

# Evaluation of the main research article health and social care essay



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Abstract. Pressure ulcers remain prevalent in all hospitals wards on a global scale. The utilisation of pressure relieving mattresses in hospitals may serve as a useful intervention due to the proposition of reducing the incidence rate of pressure ulcers. Literature reviews supporting the phenomenon of alternative pressure air mattresses being a preferred evidence based intervention for pressure ulceration prevention in comparison to hospital used foam mattresses. Due to the specificity of the topic, studies between 2005 and 2013 relating to the topic were reviewed, subsequently only relevant, published and English written studies were included. Any others studies that deviated from this, were automatically excluded. The studies reviewed were accessed via the database search engines CINAHL via EBSCO, Cochrane Collaboration, Google Scholar, BMJ and PubMed. Studies founded through these databases remained relevant due to the differential investigations and techniques utilised in specific studies, whilst conclusions continued to promote of pressure relieving mattresses as a superior and effective preventative device for adults acquiring pressure ulcers. However, before implementing the use of pressure relieving mattresses holistic body morphology should be considered to optimise the prevention of pressure ulcers.

1. 0 Background

1. 1 Aim: To critically analyse and interpret literature that utilises alternating pressure air mattresses (APAM's) reduce ulcers more than the hospital used, standard foam mattresses (SFM's). This allowing for the establishment of a heightened evidence-base to be formulated for the prevention in pressure ulcerations, compared to the widely used standard foam mattresses. This allowing for further prevention of pressure ulcers in future.

1. 2 Purpose: The purpose of the study is to identify the proposition regarding pressure relieving mattresses leading to the reduction of pressure

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ulcerations and whether this is a valid and reliable statement of truth, potentially leading to better patient outcomes. Comparing this phenomenon of preventing pressure ulcers against the already ubiquitously used standard foam mattress.

1. 3 Scope: Due to the nature and content of the investigation, this inevitably must remain limited to academic use only. Subsequently, attempts appraised the reputable sources of Cochrane Collaboration (2013) to provide systematic reviews of evidence-based literature.

1. 4 Literature Search Review: The search for relevant, published and English written studies consisted of searches utilising a variety of terms from a methodological plan created prior to investigating the topic. This plan forming a chronological sequence to follow in regards to accessing, analysing and reviewing information through key areas of the research design, description of intervention, specific outcome measures, resolution and authors conclusion. Initially this allowed accessing database search engines that included; CINAHL via EBSCO, Cochrane Collaboration, Google Scholar, BMJ and PubMed to search relevant key terms. These various terms including; Adult, patients, hospital, mattresses, alternating pressure air mattresses, pressure air mattresses, different mattresses, foam mattresses, APAM's, SFM's, mattresses, hospital bed, foam bed, bed, pressure relief, pressure relieving mattresses, surfaces, pressure ulcers, pressure sores, pressure wounds, prevention, intervention, comparisons, studies, trails, reviews, reduction, risk and incidence. Due to the specific nature of the topic, many studies were excluded due to levels of irrelevant data. This including, differential mattress types to those being examined, those written in other languages or those with outdated publications that had the potential to alter conclusions of the literature review. The years in which publications were

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deemed to be within a justified, valid and relevant time-frame were between 2005 and 2013, only between these years were studies accessed or reviewed. When all aspects of the initial plan were covered and the unnecessary or irrelevant studies were excluded, this allowed for an appropriate evaluation of literature. 2. 0 Critical Review and Appraisal2. 1

Appraisal of literature: Pressure ulcers is a form of tissue injury, occurring as the result of ischemic tissue hypoxia. Pressure ulcers commonly presenting upon bony prominences where there is less subcutaneous fat, therefore less protection and its incidence resulting from the combination or mixture of; continuous unrelieved pressure, shear and or friction (Brown et al. 2010).

