

RECOMENDACIÓN DE TRATAMIENTO

BÚSQUEDA Y SÍNTESIS DE EVIDENCIA DE EFECTOS DESEABLES E INDESEABLES

Guía de Práctica Clínica Ayudas Técnicas - 2018

A. PREGUNTA CLÍNICA

En personas de 65 años y más con limitación en la movilidad ¿Se debe usar colchón antiescaras con celdas de aire, en comparación a usar colchón antiescaras con presión alternante?

Análisis y definición de los componentes de la pregunta en formato PICO

Población: Personas de 65 años y más con limitación en la movilidad.

Intervención: Colchón antiescaras con celdas de aire.

Comparación: Colchón antiescaras con presión alternante.

Desenlace (outcome): Incidencia de úlceras por presión, riesgo de úlceras por presión.

B. BÚSQUEDA DE EVIDENCIA

Se realizó una búsqueda general de revisiones sistemáticas asociadas al tema de “Technical aids”. Las bases de datos utilizadas fueron: Cochrane database of systematic reviews (CDSR); Database of Abstracts of Reviews of Effectiveness (DARE); HTA Database; PubMed; LILACS; CINAHL; PsycINFO; EMBASE; EPPI-Centre Evidence Library; 3ie Systematic Reviews and Policy Briefs Campbell Library; Clinical Evidence; SUPPORT Summaries; WHO institutional Repository for information Sharing; NICE public health guidelines and systematic reviews; ACP Journal Club; Evidencias en Pediatría; y The JBI Database of Systematic Reviews and implementation Reports. No se aplicaron restricciones en base al idioma o estado de publicación. Dos revisores de manera independiente realizaron la selección de los títulos y los resúmenes, la evaluación del texto completo y la extracción de datos. Un investigador experimentado resolvió cualquier discrepancia entre los distintos revisores. En caso de considerarse necesario, se integraron estudios primarios.¹

Seleccionadas las revisiones sistemáticas o estudios primarios asociadas a la temática, se clasificaron en función de las potenciales preguntas a las que daban respuesta. Al momento de definir la pregunta la evidencia ya se encontraba previamente clasificada según intervenciones comparadas. Los resultados se encuentran alojados en la plataforma Living Overview of the Evidence (L-OVE), sistema que permite la actualización periódica de la evidencia.

¹ Para revisar la metodología, las estrategias y los resultados de la búsqueda, favor revisar el informe “*Búsqueda sistemática de evidencia de los efectos deseables e indeseables*” en la sección de método de la Guía de Práctica Clínica respectiva.

C. SÍNTESIS DE EVIDENCIA

Resumen de la evidencia identificada

Se identificaron 9 revisiones sistemáticas que incluyen 108 estudios primarios, de los cuales 95 corresponden a ensayos aleatorizados que evalúan el efecto de diferentes superficies de soporte para prevención de úlceras por presión. Para más detalle ver “*Matriz de evidencia*”², en el siguiente enlace: [Superficies de soporte \(colchón, cojín o cobertor\) para prevención de úlceras por presión](#).

Tabla 1: Resumen de la evidencia seleccionada

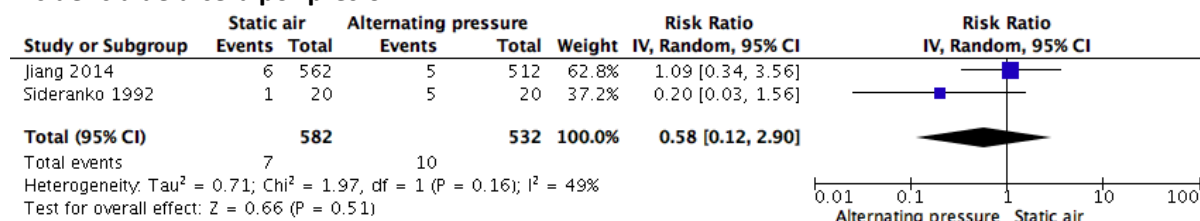
Revisión Sistemática	9 [1-9]
Estudios primarios	93 ensayos aleatorizados [10-104], 13 observacionales [105-117]

