cannot be rated higher than 1+

2. **Is the paper relevant to key question?** Analyse using PICO (Patient or Population Intervention Comparison Outcome). IF NO REJECT (give reason below). IF YES complete the checklist.

**Reason for rejection:**

1. Paper not relevant to key question □
2. Other reason □ (please specify):

**Checklist completed by:**

### SECTION 1: INTERNAL VALIDITY

*In a well conducted RCT study…*  

**In this study this criterion is:**

<table>
<thead>
<tr>
<th>1.1 The study addresses an appropriate and clearly focused question.</th>
<th>Well covered</th>
<th>Not addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequately addressed</td>
<td>Not reported</td>
<td></td>
</tr>
<tr>
<td>Poorly addressed</td>
<td>Not applicable</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.2 The assignment of subjects to treatment groups is randomised</th>
<th>Well covered</th>
<th>Not addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequately addressed</td>
<td>Not reported</td>
<td></td>
</tr>
<tr>
<td>Poorly addressed</td>
<td>Not applicable</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.3 An adequate concealment method is used</th>
<th>Well covered</th>
<th>Not addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequately addressed</td>
<td>Not reported</td>
<td></td>
</tr>
<tr>
<td>Poorly addressed</td>
<td>Not applicable</td>
<td></td>
</tr>
</tbody>
</table>
### Subjects and investigators are kept ‘blind’ about treatment allocation

<table>
<thead>
<tr>
<th>Well covered</th>
<th>Adequately addressed</th>
<th>Poorly addressed</th>
</tr>
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<tbody>
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</table>

### The treatment and control groups are similar at the start of the trial

<table>
<thead>
<tr>
<th>Well covered</th>
<th>Adequately addressed</th>
<th>Poorly addressed</th>
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<tbody>
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</tbody>
</table>

### The only difference between groups is the treatment under investigation

<table>
<thead>
<tr>
<th>Well covered</th>
<th>Adequately addressed</th>
<th>Poorly addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

### All relevant outcomes are measured in a standard, valid and reliable way

<table>
<thead>
<tr>
<th>Well covered</th>
<th>Adequately addressed</th>
<th>Poorly addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?

<table>
<thead>
<tr>
<th>Well covered</th>
<th>Adequately addressed</th>
<th>Poorly addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis)

<table>
<thead>
<tr>
<th>Well covered</th>
<th>Adequately addressed</th>
<th>Poorly addressed</th>
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</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

### Where the study is carried out at more than one site, results are comparable for all sites

<table>
<thead>
<tr>
<th>Well covered</th>
<th>Adequately addressed</th>
<th>Poorly addressed</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

## SECTION 2: OVERALL ASSESSMENT OF THE STUDY

### How well was the study done to minimise bias?

*Code ++, +, or −*

### Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?

### Are the results of this study directly applicable to the patient group targeted by this guideline?
Notes. Summarise the authors conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question.

The following section is provided for non-SIGN users of this checklist and is being developed to conform to the standards set by the Guidelines International Network Evidence Tables Working Group.