Pressure ulcers can be founded on patients of all ages from all medical specialities, with approximately four hundred thousand patients estimated to develop a pressure ulcer each year in hospital (Benbow, 2008). Many differential support surfaces have been implemented in attempts to relieve the pressure and reduce the risk of pressure ulceration, this has been completed via utilising differential mattresses in the hospital setting. These including standard foam filled mattresses found across a broad spectrum of hospitals, electronically powered to alternating pressure air mattresses that work by circulating air within them. (McInnes et al. 2011). With vast amounts of studies being conducted each year in order to reach best evidence based practice, patients continue to necessitate the most appropriate surface to prevent pressure ulcers, however with differing opinions, further research is required (Benbow, 2008). Provision of further evidence based studies will allow for the appropriateness depiction of the most effective support surface to prevent pressure ulcers (McInnes et al. 2011). This review evaluated the relevant clinical evidence supporting the utilisation of air-filled mattresses of <https://assignbuster.com/evaluation-of-the-main-research-article-health-and-social-care-essay/>

APAM's in contrast to SFM's for adults in the hospital setting. After encompassing an investigative and detailed literature search, five studies were elected that adequately befitted the criteria, being selected for this purpose. Four of these studies provided evidence between level two to four, whilst another providing level one evidence. Level 1 evidence was provided through the biophysical systematic review by Cullum et al. (2011). This review determining the most significant surfaces that aid in the reduction of pressure ulcers with a sample of 6875 individuals and included the use of APAM's and SFM's. Two RCT identified that APAM's were more effective at reducing pressure ulcers than SFM's. The strength of the study is that is from a renowned Cochrane study, that selected evidence from a large quantity (totalling 53) random control trails to fit their criteria. Furthermore these trials being single blinded, selective in reporting and allocation concealment. The study continued to maintain its strength through using qualitative methodology, using a hybrid and mixed triangulation method to analyse the sample with a subjective ideology of identifying the most effective support surface (Cullum et al. 2011). However a weakness was identified, the authors concluded that APAM's had varied success and were more favourable than SFM's for reducing pressure ulcers, stating that further research was required due to minor flaws in the final resulting of the study (Cullum et al. 2011). Level 2 evidence was provided by Vanderwee et al. (2005), identifying the use of APAM's to be successful in reducing the risk of pressure ulcers in comparison to foam mattresses. The researchers strengthened their research by using a randomised control trail with a large sample of 447 participants, this was further enhanced by placing participants to either an experimental or control group and blinded the participants during the study <https://assignbuster.com/evaluation-of-the-main-research-article-health-and-social-care-essay/>

for accurate results. The control group consisting of 225 patients were to lie on visco-elastic foam with 4 hourly turns. The experimental group consisting of 222 patients were to lie on an Alpha-X-Cell APAM. The research concluding that although their remained the risk of gaining a pressure ulcer their was less of a risk with the experimental group. however weaknesses in the research that determined APAM devices as being more effective supporting surface were identified by the authors in the conclusion, the authors claimed that further research was necessary and furthermore, due to the sample size being split into two groups, the results would also impact the conclusion by reducing the ability for the results to be generalised (Vanderwee et al. 2005). Level 3 evidence was provided by Ochs et al. (2005), which determined that APAM's were founded to be more effective than foam mattresses in an age care setting. The study used a retrospective observational design to investigate the effects differing supportive surfaces by observing the pressure ulcer healing rates, comparing three groups of mattresses. These groups consisting of; group one (replacement mattresses and static overlays), group 2 (constant low pressure mattresses, alternating pressure foam mattresses and group 3 (APAM's). The study revealed that APAM mattresses were the most superior and effective mattresses due to holding a greater healing potential than other groups, particularly in stage 3 and four ulcers and that this could be considered for optimising pressure relief for patients. Strengths of the study was the large sample size of 664 participants that were residing in long term care facilities that made strong relevance to geriatric patients with pressure ulcerations. There were benefits of the patients being single blinded and asked to utilise one of the three groups of different mattresses over a 14 day

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period whilst the study took place to allow for accurate results. The Measurements of the initial pressure ulcer surface area was collected as a baseline at the beginning of the trial and was collected once the 14 days were completed, using a Quantitative data collection device (Transana and Clan) determining the mean surface area range of the reduction in pressure ulcerations between the three groups of different support surfaces, by using this technological equipment would give accurate readings of the patients outcome further enhancing the strengths of the results. However the study also had numerous weaknesses, Firstly the study utilised a retrospective observational design rather than random control trials that are the preferred measure for evidenced based research, random controlled trials allows for blinding and concealment that prevent biased results (Styles, 2009). The authors of the study stated that only eligible residents were enrolled in the study and failed to state the selective criteria for those excluded, instead merely stating those with chronic wounds were included, this identifying poor reporting of the study and placing the research at high risk of bias. Furthermore, the authors failed to indicate what typified the criteria for a chronic wound, making no mention of either acute wounds or types of wound dressings used, due to the poor methodology of this study, the conclusion identified further research was essential (Ochs et al. 2005). Level 3 evidence was provided by Benbow (2008). This piece examining the differences in the risks of pressure ulcers, incidence rates and types of pressure ulcers. The review including the effective use of APAM's and SFM's, with strengths of Identifying the use of APAM's being effective at reducing the risk of pressure ulcerations through the citation of highly regarded systematic reviews.