Estimador del efecto

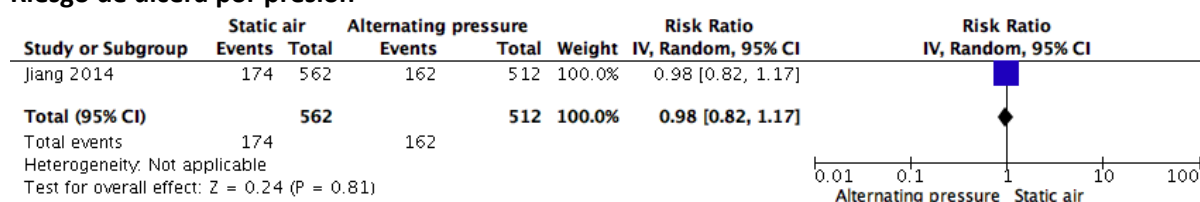
Se realizó un análisis de la matriz de evidencia, identificando que una de las revisiones sistemáticas [1] incluyó los ensayos que evalúan la comparación de interés [55, 84], sin embargo no presentó los datos suficientes para la construcción de la tabla de resumen de resultados, por lo cual se decidió extraerlos directamente desde los estudios primarios [55, 84]. El resto de los estudios primarios no realizaba la comparación de interés [10-54, 56-83, 85-104]. Además, los estudios observacionales no aumentaban la certeza de evidencia.

Metanálisis

Incidencia de úlcera por presión



Riesgo de úlcera por presión



² **Matriz de Evidencia**, tabla dinámica que grafica el conjunto de evidencia existente para una pregunta (en este caso, la pregunta del presente informe). Las filas representan las revisiones sistemáticas y las columnas los estudios primarios que estas revisiones han identificado. Los recuadros en verde corresponden a los estudios incluidos en cada revisión. La matriz se actualiza periódicamente, incorporando nuevas revisiones sistemáticas pertinentes y los respectivos estudios primarios.

Tabla de Resumen de Resultados (Summary of Findings)

COLCHÓN ANTIESCARAS CON CELDAS DE AIRE COMPARADO CON COLCHÓN ANTIESCARAS CON PRESIÓN ALTERNANTE.						
Población	Personas de 65 años y más con limitación en la movilidad.					
Intervención	Colchón antiescaras con celdas de aire.					
Comparación	Colchón antiescaras con presión alternante.					
Desenlaces	Efecto relativo (IC 95%) -- Estudios/ pacientes	Efecto absoluto estimado*			Certeza de la evidencia (GRADE)	Mensajes clave en términos sencillos
		Colchón antiescaras con presión alternante	Colchón antiescaras con celdas de aire	Diferencia (IC 95%)		
Incidencia de úlceras por presión	RR 0,58 (0,12 a 2,90) -- 2 ensayos [55, 83] / 1114 pacientes	19 por 1000	11 por 1000	Diferencia: 8 menos (17 menos a 36 más)	⊕○○○ ^{1,2,3} Muy baja	El uso de un colchón antiescaras con celdas de aire podría ser efectivo en disminuir la incidencia de úlceras por presión en comparación con colchón antiescaras con presión alternante. Sin embargo, existe considerable incertidumbre dado que la certeza de la evidencia es muy baja.
Riesgo de desarrollar úlceras por presión **	RR 0,98 (0,82 a 1,17) -- 1 ensayo [55] /1074 pacientes	316 por 1000	310 por 1000	Diferencia: 6 menos (57 menos a 57 más)	⊕○○○ ^{1,2} Muy baja	El uso de un colchón antiescaras con celdas de aire podría ser efectivo en disminuir el riesgo de desarrollar úlceras por presión comparado con colchón antiescaras con presión alternante. Sin embargo, existe considerable incertidumbre dado que la certeza de la evidencia es muy baja.

IC 95%: Intervalo de confianza del 95%.

RR: Riesgo relativo.

GRADE: Grados de evidencia Grading of Recommendations Assessment, Development and Evaluation.

* El **riesgo CON colchón antiescaras con celdas de aire** está basado en el riesgo del grupo control en los estudios. El **riesgo CON colchón antiescaras con presión alternante** (y su intervalo de confianza) está calculado a partir del efecto relativo (y su intervalo de confianza).

