The position therapy in elderly people at risk of developing pressure injuries

Rita Ferreira¹, Maria Margarida Goes², Henrique Oliveira³, João Vítor Vieira⁴, Margarida Santos⁵

¹Hospital Beatriz Ângelo, Loures, Portugal
²Polytechnic Institute of Beja, Beja, Portugal
³Telecommunications Institute, Lisbon, Portugal
⁴Polytechnic Institute of Beja, Beja, Portugal
⁵Salt Clinic Center, Póvoa de Varzim, Portugal

hjmo@lx.it.pt

Abstract: Pressure injuries (PI) are a major public health problem, as they significantly reduce the quality of life of elderly people. On the other hand, they increase costs and burdens in health services. Nursing interventions contribute to the development and implementation of preventive strategies to reduce all these negative impacts. **Objective:** To identify the contribution of position therapy to safe care in elderly people at risk of developing PI. **Methodology:** The methodology used was based on an Integrative Literature Review (ILR), which included the formulation of an initial research question, research in scientific databases, analysis and interpretation of selected articles, as well as the synthesis and presentation of the results obtained. For the selection of articles and formulation of the research question, the PI[C]OD methodology was used. **Results:** Once the methodology was applied, a final set comprising 7 studies was obtained, which suggest that there is scientific evidence that repositioning therapy, as well as automatic repositioning systems, contribute to the prevention of PI development. **Conclusion:** Based on the scientific evidence found in this research, the practice of position therapy prevents PI in the elderly and, consequently, promotes their comfort and quality of life. It also contributes to lower health care costs.

**Keywords:** Elderly, Nursing Care, Pressure Injury, Position Therapy, Prevention.

1 Introduction

The Portuguese population is characterized by an accentuated aging, associated with an increased vulnerability to morbidity and, consequently, to functional dependence. The Pressure Injuries (PI) are prevalent in the elderly, generating a negative impact on the quality of life of individuals and their families, as well as on health care services. The "National Plan for the Safety of Patients 2015-2020" established as a goal, for the year 2020, that 95% of the institutions responsible for providing health care have implemented strategies for evaluation, prevention and treatment of PI, aiming to reduce...
by 50% the number of PI, compared to the year 2014, for all the entities belonging to the National Health System (NHS) [1]. Nursing is a profession at the service of a health policy that contributes to the design of new interventions, through a "diagnostic evaluation" and subsequent "nursing interventions evaluation" in a continuous process, which makes it possible to measure systematically and throughout the entire care process, the results sensitive to nursing care, considered as health outcomes whenever there is a recovery of functional capacity of the person [2].

PI are characterized by damage to the skin or in its adjacent tissues, mostly in bony prominences, caused by an inadequate compression and/or perfusion forces. Slip/torsion and friction forces are also considered causes of PI [5,16]. Tissue rupture may be originated by the constant abrupt supply of blood flow to tissues when there is a pressure relief. However, when there is no such relief for a long period of time, the cells may end up dying due to capillaries occlusion [7]. Regarding the sliding force, this causes the tissues to move but the skeleton remains in the same place, causing tissue deformation and damage on the blood vessels. The frictional force is when the force mentioned above is exceeded and the upper layers of epithelial cells are eliminated by scraping. The most common areas where PI occur are the sacrococcygeal zone, the perineal zone due to ischial tuberosities, trochanters, calcaneus, and elbows [5].

The risk factors of these PI may be the pressures as mentioned above, age, perfusion and oxygenation, sensory perception, nutrition, skin conditions, body temperature, spinal cord injuries, decreased collagen, hemoglobin and hematocrit, smoking and other types of pathologies [3].