*Members of SIGN guideline groups do not need to complete this section.*

<table>
<thead>
<tr>
<th>SECTION 3: DESCRIPTION OF THE STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PLEASE PRINT CLEARLY</strong></td>
</tr>
<tr>
<td>3.1 Do we know who the study was funded by?</td>
</tr>
<tr>
<td>□ Academic Institution □ Healthcare Industry</td>
</tr>
<tr>
<td>□ Government □ NGO □ Public funds □ Other</td>
</tr>
<tr>
<td>3.2 How many centres are patients recruited from?</td>
</tr>
<tr>
<td>3.3 From which countries are patients selected? (Select all those involved. Note additional countries after “Other”)</td>
</tr>
<tr>
<td>□ Scotland □ UK □ USA □ Canada</td>
</tr>
<tr>
<td>□ Australia □ New Zealand □ France □ Germany</td>
</tr>
<tr>
<td>□ Italy □ Netherlands □ Scandinavia □ Spain</td>
</tr>
<tr>
<td>□ Other:</td>
</tr>
<tr>
<td>3.4 What is the social setting (ie type of environment in which they live) of patients in the study?</td>
</tr>
<tr>
<td>□ Urban □ Rural □ Mixed</td>
</tr>
<tr>
<td>3.5 What criteria are used to decide who should be INCLUDED in the study?</td>
</tr>
<tr>
<td>3.6 What criteria are used to decide who should be EXCLUDED from the study?</td>
</tr>
<tr>
<td>3.7 What intervention or risk factor is investigated in the study? (Include dosage where appropriate)</td>
</tr>
<tr>
<td>3.8 What comparisons are made in the study (ie what alternative treatments are used to compare the intervention with). Include dosage where appropriate.</td>
</tr>
<tr>
<td>3.9</td>
</tr>
<tr>
<td>3.10</td>
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<tr>
<td>3.11</td>
</tr>
<tr>
<td>3.12</td>
</tr>
<tr>
<td>3.13</td>
</tr>
<tr>
<td><strong>Arm 1:</strong></td>
</tr>
<tr>
<td>Treatment:</td>
</tr>
<tr>
<td>Sample size:</td>
</tr>
<tr>
<td>No. analysed</td>
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<tr>
<td>With outcome:</td>
</tr>
<tr>
<td>Without outcome:</td>
</tr>
<tr>
<td>Primary outcome?</td>
</tr>
<tr>
<td><strong>3.14</strong></td>
</tr>
<tr>
<td><strong>Outcome 1:</strong></td>
</tr>
<tr>
<td>Value:</td>
</tr>
<tr>
<td>Measure:</td>
</tr>
<tr>
<td>P value</td>
</tr>
<tr>
<td>Upper CI</td>
</tr>
<tr>
<td>Lower CI</td>
</tr>
<tr>
<td>Primary outcome?</td>
</tr>
<tr>
<td>3.15</td>
</tr>
</tbody>
</table>
# METHODOLOGY CHECKLIST 3: COHORT STUDIES

## Study identification

Include author, title, year of publication, journal title, pages.

## Guideline topic:

Key Question No:

## Before completing this checklist, consider:

1. Is the paper really a cohort study? If in doubt, check the study design algorithm available from SIGN and make sure you have the correct checklist.

2. Is the paper relevant to key question? Analyse using PICO (Patient or Population Intervention Comparison Outcome). IF NO REJECT (give reason below). IF YES complete the checklist.

## Reason for rejection:

1. Paper not relevant to key question □  2. Other reason □  (please specify):  

## Checklist completed by:

## SECTION 1: INTERNAL VALIDITY

### In a well conducted cohort study:

<table>
<thead>
<tr>
<th></th>
<th>In this study the criterion is:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>The study addresses an appropriate and clearly focused question.</td>
</tr>
<tr>
<td>Well covered</td>
<td>Not addressed</td>
</tr>
<tr>
<td>Adequately addressed</td>
<td>Not reported</td>
</tr>
<tr>
<td>Poorly addressed</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

### SELECTION OF SUBJECTS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2</td>
<td>The two groups being studied are selected from source populations that are comparable in all respects other than the factor under investigation.</td>
</tr>
<tr>
<td>Well covered</td>
<td>Not addressed</td>
</tr>
<tr>
<td>Adequately addressed</td>
<td>Not reported</td>
</tr>
<tr>
<td>Poorly addressed</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.3</td>
<td>The study indicates how many of the people asked to take part did so, in each of the groups being studied.</td>
</tr>
<tr>
<td>Well covered</td>
<td>Not addressed</td>
</tr>
<tr>
<td>Adequately addressed</td>
<td>Not reported</td>
</tr>
<tr>
<td>Poorly addressed</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>
1.4 The likelihood that some eligible subjects might have the outcome at the time of enrolment is assessed and taken into account in the analysis.