** El riesgo de úlceras por presión fue medido de acuerdo a la Escala de Braden. Los pacientes que obtuvieron un puntaje menor a 16 en esta escala, fueron considerados en riesgo.

¹ Se disminuyó un nivel de certeza de evidencia por riesgo de sesgo, ya que en los ensayos no estaba clara la generación de secuencia de aleatorización, ocultamiento de ésta y no estaba claro si fue ciego.

² Se disminuyó dos niveles de certeza de evidencia por imprecisión ya que cada extremo del intervalo de confianza conlleva una decisión diferente. Además ambos ensayos incluidos presentan un número reducido de eventos.

³ Se disminuyó un nivel de certeza de evidencia por inconsistencia, ya que cada ensayo presenta diferentes conclusiones.

Fecha de elaboración de la tabla: Diciembre, 2018.

Referencias

1. Serraes B, van Leen M, Schols J, Van Hecke A, Verhaeghe S, Beeckman D. Prevention of pressure ulcers with a static air support surface: A systematic review. *International wound journal*. 2018;15(3):333-343.
2. Shi C, Dumville JC, Cullum N. Support surfaces for pressure ulcer prevention: A network meta-analysis. *PLoS one*. 2018;13(2):e0192707.
3. Reddy M, Gill SS, Rochon PA. Preventing pressure ulcers: a systematic review. *JAMA : the journal of the American Medical Association*. 2006;296(8):974-84.
4. McInnes E, Jammali-Blasi A, Bell-Syer SE, Dumville JC, Middleton V, Cullum N. Support surfaces for pressure ulcer prevention. *Cochrane Database of Systematic Reviews*. 2015;9(9):CD001735.
5. Vanderwee K, Grypdonck M, Defloor T. Alternating pressure air mattresses as prevention for pressure ulcers: a literature review. *International journal of nursing studies*. 2008;45(5):784-801.
6. McInnes E, Jammali-Blasi A, Bell-Syer S, Dumville J, Cullum N. Preventing pressure ulcers: Are pressure-redistributing support surfaces effective? A Cochrane systematic review and meta-analysis. *International journal of nursing studies*. 2012;49(3):345-59.
7. Nicosia G, Gliatta AE, Woodbury MG, Houghton PE. The effect of pressure-relieving surfaces on the prevention of heel ulcers in a variety of settings: a meta-analysis. *International wound journal*. 2007;4(3):197-207.
8. Huang HY, Chen HL, Xu XJ. Pressure-redistribution Surfaces for Prevention of Surgery-related Pressure Ulcers: A Meta-Analysis. *Ostomy/wound management*. 2013;59(4):36-48.
9. Health Quality Ontario. Pressure ulcer prevention: an evidence-based analysis. *Ont Health Technol Assess Ser*. 2009;9(2):1-104.
10. Andersen KE, Jensen O, Kvorning SA, Bach E. Decubitus prophylaxis: a prospective trial on the efficiency of alternating-pressure air-mattresses and water-mattresses. *Acta dermato-venereologica*. 1983;63(3):227-30.
11. Aronovitch SA, Wilber M, Slezak S, Martin T, Utter D. A comparative study of an alternating air mattress for the prevention of pressure ulcers in surgical patients. *Ostomy/wound management*. 1999;45(3):34-40, 42-4.
12. Bennett RG, Baran PJ, DeVone LV, Bacetti H, Kristo B, Tayback M, Greenough WB. Low airloss hydrotherapy versus standard care for incontinent hospitalized patients. *Journal of the American Geriatrics Society*. 1998;46(5):569-76.
13. Bliss MR, McLaren R, Exton-Smith AN. Preventing pressure sores in hospital: controlled trial of a large-celled ripple mattress. *British medical journal*. 1967;1(5537):394-7.
14. Bliss MR. Preventing pressure sores in elderly patients: a comparison of seven mattress overlays. *Age and ageing*. 1995;24(4):297-302.
15. Brienza D, Kelsey S, Karg P, Allegretti A, Olson M, Schmeler M, Zanca J, Geyer MJ, Kusturiss M, Holm M. A randomized clinical trial on preventing pressure ulcers with wheelchair seat cushions. *Journal of the American Geriatrics Society*. 2010;58(12):2308-14.
16. Cadue JF, Karolewicz S, Tardy C, Barrault C, Robert R, Pourrat O. [Prevention of heel pressure sores with a foam body-support device. A randomized controlled trial in a medical intensive care unit]. *Presse médicale (Paris, France : 1983)*. 2008;37(1 Pt 1):30-6.
17. Cavicchioli A, Carella G. Clinical effectiveness of a low-tech versus high-tech pressure-redistributing mattress. *Journal of wound care*. 2007;16(7):285-9.