Contrastingly the authors display many weaknesses by discussing the <https://assignbuster.com/evaluation-of-the-main-research-article-health-and-social-care-essay/>

utilisation of mattresses from an informative overview rather than its own systematic review, furthermore when discussing preferred equipment choices, recommendations are made to utilise hospital foam mattresses, prior to utilising high-tech support of APAM's due to the levels of inconclusive evidence on the topic. Hence by the authors being able to find firm conclusions from other reviews, the authors concluding that 'physiological factors' are how nurses determine the correct support surface rather than identifying the most effective mattress and the advancements in APAM usage needs for further investigation (Benbow, 2008, pp. 835). Level 4 evidence was provided through a systematic review by Beghè et al. (2005). This study was conducted to assess the most effective surface for reducing pressure ulcers. This study had a vast strength of including 18 RCT's of a large sample of 1309 participants, however the weakness of the study was that both published and unpublished RCT's from any patient group or setting were utilised (Beghè et al. 2005). The authors noted that 3 RCT's favoured APAM's over foam alternatives, however, due to the methodological limitations, poor reporting and lack of variance data, the authors concluded that the evidence base for the review was weak and further research was required to determine a generalised outcome (Beghè et al. 2005). 3. 0

Evaluation of the Main Research Article3. 1 The Study overview: This biophysical study developed by Cullum et al. (2011) was established to measure whether pressure relieving mattresses were more effective than standard hospital support surfaces. This study covering a range of mattresses to ensure the best surface for the reduction of pressure ulcers could be identified, including; APAM's (Huntleigh APAM and Alpha-X-Cell),

SFM's (Tempur) and also other mattresses were included in some trials  
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(Cullum et al. 2011). Study's were identified by the authors by searching the specialized trials register of the Cochrane Wounds Collaboration before 2004, allowing the authors to access 53 RCT's. RCT's being the best quality standard of evidence based by viewing clinical outcomes that are measured by two samples identifying a problem or measuring effectiveness (Styles et al. 2010). The authors fitting within their selection criteria of both allocation and blinding, without blinding trial participants may have attempted to achieve certain results known as the Hawthorne Effect and allocation concealment being the randomisation of participants to ensure the sample of 6875 participants being measured for the most effective surface is both valid and unbiased in the final results (Styles, 2009). There were minor issues with the methodology that resulted in 21 RCT's that were founded having poorly documented or inadequate allocation concealment and only 10 RCT's reported binding. Due to the size of the study, data was collected from hospital setting ranging from Intensive care wards, emergency wards and general hospital wards, spanning across the UK, Canada and the USA. The numerous countries under review may be beneficial by gathering data from a broad spectrum of hospital settings on an international scale, however the numerous wards may also have the potential to loose the relevance of how APAM's effect geriatric patients in the prevention of pressure ulcers. The median sample size for each study consisted of around 100 participants, this quantity may allow generalised results of the outcomes by maximising the sample to perceive clinical results especially the RCT's of 409 participants (Styles et al. 2010) This study investigated and founded APAM's were better than SFM for reducing pressure ulcers, although the authors noted that further investigation may need to involve the comparisons of clinical

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effectiveness. (Cullum et al. 2011). 3. 2 Type of article and level of evidence:

According to the Joanna Briggs Institute (2008), this study has level 1

evidence and is a qualitative paper. 3. 3 The Study Design: This study was

extensively researched by validated methods aimed at measuring which

surface would reduce the incidence of pressure ulcers by comparing each

surface to one another to determining the most effective. The study included

different pressure relieving surfaces including, high-tech APAM's (Huntleigh

APAM and Alpha-X-Cell), SFM's (Tempur), low-tech CLP mattresses, AFM's of

gel, fibre, air, water or bead filled mattresses and in some trials, sheepskin

overlays, cushions and other surfaces (Cullum et al. 2011). The types of

studies incorporated in this study included RCT's and some quasi-

randomised trials that were clinical and objectively compared already

existing support surfaces, having a measurable outcomes that related to

either the incidence or severity of pressure ulcerations occurring. Studies

utilised in the systematic review were founded between between 1982 and

December 2010. For the Authors to prevent the occurrence of the Hawthorn

effect blinding was part of the selection criteria along with allocation

concealment to prevent bias, however there were some studies that had

poor reporting of blinding and allocation concealment that placed some of

the results at risk of bias. In all, 53 RCT's which were selected for review,

however 8 RCT's were later founded with a risk of bias, impinging on results

(Cullum et al. 2011). Studies were selected from countries that reported high

prevalences of pressure ulcers in hospitals, these included, Canada, The

United Kingdom and the USA , all settings that showed a pressure ulcer

incidence were included in the meta-analysis, commonly settings were

amongst hospitals from Intensive care wards, emergency wards and general

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hospital wards. Furthermore due to the number of RCT's included in the study the sample size accumulated to 6875, these participants included anyone who was deemed at risk of developing a pressure ulcer in a hospital setting. This allowing for the result to be generalised in the study. These participants were then measured for a primary outcome of the rate of new pressure ulcers and the grade of the new pressure from one to four, evaluated by either interface pressure from the body in contact with the support surface or by using a grading systems such as the Braden scale or the EPUAP classification system. The Braden Scale and the EPUAP classifying system holding similar characteristics of, grade 1 as persistent discolouration's of the skin, grade 2 as partial thickness skin loss, grade 3 as full thickness skin loss and grade 4 to be of full thickness skin loss with subsequent tissue necrosis that extended to bones, ligaments and joints (Schoonhoven et al. 2007). Although the trials accepted anyone at risk, 27 trails had pre-existing ulcers, 8 trails had grade one as their baseline, 1 trail had grade 4 ulcerations, 16 trials had no baseline or were unclear leaving a potential for bias. However any risks of bias found in the studies were discussed in the methodology by the researchers. The study between the use of APAM's in comparison to standard foam mattresses included 409 participants from 2 RCT's using a fixed model that divided patients at high risk of pressure ulcers to either the experimental APAM group (221 participants) or the control SFM group (188 participants) to determine the effectiveness by relative risk ratio's (Cullum et al. 2011). Although there was a significant reduction in pressure ulcers forming on patients that used APAM's, the authors of the research could only favour these results, however indicating that writer of the original study poorly indicated allocation and <https://assignbuster.com/evaluation-of-the-main-research-article-health-and-social-care-essay/>

concealment or blinded outcomes, therefore the results were at high risk of bias by the lack of information. This study was conducted through the Cochrane wound care collaboration independently with the use of other Cochrane studies, the methodology to selecting appropriate studies from the Authors was poor, hence its suggestion of further research is depicted in the conclusion of the study, however the favourability leans towards APAM's for being more superior than SFM's and more research will be conducted in future (Cullum et al. 2011).

### 3. 4 Statistical Analysis: Using Raosoftware

(2004) allowed for the assessment of the appropriate sample size for the study. With a confidence interval of 95% and the margin for error being 5% and the response distribution was 50%. The study of the entire systematic review consisted of 6875 participants, the sample for the 2 RCT's for comparing APAM's to SFM's consisted of 409 participants. These figures were well above the minimum recommended sample size of 377 patients. This allowed researches to have accurate outcomes and incidence rates, allowing to form generalised results (Raosoftware 2004). For each trial, researchers also calculated the relative risk of patients developing ulcers in the outcome and the P value was only viewed as significantly significant if P was  $<0.10$ . Validity of the study was promoted through the use of scaling systems of either the Braden Scale or the EPUAP classifying system to assess the participants baseline before and after the study, although all participants were deemed at risk of developing a pressure ulcer, this assisted by measuring the exact difference. Due to studies not having had baselines in particular trials, some trials were then placed at risk of biased, therefore some trials could not portray accurate results for validity being

compromised. Furthermore the promotion of blinding and concealment lead <https://assignbuster.com/evaluation-of-the-main-research-article-health-and-social-care-essay/>