PI can be classified into: (i) "PI stage 1"; (ii) "PI stage 2"; (iii) "PI stage 3"; (iv) "PI stage 4"; (v) "PI without stage"; (vi) "Deep PI of fabrics". In the "PI stage 1", there is still no damage to the integrity of the skin, but there is a non-bleachable erythema in a specific area. In the "PI stage 2" there is a partial loss of the dermis, in which its area of tissue damage is a viable pink, moist tissue and without devitalized tissue or a serous blister. In the "PI stage 3" there is a complete loss of the skin integrity, but without the exposure of bones, tendons, joints, or muscles. Regarding "PI stage 4", there is already exposed or palpable muscles, tendons, joints and/or bones. The "PI without stage" are distinguished from the others as it presents a total skin loss, but without visualization of the extent of tissue damage. This happens due to devitalized and/or necrosed tissue that covers the wound. As such, its degree can only be defined after cleaning wound tissues. Finally, the "deep tissue Pls" present the skin intact or not with a dark, painful and swollen area [8].

For PI prevention it is important to know the needs of an individual before implementing any intervention. In Portugal, the Braden Scale is used to evaluate the risk of developing PI. Among the various prevention interventions, are: skin evaluation and care; nutritional evaluation and support; positioning and support surfaces [6].

This Integrative Literature Review is intended to focus on position therapy for PI prevention. It is characterized by the alternation of positions of an individual, executed by the individual himself or with the help of other people or material resources. Sometimes it may be necessary to be fully positioned by someone else [3].

The frequency of the repositioning should be selected according to the level of the activity, mobility and capacity of the individual. If the individual is not on a support
surface, he or she should be repositioned more frequently [3]. To help with this practice, methods can be implemented that serve as reminders of the need to reposition the person [8].

According to the guidelines proposed by EPUAP, NPIAP and PPPIA in 2019, the recommended position is lateralization with a 30° slope compared to lateralization at 90°. In the lateral position with a slant of 30°, the joints are positioned in a natural way, which is beneficial since it avoids unnecessary stretching of the muscles [8]. Furthermore, in this position, all body segments are aligned and the pressure in areas of bone prominence decreases significantly [17].

When positioning an individual, the use of foam pads to raise the heels should be considered [9], as well as some type of prophylactic dressing material [8]. When sitting in a chair, it is important to tilt the chair slightly, to be in harmony with the heel lift [8].

The support surfaces work as an aid for nurses to optimize the nursing care. Among the different support surfaces available today, one should consider using a high specification, single-layer reactive foam mattress, rather than a low-density foam mattress. In addition, the use of an overlay mattress, such as an alternating pressure mattress [8], can also be considered. They work by eliminating the pressure in areas located for cyclic periods, having a sensor responsible for assessing the pressure of the capillary occlusion, so that the surface pressure remains at lower values [3]. For positioning in the chair, a pressure redistribution cushion should be used, especially when the person is unable to position by itself to relieve pressure in an autonomous way [8].

2 Objective

To identify the nursing care sensitive outcomes, resulting from the position therapy for a safe care, in elderly people with risk of developing PI.

3 Methods

3.1 Ethical aspects

No opinion was requested from the Ethics Committee as this was a secondary study. In the formulation of the problem there was the concern with the respect for the principles of clarity, objectivity, and precision, so that the results are assumed as an added value for the nursing care in the position therapy to the elderly person in the prevention of PI. The analysis of data extracted from the selected studies was developed in harmony with the principle of respect for the results obtained in this research and by these researchers. The reference of the authors followed the standards of good academic and scientific practices.

3.2 Study type

The clinical practice of the nurse is always based on the most current scientific evidence, and this is what turns nursing care into quality care. This evidence-based practice
encompasses the entire process of collecting, interpreting, evaluating, and implementing clinical data that are important for the decision-making by professionals [11].

This research work consists of an Integrative Literature Review, based on the need to implement quality care according to the most recent scientific evidence. It comprises the following steps: i) identification of the research question; ii) definition of inclusion and exclusion criteria for studies; iii) selection of studies according to the defined criteria; iv) analysis of the selected articles; v) presentation and discussion of the results; and, vi) synthesis of the scientific knowledge acquired.