18. Chalian AA, Kagan SH. Backside first in head and neck surgery?: preventing pressure ulcers in extended length surgeries. *Head & neck*. 2001;23(1):25-8.
19. Chaloner, D., Cave, J.. Should weaker study designs ever be preferred over randomised controlled trials. *Journal of Tissue Viability*. 2000.
20. Chunping Ji, Jinxia Dong, Chun Li.. Comparison of effectiveness of preventing pressure sore by three different mattresses. *Chinese Nursing Research*. 2011;
21. Cobb, G.A., Yoder, L.H., Warren, J.B.. Pressure Ulcers: Patient Outcomes on a KinAir Bed or EHOB Waffle Mattress. 1997;
22. Collier ME. Pressure-reducing mattresses. *Journal of wound care*. 1996;5(5):207-11.
23. Conine TA, Daechsel D, Choi AK, Lau MS. Costs and acceptability of two special overlays for the prevention of pressure sores. *Rehabilitation nursing : the official journal of the Association of Rehabilitation Nurses*. 1990;15(3):133-7.
24. Conine TA, Hershler C, Daechsel D, Peel C, Pearson A. Pressure ulcer prophylaxis in elderly patients using polyurethane foam or Jay wheelchair cushions. *International journal of rehabilitation research. Internationale Zeitschrift für Rehabilitationsforschung. Revue internationale de recherches de réadaptation*. 1994;17(2):123-37.
25. Conine, Tali A., Daechsel, Dawn, Hershler, Cecil. Pressure Sore Prophylaxis in Elderly Patients Using Slab Foam or Customized Contoured Foam Wheelchair Cushions. *OTJR: Occupation, Participation and Health*. 1993;13(2):101-116.
26. Cooper PJ, Gray DG, Mollison J. A randomised controlled trial of two pressure-reducing surfaces. *Journal of wound care*. 1998;7(8):374-6.
27. Daechsel D, Conine TA. Special mattresses: effectiveness in preventing decubitus ulcers in chronic neurologic patients. *Archives of physical medicine and rehabilitation*. 1985;66(4):246-8.
28. Demarré L, Beeckman D, Vanderwee K, Defloor T, Grypdonck M, Verhaeghe S. Multi-stage versus single-stage inflation and deflation cycle for alternating low pressure air mattresses to prevent pressure ulcers in hospitalised patients: a randomised-controlled clinical trial. *International journal of nursing studies*. 2012;49(4):416-26.
29. Donnelly J, Winder J, Kernohan WG, Stevenson M. An RCT to determine the effect of a heel elevation device in pressure ulcer prevention post-hip fracture. *Journal of wound care*. 2011;20(7):309-12, 314-8.
30. Economides NG, Skoutakis VA, Carter CA, Smith VH. Evaluation of the effectiveness of two support surfaces following myocutaneous flap surgery. *Advances in wound care : the journal for prevention and healing*. 1995;8(1):49-53.
31. EWING MR, GARROW C, PRESSLEY TA, ASHLEY C, KINSELLA NM. FURTHER EXPERIENCES IN THE USE OF SHEEPSKINS AS AN AID IN NURSING. *The Medical journal of Australia*. 1964;2:139-41.
32. Ewing, M., Garrow, C., Presley, T., Ashley, C., Kinsella, N., . Further experiences in the use of sheep skins as an aid in nursing. *The Australian Nurses' Journal*. 1964;:215-219.
33. Exton-Smith AN, Overstall PW, Wedgwood J, Wallace G. Use of the 'air wave system' to prevent pressure sores in hospital. *Lancet (London, England)*. 1982;1(8284):1288-90.
34. Feuchtinger J. [Preventing decubitus ulcer in heart surgery interventions: visco-elastic foam layer on the operating room table--a study]. *Pflege Zeitschrift*. 2006;59(8):498-501.
35. Finnegan MJ, Gazzero L, Finnegan JO, Lo P. Comparing the effectiveness of a specialized alternating air pressure mattress replacement system and an air-fluidized integrated bed in