to further accuracy of the results, this preventing instances such as the Hawthorn effect (Holland et al. 2010). These three factors were all charted and graphed, also including risks of either bias, level of reporting by the original author of the studies or allocation concealment, ensuring that the research is reliable. A line graph was used to described the potential for bias by; selective reporting, blinding and allocation concealment as being either low, unclear or a high risk of bias (Cullum et al. 2011). Among the 53 selected trials the allocation concealment risk of bias was unclear, with a median of 27 or 51%, with 16 trails having low risk of bias and 10 trails having a high risk of bias, this giving an interquartile range of 17 (Easy Calculation. 2013). Among the the 53 trails the risk of bias for selective reporting was low, with a median of 42 or 71%, with 11 studies being unclear due to either incomplete data or reporting was non-specific to the topic, an interquartile range of 31 (Easy Calculation. 2013). The risk of bias for blinding was difficult to determine due to most studies collected from the Cochrane Wounds Collaboration not having been assessed by an independent assessor blinded to the treatment, due to this, researchers could only be certain that a blinded outcome was used in 8 or 15% of trails and because of this methodological flaw, blinding was not used to weight studies in the analysis. For the support surface trials, these were charted by proportions of participants experiencing pressure ulcers by determining the risk ratio in the two RCT's that compared APAM's to SFM's, these were measured by the relative risk probability value (P value) for developing an ulcers. The relative risk probability value for APAM's indicating 0. 17 and for SFM's was 0. 58, interquartile range between 0. 14 to 0. 73 with a median of 0. 31 (Easy Calculation. 2013)3. 5 Outcomes/Results for Nurses and Patients: <https://assignbuster.com/evaluation-of-the-main-research-article-health-and-social-care-essay/>

The comparison study of APAM's to SFM's, 13 of 221 participants using APAM's developed pressure ulcers between grade 1 to grade 2, whilst participants using SFM's 31 of 188 participants developed pressure ulcers grade 1 to grade 2 (Cullum et al. 2011). Nurses and healthcare professionals attempting to reduce the level of incidence of patients at risk of developing pressure ulcerations, so it was deemed essential that the relative risk was an acceptable measure of the support surfaces effectiveness and that both studies had the same intervention of two hourly turning and necessary skin care. Patients in the SFM control group developed a larger rate of incidence in the development of pressure ulcers, whilst also having having more grade 2 (22%) ulcerations than the experimental studies APAM groups (13. 8%) (Cullum et al. 2011). This provided a noticeable statistical significance relating to the use of APAM'S being more superior, however biased results rendered theses statistic invalid.

3. 6 Limits and Gaps: The authors also identified that both single layered APAM's and double layered APAM's had similar results in the studies with one RCT having 6 participants develop a pressure ulcer and the other having 7 (Cullum et al. 2011). Although APAM's were statistically significant in identifying the reduction in the number of participants developing pressure ulcers compared to SFM's and the authors were in strong favour of these results. These studies had poor reporting by the original authors in both blinding and lifting the head of participants in some studies, this placing studies in high risk of bias, therefore these results showed some evidence in support of APAM's, however for evidence based practice were unreliable.

3. 7 Recommendations For Further Research:

Further research is necessary, although the studies show evidence that

allows the authors to favour particular results, many studies selected by the <https://assignbuster.com/evaluation-of-the-main-research-article-health-and-social-care-essay/>

researchers included trials with already existing methodological flaws. The exclusion criteria should have only included trials that had no deficiencies relating to bias from poor reporting, blinding and allocation concealment, for these elements lead to results being at risk of bias, it's important for the researchers to ensure that the outcomes that are resulted are both valid and reliable when trying to determine an accurate comparison of support surfaces (Styles et al. 2010). Furthermore it would be more beneficial reviewing one larger RCT rather than combining the results of the RCT's by which lead to a minor differentiation in interventions, such as head lifting, in future studies positioning needs to be of an equal standard to ensure accurate results (Styles et al. 2010). The authors recommending that this could be enhanced by future studies that are published by the Cochrane Collaboration to have equal international standards for trial reporting (Cullum et al. 2011).

#### 4.0 Conclusion

Based on the research findings APAM's were favoured by researchers for preventing the level of pressure ulcers in comparison to SFM's, nevertheless when studies investigated the use of APAM's the results had a high risk of bias, in future research they need to ensure to provide valid and reliable results that can accurately determine the most effective mattress. From a nursing perspective, there remains no clear evidence that illustrates the most effective mattress, although there is some evidence that allows for the potential for APAM's to reduce pressure ulcers, this remains unclear and nurses must continue current protocols for treating and managing pressure ulcerations.