3.3 Methodological procedures

Following the objective outlined above, which served as a common thread for the Integrative Literature Review, a research question was formulated using the P[I(C)D] methodology, being (P) the target population, (I) the type of intervention, (C) the comparisons, (O) the outcomes and (D) the type of study (design). Based on this structure, the following guiding question was elaborated: What are the nursing intervention outcomes (Results) of nursing care of position therapy (Intervention) of the elderly person with wound/injury by pressure (Population)?

The research strategy adopted included the search of articles published in Portuguese, English and Spanish languages, which took place during May 2020, in the CINAHL Complete database through the EBSCOhost platform. Specific descriptors were used, which were connected to the Boolean operators "AND" and "OR" in the following arrangement and in the following order: "pressure ulcer" or "bed sores" or "bedsore" or "decubitus ulcer" or "pressure sore" and "positioning" and "wound healing or prevention".

In order to limit the search, the following inclusion criteria were selected: (i) full text; (ii) time period between 2010 and 2020; (iii) English, Spanish and Portuguese languages; (iv) publications of academic journals with peer review and; (v) population over 65 years. The following exclusion criteria was adopted: articles in duplicate and those with a population under 65 years of age that were not aligned with the objective of this research study.

After this research, a total of 80 articles were obtained. However, 24 of them were duplicated and, as such, were excluded, resulting in a total of 56. With the latter, the respective selection was made in two stages. First by reading the titles, abstracts and keywords, and then by reading them in full. At the end of the first stage there were 25 articles and at the end of the second stage, only 7 articles remain, which met all the criteria considered for data collection and analysis. These research steps are shown in Fig. 1.
4 Results

This Integrative Literature Review resulted in 7 articles. The levels of evidence listed in the following in Table 1 were identified through a hierarchical system of scientific evidence advocated by the Joanna Briggs Institute [19], which considers the following levels of evidence:

- Level 1 - Experimental Designs;
- Level 2 - Quasi-experimental Designs;
- Level 3 - Observational - Analytic Designs;
- Level 4 - Observational - Descriptive Studies;
- Level 5 - Expert Opinion and Bench Research.
<table>
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<th>Authors/Method/level of evidence</th>
<th>Objectives</th>
<th>Results</th>
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<td>Bergstrom, N., Horn, S. D., Rapp, M. P., Stern, A., Barrett, R. and Watkiss, M. (2013) [4].</td>
<td>-Determine the appropriate frequency of repositioning of elderly people in homes at risk of developing pressure injury in the presence of high-density foam mattresses by comparing repositioning every 2 hours, every 3 hours and every 4 hours.</td>
<td>-In this study, the authors found a low incidence of PI (2.0%) in people at moderate and high risk distributed among the three repositioning groups. There were no significant differences between the participants of moderate and high risk, as well as no differences between the three repositioning groups. Stage 3 and 4 PI were not observed. However, in previous studies there was presence of these injuries, which leads the authors to conclude that electric beds, spring mattresses and overlapping surfaces associated with long periods of time do not prevent PI. The authors also add that the reduced incidence of PI can be explained by the combination of high-density foam mattresses, repositioning and documentation. The latter was considered essential to remind nurses to implement heel elevation, observe and describe the skin, as well as to take care of incontinence episodes. With this study it was also possible to verify, due to the reduced PI incidence, that with the use of a high-density foam mattress it is allowed to increase the repositioning period of time, without increasing the number of new Injury in the individual.</td>
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<td>Moore, Z., Cowman, S. and Conroy, R. M. (2011) [15].</td>
<td>-To compare the incidence of PI in elderly people using a repositioning every 6 hours with lateralization at 90º (control group) and a repositioning every 3 hours with lateralization at 30º (experimental group).</td>
<td>-In this study the authors identified among the different components of the Braden Scale, that mobility and activity were the main responsible for the development of PI. -The incidence of PI in the control group was higher (11%) than the incidence in the experimental group (3%). Thus, it was possible for the authors to conclude that positioning with a 30º slope every 3 hours is more effective in reducing PI. These results were in line with previous studies. It should be noted that for the support surface used in these individuals, an alternating pressure device was used for chairs of 99% of the population and beds of 86% of the population in the control group and 96% of the population in the experimental group.</td>
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<td>Rich, S. E., Margolis, D., Shardell, M., Hawkes, W. G., Miller, R. R., Amr, S. and Baumgarten, M. (2010) [18].</td>
<td>-To compare the benefit of repositioning every 2 hours and repositioning at intervals longer than 2 hours in elderly patients undergoing hip fracture surgery, bedridden.</td>
<td>-In this study the authors found that repositioning every 2 hours in elderly patients with hip fractures does not effectively prevent PI. When compared with other studies, it was possible to realize that the ideal repositioning interval is inconclusive and that it should be selected according to the mobility characteristics and general clinical status of the patients. -The risk of developing PI identified by the Braden Scale may also have influenced the effect of repositioning in this study, as high-risk patients repositioned every 2 hours during visits of the first 5 days of hospitalization had a lower incidence of PI compared to those repositioned less frequently. Low risk patients had a higher incidence of PI repositioning every 2 hours during the first 5 days of hospital stay compared to those repositioned less frequently. These differences were not very significant, so more studies focused on this topic are needed. -In addition, the authors also found that the adherence of nurses to the most frequent repositioning was not much, because only in 53% of the days the repositioning every 2 hours was accomplished. In patients with pressure redistribution support surfaces there was a higher prevalence of repositioning compared to patients on standard surfaces. Thus, the authors could verify that the use of pressure redistribution mattresses allow reminding professionals of the need for more frequent repositioning.</td>
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Table 1. Results of the Integrative Literature Review.