- the management of post-operative flap patients: a randomized controlled pilot study. *Journal of tissue viability*. 2008;17(1):2-9.
36. Gebhardt KS, Bliss MR, Winwright PL, Thomas J. Pressure-relieving supports in an ICU. *Journal of wound care*. 1996;5(3):116-21.
 37. Gentilello L, Thompson DA, Tonnesen AS, Hernandez D, Kapadia AS, Allen SJ, Houtchens BA, Miner ME. Effect of a rotating bed on the incidence of pulmonary complications in critically ill patients. *Critical care medicine*. 1988;16(8):783-6.
 38. Geyer MJ, Brienza DM, Karg P, Trefler E, Kelsey S. A randomized control trial to evaluate pressure-reducing seat cushions for elderly wheelchair users. *Advances in skin & wound care*. 2002;14(3):120-9; quiz 131-2.
 39. Gilcreast DM, Warren JB, Yoder LH, Clark JJ, Wilson JA, Mays MZ. Research comparing three heel ulcer-prevention devices. *Journal of wound, ostomy, and continence nursing : official publication of The Wound, Ostomy and Continence Nurses Society / WOCN*. 2005;32(2):112-20.
 40. Goldstone, L. A., Norris, M., O'Reilly, M., Srn, J. White. A clinical trial of a bead bed system for the prevention of pressure sores in elderly orthopaedic patients. *Journal of Advanced Nursing*. 1982;7(6):545-548.
 41. Gray D, Cooper P, Bertram M, Duguid K, Pirie G.. A clinical audit of the Softform Premier Active[trademark] mattress in two acute care of the elderly wards. 2008;
 42. Gray D, Smith M. A randomized controlled trial of two pressure-reducing foam mattresses. *European Wound Management Association Conference*. 1998;4.
 43. Gray Dg, Smith M. Comparison of a new foam mattress with the standard hospital mattress. *Journal of Wound Care*. 2000;9(1):29-31.
 44. Gray, David, Campbell, Marion. A Randomised Clinical Trial of Two Types of Foam Mattresses. *Journal of Tissue Viability*. 1994;4(4):128-132.
 45. Grindley A, Acres J. Alternating pressure mattresses: comfort and quality of sleep. *British journal of nursing (Mark Allen Publishing)*. 1996;5(21):1303-10.
 46. Gunningberg L, Lindholm C, Carlsson M, Sjöden PO. Effect of visco-elastic foam mattresses on the development of pressure ulcers in patients with hip fractures. *Journal of wound care*. 2000;9(10):455-60.
 47. Haiying Liu, Chunyin Su, Xueping Hu, et al.. Comparison of decompression effect of the static and dynamic air cushion on bedridden in-patients. *Chin J Mod Nurs*. 2012;
 48. Hampton S. Evaluation of the new Cairwave Therapy System in one hospital trust. *British journal of nursing (Mark Allen Publishing)*. 1997;6(3):167-70.
 49. Hofman A, Geelkerken RH, Wille J, Hamming JJ, Hermans J, Breslau PJ. Pressure sores and pressure-decreasing mattresses: controlled clinical trial. *Lancet*. 1994;343(8897):568-71.
 50. Huiju Zhan, Meiyang Liu.. Application of cold therapy cushion in preventing pressure sores of unstable pelvic fracture. *China's Modern Medicine and Drugs*.. 2014;
 51. Inman KJ, Dymock K, Fysh N, Robbins B, Rutledge FS, Sibbald WJ. Pressure ulcer prevention: a randomized controlled trial of 2 risk-directed strategies for patient surface assignment. *Advances in wound care : the journal for prevention and healing*. 1999;12(2):72-80.
 52. Inman KJ, Sibbald WJ, Rutledge FS, Clark BJ. Clinical utility and cost-effectiveness of an air suspension bed in the prevention of pressure ulcers. *JAMA : the journal of the American Medical Association*. 1993;269(9):1139-43.