<table>
<thead>
<tr>
<th>Well covered</th>
<th>Adequately addressed</th>
<th>Poorly addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not addressed</td>
<td>Not reported</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

1.5 What percentage of individuals or clusters recruited into each arm of the study dropped out before the study was completed.

<table>
<thead>
<tr>
<th>Well covered</th>
<th>Adequately addressed</th>
<th>Poorly addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not addressed</td>
<td>Not reported</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

1.6 Comparison is made between full participants and those lost to follow up, by exposure status.

<table>
<thead>
<tr>
<th>Well covered</th>
<th>Adequately addressed</th>
<th>Poorly addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not addressed</td>
<td>Not reported</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

**ASSESSMENT**

1.7 The outcomes are clearly defined.

<table>
<thead>
<tr>
<th>Well covered</th>
<th>Adequately addressed</th>
<th>Poorly addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not addressed</td>
<td>Not reported</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

1.8 The assessment of outcome is made blind to exposure status.

<table>
<thead>
<tr>
<th>Well covered</th>
<th>Adequately addressed</th>
<th>Poorly addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not addressed</td>
<td>Not reported</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

1.9 Where blinding was not possible, there is some recognition that knowledge of exposure status could have influenced the assessment of outcome.

<table>
<thead>
<tr>
<th>Well covered</th>
<th>Adequately addressed</th>
<th>Poorly addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not addressed</td>
<td>Not reported</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

1.10 The measure of assessment of exposure is reliable.

<table>
<thead>
<tr>
<th>Well covered</th>
<th>Adequately addressed</th>
<th>Poorly addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not addressed</td>
<td>Not reported</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

1.11 Evidence from other sources is used to demonstrate that the method of outcome assessment is valid and reliable.

<table>
<thead>
<tr>
<th>Well covered</th>
<th>Adequately addressed</th>
<th>Poorly addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not addressed</td>
<td>Not reported</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

1.12 Exposure level or prognostic factor is assessed more than once.

<table>
<thead>
<tr>
<th>Well covered</th>
<th>Adequately addressed</th>
<th>Poorly addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not addressed</td>
<td>Not reported</td>
<td>Not applicable</td>
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</tbody>
</table>
The following section is provided for non-SIGN users of this checklist and is being developed to conform to the standards set by the Guidelines International Network Evidence Tables Working Group.

*Members of SIGN guideline groups do not need to complete this section.*

<table>
<thead>
<tr>
<th>SECTION 2: OVERALL ASSESSMENT OF THE STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2.1</strong> How well was the study done to minimise the risk of bias or confounding, and to establish a causal relationship between exposure and effect?</td>
</tr>
<tr>
<td>Code ++, +, or –</td>
</tr>
<tr>
<td><strong>2.2</strong> Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?</td>
</tr>
<tr>
<td><strong>2.3</strong> Are the results of this study directly applicable to the patient group targeted in this guideline?</td>
</tr>
<tr>
<td><strong>2.4</strong> Notes. Summarise the authors conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question.</td>
</tr>
</tbody>
</table>

The following section is provided for non-SIGN users of this checklist and is being developed to conform to the standards set by the Guidelines International Network Evidence Tables Working Group.

*Members of SIGN guideline groups do not need to complete this section.*

<table>
<thead>
<tr>
<th>SECTION 3: DESCRIPTION OF THE STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3.1</strong> Do we know who the study was funded by?</td>
</tr>
<tr>
<td>Academic Institution</td>
</tr>
<tr>
<td>Government</td>
</tr>
<tr>
<td><strong>3.2</strong> How many centres are patients recruited from?</td>
</tr>
<tr>
<td>3.3</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3.4</th>
<th>What is the social setting (i.e. type of environment in which they live) of patients in the study?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>□ Urban □ Rural □ Mixed</td>
</tr>
</tbody>
</table>