**Method:** Systematic Literature Review (RSL)

**Level of Evidence:** 1

- To identify the most appropriate PI prevention strategies in a hospital context through the analysis of 26 studies, with the following inclusion criteria: publications during the period of 2009 to December 7, 2018, regarding the effectiveness of PI prevention; cross-sectional, prospective and retrospective, comparative, pre-test and post-test studies, almost experimental, experimental, RCT and studies with mixed design; studies with incidence of PI; studies with a population of adults admitted to hospital wards and acute units; language in English, French, Portuguese or Spanish.

- The authors found that for the support surfaces, the low-pressure air mattresses and the alternating pressure air mattresses were more effective in preventing PI compared to the overlaps of alternating pressure air mattresses and add that the duration and intensity of the cycle of the support surfaces have a great influence on PI prevention. In addition, they concluded that dynamic surfaces, such as electric beds and hybrid air mattresses, reduce PI incidence more than standard hospital mattresses. Multi-phase alternating pressure air mattresses are effective for patients in geriatric wards and acute medicine, but for individuals in intensive care units the most effective are alternating pressure air mattresses. The authors state that it is difficult to define the ideal support surface because the development of PI depends on a set of associated risk factors. Therefore, they state that these should be selected based on the individual characteristics and needs of the users.

- Regarding the frequency of positioning, they found in some studies that positioning every two hours in association with pressure mapping technological devices can decrease the incidence of PI and consequently increase the comfort of individuals. The devices for mapping the heads of patients detect the pressures on the entire body surface and act as warnings, of the need for repositioning, for nurses. However, they have also found in some studies that high frequency of positioning does not decrease the incidence of PI, but increases the adverse effects associated with clinical devices, as well as increases the workload of health professionals. The evaluation of the degree of position with an automatic positioning system helps to prevent PI. Additionally, these devices perform pressure relief in the sacrum area, control of skin temperature and humidity, prevention of sliding and preservation of the position with an angle of 30°. Also, these devices optimize the nursing team in the sense that it reduces the need of less personnel to perform this therapy.
| Meyer, D., Hecke, A. V., Varhaeghe, S. and Beeckman, D. (2019) [14]. | -Compare the benefit between: experimental group 1 (application of a PROTECT - tool that evaluates the frequency and type of positioning required according to the individuals' risk factors and use of a bed positioning system); experimental group 2 (use of a bed positioning system, selection of the frequency and type of positioning according to the usual protocol); and, control group (positioning and frequency according to the usual protocols). | -In this study the authors found that when individuals were in bed, they were more often repositioned than sitting on chairs. The repositioning protocol resulting from the use of the PROTECT tool recommended that individuals should not be seated more than twice 4 hours per day and in patients with Injury or erythema in the sacrococcygeal zone up to 3 times 1 hour per day. However, these recommendations were based on literature reviews and expert opinions, and the authors may conclude that these cares can be difficult to integrate in practice. -The use of the bed repositioning system managed to maintain the lateral positions from 30 to 45°, but there was no significant effect in reducing the pressure in the sacral zone. The authors could also see that this system provides comfort to the users and reduces the work of the nurses. -Regarding the costs of the interventions, in the control group these were higher. This was due to the fact that in this group the repositioning time was longer. These results were in accordance with other studies. |