53. Jackson M, McKenney T, Drumm J, Merrick B, LeMaster T, VanGilder C. Pressure ulcer prevention in high-risk postoperative cardiovascular patients. *Critical care nurse*. 2011;31(4):44-53.
54. Jesurum J, Joseph K, Davis JM, Suki R. Balloons, beds, and breakdown. Effects of low-air loss therapy on the development of pressure ulcers in cardiovascular surgical patients with intra-aortic balloon pump support. *Critical care nursing clinics of North America*. 1996;8(4):423-40.
55. Jiang Q, Li X, Zhang A, Guo Y, Liu Y, Liu H, Qu X, Zhu Y, Guo X, Liu L, Zhang L, Bo S, Jia J, Chen Y, Zhang R, Wang J. Multicenter comparison of the efficacy on prevention of pressure ulcer in postoperative patients between two types of pressure-relieving mattresses in China. *International journal of clinical and experimental medicine*. 2014;7(9):2820-7.
56. Jinjin Wei, Zhiyun Guan, Jiyun Hong, et al.. Observation on effect of home-made water bag combined with air bed for prevention of pressure ulcer in patients with coma. *Chinese Nursing Research*.. 2016;
57. Jolley DJ, Wright R, McGowan S, Hickey MB, Campbell DA, Sinclair RD, Montgomery KC. Preventing pressure ulcers with the Australian Medical Sheepskin: an open-label randomised controlled trial. *The Medical journal of Australia*. 2004;180(7):324-7.
58. Juan Cao, YaliTian, Lingli Zhao, et al.. Efficacy of ACTION cushion in preventing sacrococcygeal pressure ulcers for elderly ICU patients. *Journal of Medical theory and practice*. 2013;
59. Kemp MG, Kopanke D, Tordecilla L, Fogg L, Shott S, Matthiesen V, Johnson B. The role of support surfaces and patient attributes in preventing pressure ulcers in elderly patients. *Research in nursing & health*. 1993;16(2):89-96.
60. Keogh A, Dealey C. Profiling beds versus standard hospital beds: effects on pressure ulcer incidence outcomes. *Journal of wound care*. 2001;10(2):15-9.
61. Laurent, S. Effectiveness of pressure decreasing mattresses in cardiovascular surgery patients: a controlled clinical trial. 3rd European Conference for Nurse Managers. 1997;
62. Lazzara DJ, Buschmann MT. Prevention of pressure ulcers in elderly nursing home residents: are special support surfaces the answer?. *Decubitus*. 1991;4(4):42-4, 46, 48.
63. Lichtenstein S. A 7 day comparative randomized parallel single centre study to determine the safety and efficacy of the Micropulse system for the prevention of pressure ulcers. *Micropulse*. 1997;
64. Lim R, Sirett R, Conine TA, Daechsel D. Clinical trial of foam cushions in the prevention of decubitus ulcers in elderly patients. *Journal of rehabilitation research and development*. 1988;25(2):19-26.
65. Malbrain M, Hendriks B, Wijnands P, Denie D, Jans A, Vanpellicom J, De Keulenaer B. A pilot randomised controlled trial comparing reactive air and active alternating pressure mattresses in the prevention and treatment of pressure ulcers among medical ICU patients. *Journal of tissue viability*. 2010;19(1):7-15.
66. Matsui Y, Miyake S, Kawasaki T, Konya C, Sugama J, Sanada H.. Randomized controlled trial of a two layer type air cell mattress in the prevention of pressure ulcers. *Japanese Journal of Pressure Ulcers*. 2001;3(3):331-7.
67. McGowan, S., Montgomery, K., Jolley, D., Wright, R.. The role of sheepskins in preventing pressure ulcers in elderly orthopaedic patients. *Primary Intention*. 2000;8(4):1-8.
68. Miaoli Gao, Hong Xiao.. Study of air mattress in reducing local skin pressure status for patients with persistent vegetative state. *Int J Nurs*. 2014;