| 3.5 | What criteria are used to decide who should be INCLUDED in the study? |

| 3.6 | What criteria are used to decide who should be EXCLUDED from the study? |

| 3.7 | What intervention or risk factor is investigated in the study? (Include dosage where appropriate) |

| 3.8 | What comparisons are made in the study (i.e. what alternative treatments are used to compare the intervention/exposure with). Include dosage where appropriate. |

| 3.9 | What methods were used to randomize patients, blind patients or investigators, and to conceal the randomization process from investigators? |

| 3.10 | How long did the active phase of the study last? |

| 3.11 | How long were patients followed-up for, during and after the study? |

| 3.12 | List the key characteristics of the patient population. Note if there are any significant differences between different arms of the trial. |

<p>| 3.13 | Record the basic data for each arm of the study. If there are more than four arms, note data for subsequent arms at the bottom of the page. |</p>
<table>
<thead>
<tr>
<th>Arm 1:</th>
<th>Arm 2:</th>
<th>Arm 3:</th>
<th>Arm 4:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Treatment:</strong></td>
<td><strong>Treatment:</strong></td>
<td><strong>Treatment:</strong></td>
<td><strong>Treatment:</strong></td>
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<td><strong>Sample size:</strong></td>
<td><strong>Sample size:</strong></td>
<td><strong>Sample size:</strong></td>
</tr>
<tr>
<td><strong>No. analysed</strong></td>
<td><strong>No. analysed</strong></td>
<td><strong>No. analysed</strong></td>
<td><strong>No. analysed</strong></td>
</tr>
<tr>
<td><strong>With outcome:</strong></td>
<td><strong>With outcome:</strong></td>
<td><strong>With outcome:</strong></td>
<td><strong>With outcome:</strong></td>
</tr>
<tr>
<td><strong>Without outcome:</strong></td>
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<td><strong>Primary outcome?</strong></td>
<td><strong>Primary outcome?</strong></td>
<td><strong>Primary outcome?</strong></td>
</tr>
</tbody>
</table>

### 3.14
Record the basic data for each IMPORTANT outcome in the study. If there are more than four, not data for additional outcomes at the bottom of the page.

<table>
<thead>
<tr>
<th>Outcome 1:</th>
<th>Outcome 2:</th>
<th>Outcome 3:</th>
<th>Outcome 4:</th>
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<tbody>
<tr>
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<td><strong>Value:</strong></td>
<td><strong>Value:</strong></td>
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<td><strong>Measure:</strong></td>
<td><strong>Measure:</strong></td>
</tr>
<tr>
<td><strong>P value</strong></td>
<td><strong>P value</strong></td>
<td><strong>P value</strong></td>
<td><strong>P value</strong></td>
</tr>
<tr>
<td><strong>Upper CI</strong></td>
<td><strong>Upper CI</strong></td>
<td><strong>Upper CI</strong></td>
<td><strong>Upper CI</strong></td>
</tr>
<tr>
<td><strong>Lower CI</strong></td>
<td><strong>Lower CI</strong></td>
<td><strong>Lower CI</strong></td>
<td><strong>Lower CI</strong></td>
</tr>
<tr>
<td><strong>Primary outcome?</strong></td>
<td><strong>Primary outcome?</strong></td>
<td><strong>Primary outcome?</strong></td>
<td><strong>Primary outcome?</strong></td>
</tr>
</tbody>
</table>

### 3.15
**Notes.** Summarise the authors conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question. *(Much of this is likely to be contributed by GDG members).*
APPENDIX E