| Method: RCT | Level of Evidence: 1 | |
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| Lozano-Montoya, I., Vélez-Díaz-Pallarés, M., Abraha, I., Cherubini, A., Soiza, R. L., O'Mahony, D., Montero-Errasquín, B., Correa-Pérez, A. and Cruz-Jentoft, A. J. (2015) [12]. | -Identify the most appropriate non-pharmacological strategies for the prevention of PI. | -In this study it was found that pressure mattresses alternatively reduce the incidence of PI compared to standard foam mattresses. Constant low-pressure mattresses proved to be more suitable compared to standard foam mattresses for PI prevention. However, no differences were found between alternating pressure mattresses and constant low-pressure mattresses. The likelihood of PI risk reduction by medical sheep skin is like that of constant low-pressure mattresses. In this way, the authors were able to conclude that new technology mattresses are more suitable than a standard hospital mattress. -These results were in line with guidelines and recommendations from other institutions. -Regarding repositioning, the authors concluded that there was no consensus among studies on the frequency and ideal techniques needed to prevent PI. |
| Method: RSL | Level of Evidence: 1 | |
| || |

| Mateo, M. M. and Herrera, D. G. (2018) [13]. | -Identify the support surfaces and repositioning that best prevent PI in the elderly, through the analysis of 3 articles. | -The authors concluded that repositioning should be done every 3 hours or every 4 hours, instead of repositioning every 2 hours. By increasing the repositioning time, it is possible to prevent PI, promote sleep and quality of life of the elderly and reduce the burden of the Nursing team. -They also found that the inclination of the positioning of individuals in bed should be 30° as opposed to 90°. -Regarding the support surfaces, they found that the most advanced in science and technology are better for PI prevention than the standard hospital mattress. Although the pressure decreases on improved surfaces it is necessary to continue to reposition manually for PI prevention. |
| Method: RSL | Level of Evidence: 1 | |
5 Discussion

This Integrative Literature Review summarizes the contributions of position therapy addressing the PI prevention in the elderly population. Of the 7 studies analyzed, there was a general agreement among authors regarding the frequency and type of positioning, but with slight disagreements in the selection of support surfaces.

According to Lozano-Montoya et al. [12], the adequate frequency and technique of repositioning for PI prevention proved to be inconclusive. However, in the trial done by Moore et al. [15] the lateral position with a 30° slope every 3 hours was identified as the most effective in PI prevention. Mateo and Herrera [13] corroborated this idea, stating that repositioning every 3 hours or 4 hours with a 30° slope is ideal to avoid tissue damage and, at the same time, promote a more peaceful sleep.

Regarding the repositioning of individuals every 2 hours, this procedure was not proven to be beneficial for the prevention of PI in the elderly with limited activity. Rich et al. [18] were responsible for corroborating this idea, using as population the elderly with hip fracture. For Gaspar et al. [10], this repositioning is inadequate for prevention of PI, and may even potentiate the opposite effect. Furthermore, it increases the burden on the nursing team. In the study by Rich et al. [18], it was found that nurses adhere less to position therapy in the presence of very frequent repositioning. This author also concluded that the repositioning interval should be selected according to the mobility characteristics and general clinical status of the individuals.