69. Mistiaen P, Francke A, Achterberg W, Ament A, Halfens R, Huizinga J.. Australian Medical Sheepskin is effective for the prevention of pressure ulcers. 2009;
70. Nixon J, Cranny G, Iglesias C, Nelson EA, Hawkins K, Phillips A, Torgerson D, Mason S, Cullum N. Randomised, controlled trial of alternating pressure mattresses compared with alternating pressure overlays for the prevention of pressure ulcers: PRESSURE (pressure relieving support surfaces) trial. *BMJ (Clinical research ed.)*. 2006;332(7555):1413.
71. Nixon J, McElvenny D, Mason S, Brown J, Bond S. A sequential randomised controlled trial comparing a dry visco-elastic polymer pad and standard operating table mattress in the prevention of post-operative pressure sores. *International journal of nursing studies*. 1998;35(4):193-203.
72. Ozyurek P, Yavuz M. Prevention of pressure ulcers in the intensive care unit: a randomized trial of 2 viscoelastic foam support surfaces. *Clinical nurse specialist CNS*. 2015;29(4):210-7.
73. P. Mistiaen, A. Francke, W. Achterberg, A. Ament, R. Halfens, J. Huizinga. Australian Medical Sheepskin is effective for the prevention of pressure ulcers. *Tijdschrift voor Ouderengeneeskunde*. 2009;5:186-190.
74. Price P, Bale S, Newcombe R, Harding K. Challenging the pressure sore paradigm. *Journal of wound care*. 1999;8(4):187-90.
75. Qin Xu, XiaohuaXie, XiaoxiaoQuan, et al.. Comparison of the effect of two kinds of anti-pressure ulcer pad applied to the patients with high risk of pressure ulcer. *Journal of Qilu Nursing*. 2015;
76. Qixia Jiang, Yajun Zhu, Jing Jia, et al.. Randomised controlled trial of comparison of effect of two reduced pressure mattress in preventing pressure ulcer in surgical patients. *Nurs J Chin PLA*. 2015;
77. Rafter L.. Evaluation of patient outcomes: pressure ulcer prevention mattresses. *British Journal of Nursing*. 2011;
78. Ricci E, Roberto C, Ippolito A, Bianco A, Scalise MT.. A new pressure-relieving mattress overlay. *European Wound Management Association Journal*. 2013;13(1):27-32.
79. Russell LJ, Reynolds TM, Park C, Rithalia S, Gonsalkorale M, Birch J, et al. Randomised clinical trial comparing CONFOR-Med and standard hospital mattresses: results of the prevention of pressure ulcers study (PPUS-1). *Advances in Skin and Wound Care*. 2003;16(6):317-27.
80. Russell LJ, Reynolds TM, Park C, Rithalia S, Gonsalkorale M, Birch J, Torgerson D, Iglesias C, PPUS-1 Study Group. Randomized clinical trial comparing 2 support surfaces: results of the Prevention of Pressure Ulcers Study. *Advances in skin & wound care*. 2003;16(6):317-27.
81. Santy JE, , Butler MK, Whyman JD. . A comparison study of 6 types of hospital mattresses to determine which most effectively reduces the incidence of pressure sores in elderly patients with hip fractures in a District General Hospital:. 1994;
82. Schultz A, Bien M, Dumond K, Brown K, Myers A. Etiology and incidence of pressure ulcers in surgical patients. *AORN journal*. 1999;70(3):434, 437-40, 443-9.
83. Sewchuk D, Padula C, Osborne E. Prevention and early detection of pressure ulcers in patients undergoing cardiac surgery. *AORN journal*. 2006;84(1):75-96.
84. Sideranko S, Quinn A, Burns K, Froman RD. Effects of position and mattress overlay on sacral and heel pressures in a clinical population. *Research in nursing & health*. 1992;15(4):245-51.
85. Stapleton M. Preventing pressure sores--an evaluation of three products. *Geriatric nursing (London, England)*. 1986;6(2):23-5.