Levels of evidence and grades of recommendation

LEVELS OF EVIDENCE

1 ** High quality meta analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
1 + Well conducted meta analyses, systematic reviews of RCTs, or RCTs with a low risk of bias
1 - Meta analyses, systematic reviews of RCTs, or RCTs with a high risk of bias
2 ** High quality systematic reviews of case-control or cohort or studies
High quality case-control or cohort studies with a very low risk of confounding, bias, or chance and a high probability that the relationship is causal
2 + Well conducted case control or cohort studies with a low risk of confounding, bias, or chance and a moderate probability that the relationship is causal
2 - Case control or cohort studies with a high risk of confounding, bias, or chance and a significant risk that the relationship is not causal
3 Non-analytic studies, e.g. case reports, case series
4 Expert opinion

GRADES OF RECOMMENDATION

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>At least one meta analysis, systematic review, or RCT rated as 1 **, and directly applicable to the target population; or A systematic review of RCTs or a body of evidence consisting principally of studies rated as 1 +, directly applicable to the target population, and demonstrating overall consistency of results</td>
</tr>
<tr>
<td>B</td>
<td>A body of evidence including studies rated as 2 **, directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1 ** or 1 +</td>
</tr>
<tr>
<td>C</td>
<td>A body of evidence including studies rated as 2 +, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2 **</td>
</tr>
<tr>
<td>D</td>
<td>Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2 +</td>
</tr>
</tbody>
</table>
APPENDIX F

Communication Flow Chart

Forming Interest Group

Getting Approval from NO and DICs

Getting Approval from SNO

Forming PU Team

Communicating with Nurses

Communicating with HCAs

Communicating with Doctors

Communicating with Relatives and/or Patients
APPENDIX G

Turning Chart

<table>
<thead>
<tr>
<th>Time</th>
<th>Position</th>
<th>*Any Pressure Ulcer(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>

Patient’s Label

Date: ____________________

* Please put a tick on the appropriate box provided.

** Use ‘Pressure Ulcer Chart’ if pressure ulcer(s) is/are noted.
APPENDIX H

Pressure Ulcer Chart

<table>
<thead>
<tr>
<th>Pressure Ulcer(s)</th>
<th>Location</th>
<th>*Severity (Stage 1-4)</th>
<th>Size (cm x cm x cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

* Pressure ulcer(s) is/are classified using the EPUAP classification system.

Number of pressure ulcer(s) noted: __________

App/Appendix H Pressure Ulcer Chart

Patient’s Label

Review Date: __________________
* Please assign a number to each pressure ulcer.

** Mark the pressure ulcer(s) using a red ball pen.
APPENDIX I

Questionnaire

This questionnaire is to collect your opinions and indicate your satisfactory level to the implementation of the evidence-based repositioning guidelines in ward level. The collected data will be used for evaluation ONLY. Personal information will not be required.

Please circle the most appropriate answer. All questions must be answered.

1. Both nurses and healthcare assistants are competent and skillful to turn patients.

   Fully agreed   Agreed   Neutral   Disagreed   Disagreed completely

2. The intervention is useful to prevent pressure ulcer(s) in elderly patients.

   Fully agreed   Agreed   Neutral   Disagreed   Disagreed completely

3. The patient feel comfortable lying in the 30° tilt.

   Fully agreed   Agreed   Neutral   Disagreed   Disagreed completely

4. The 30° cushion is adequate to support the patient’s back.

   Fully agreed   Agreed   Neutral   Disagreed   Disagreed completely
5. The turning interval is appropriate and acceptable.

<table>
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<th>Fully agreed</th>
<th>Agreed</th>
<th>Neutral</th>
<th>Disagreed</th>
<th>Disagreed completely</th>
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</thead>
</table>

6. Overall, you feel satisfied with the intervention provided.

<table>
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<th>Very satisfied</th>
<th>Satisfied</th>
<th>Neutral</th>
<th>dissatisfied</th>
<th>Very dissatisfied</th>
</tr>
</thead>
</table>

Please give your comment(s) in the box provided (if any).
References


support surfaces: results of the prevention of pressure ulcers study. *Advances in Skin & Wound Care, 16*(6), 317-327.