Regarding the support surfaces, Lozano-Montoya et al. [12] found that the more advanced they are, provide a more effective PI prevention compared to standard hospital mattresses. Mateo and Herrera [13] proved the same idea in their study, adding that despite the presence of these improved surfaces it is essential to maintain repositioning by nurses.

In a study developed by Bergstrom et al. [4] the use of high-density foam mattresses proved the possibility of a longer repositioning period without increasing PI incidence. However, the use of electric beds or spring mattresses, associated with long periods of time in people with limited activity, may lead to the development of PI. In the study of Gaspar et al. [10], the authors concluded that even so, electric beds are more effective in preventing injuries compared to the standard hospital mattresses. Alternate pressure mattresses proved to be very effective in preventing PI in the studies published by Gaspar et al. [10] and Lozano-Montoya et al. [12]. The first authors state that this prevention is often influenced by the duration and intensity of the surface cycles. Although in the study of Rich et al. [18] there is no reference to PI prevention associated with alternating pressure mattresses, these worked as a reminder to professionals to reposition more frequently. The study developed by Gaspar et al. [10] also identified the use of pressure mapping devices with patients as a repositioning reminder. They work as alerts of the need for patient repositioning when pressure is high, being a fundamental aid for nurses.

Another alternative that makes nurses increase adherence to repositioning is the automatic positioning systems. These manage to maintain the position between 30 and
45°, increase comfort and decrease the costs of the nursing team, which consequently reduces costs in health services. The same is justified due to the manual positioning, in comparison with the automatic one, to demand more nurses available for that and more time spent by them on doing the positioning. These conclusions were verified in a study developed by Meyer et al. [14]. By analogy, the systematic review of Gaspar et al. [10] confirmed these results, adding that their prevention of injuries is related to maintaining the position at the desired angle, preventing sliding forces.

Furthermore, in the same study it was proved that the automatic positioning system allows a better control of skin temperature and humidity.

The support surfaces, together with the repositioning performed by the nurses and the clinical records are essential for PI prevention. The records additionally work as a reminder of all the care needed to be provided. This was the case in the Bergstrom et al. trial [4].

In this way it is possible to verify the acquisition of health outcomes resulting from position therapy. It prevents the development of PI, promotes the comfort of 55 individuals vulnerable to this problem and, above all, improves the quality of life of the elderly. Moreover, it optimizes nursing teams, decreases costs in health services.

6 Study limitations

The scientific publishing developed allowed the identification of the health outcomes of the position therapy to the elderly person at risk of developing PI, constituting an important contribution to the reflection on this problem, aiming at the implementation of professional intervention strategies in favor of the person's safety and compatible with excellence care. The therapy in question proved to be more economical in health resources and useful in promoting the quality of life of the elderly with limited activity. Future studies should be conducted adopting an empirical approach, to verify the effect of a repositioning program on elderly people at risk of developing PI. This experimental approach, involving the control triad, randomization and manipulation of the independent variable (repositioning program, with a structured protocol) is a methodological quality assurance of the study.

7 Conclusions

After analyzing the results and discussing them it was possible to conclude that the most appropriate repositioning for PI prevention is performed every 3 hours, which can vary between lateral positions with a 30° of slant. However, it is always necessary that nurses take into consideration the needs of individuals and develop customized repositioning plans.

Another conclusion identified in this review was that the use of improved support surfaces, such as alternating pressure mattresses and high-density foam mattresses, becomes essential to increase repositioning time and, consequently, optimize the work of nursing teams.
Automatic bed repositioning systems should be increasingly implemented in health services because they bring long-term benefits to bedridden elderly and nursing care management. These benefits provided to individuals with limited self-repositioning are characterized by the control of humidity and skin temperature, as well as by the reduction of slipping forces, which are fundamental in preventing PI. In relations to the nurses, they become more available for other equally important care, as the time taken for repositioning is less with these devices.

Taking all these aspects into consideration, this Integrative Literature Review was able to answer both the objective and the PICO question initially proposed. The position therapy has proven to be quite useful in promoting the quality of life of the elderly with limited capability of self-repositioning and more economical in health resources.

References