86. Summer, Warren R., Curry, Phyllis, Haponik, Edward F., Nelson, Steve, Elston, Robert. Continuous mechanical turning of intensive care unit patients shortens length of stay in some diagnostic-related groups. *Journal of Critical Care*. 1989;4(1):45-53.
87. Takala, J, Varmavuo, S, Soppi, E. Prevention of pressure sores in acute respiratory failure: a randomised controlled trial. *Clinical Intensive Care*. 1996;7(5):228-235.
88. Tang J, Fang Y, Han Y, Bai X, Yan X, Zhang Y, Lai R, Zhang Z. YY-39, a tick anti-thrombosis peptide containing RGD domain. *Peptides*. 2015;68:99-104.
89. Taylor L. Evaluating the Pegasus Trinova: a data hierarchy approach. *British journal of nursing* (Mark Allen Publishing). 2000;8(12):771-4, 776-8.
90. Theaker C, Kuper M, Soni N. Pressure ulcer prevention in intensive care - a randomised control trial of two pressure-relieving devices. *Anaesthesia*. 2005;60(4):395-9.
91. Torra i Bou JE, Segovia Gómez T, Verdú Soriano J, Nolasco Bonmatí A, Rueda López J, Arboix i Perejamo M. The effectiveness of a hyperoxygenated fatty acid compound in preventing pressure ulcers. *Journal of wound care*. 2005;14(3):117-21.
92. Tymec AC, Pieper B, Vollman K. A comparison of two pressure-relieving devices on the prevention of heel pressure ulcers. *Advances in wound care : the journal for prevention and healing*. 1997;10(1):39-44.
93. van Leen M, Hovius S, Halfens R, Neyens J, Schols J. Pressure relief with visco-elastic foam or with combined static air overlay? A prospective, crossover randomized clinical trial in a dutch nursing home. *Wounds : a compendium of clinical research and practice*. 2013;25(10):287-92.
94. van Leen M, Hovius S, Neyens J, Halfens R, Schols J. Pressure relief, cold foam or static air? A single center, prospective, controlled randomized clinical trial in a Dutch nursing home. *Journal of tissue viability*. 2011;20(1):30-4.
95. Vanderwee K, Grypdonck MH, Defloor T. Effectiveness of an alternating pressure air mattress for the prevention of pressure ulcers. *Age and ageing*. 2005;34(3):261-7.
96. Vermette S, Reeves I, Lemaire J. Cost effectiveness of an air-inflated static overlay for pressure ulcer prevention: a randomized, controlled trial. *Wounds : a compendium of clinical research and practice*. 2012;24(8):207-14.
97. Vyhlidal SK, Moxness D, Bosak KS, Van Meter FG, Bergstrom N. Mattress replacement or foam overlay? A prospective study on the incidence of pressure ulcers. *Applied nursing research : ANR*. 1997;10(3):111-20.
98. Whitney JD, Fellows BJ, Larson E. Do mattresses make a difference?. *Journal of gerontological nursing*. 1984;10(9):20-5.
99. Xiaohua Chen, Yong Tao, Yulan Peng, et al.. Application of three pads in surgeries with prone position. *Chinese Journal of Practical Nursing*. 2015;
100. Xiaohui Wang, Jiao Jiang, Yuanyuan Wei, et al.. Comparing the effect of two types of alternating pressure air mattresses on hospital-acquired pressure ulcers among ICU patients in department of cardiac surgery. *Journal of Nursing Science*. 2016;
101. Xiaolong Qu, Qixia Jiang.. Comparison of effectiveness of static air mattress and dynamic air mattress support in preventing pressure ulcers in patients of department of neurology. *Nurs J Chin PLA*. 2014;
102. Yuan Zhao, Yi Gong.. Application of massage air bed in preventing bedsore of critical patients. 2008;
103. Yuhong Zhang, Qixia Jiang.. A comparison of two kinds of decompression scheme to prevent pressure ulcer. *Journal of Nursing Science*. 2015;

104. Clark M, Rowland LB. Comparison of contact pressures measured at the sacrum of young and elderly subjects. *Journal of biomedical engineering*. 1989;11(3):197-9.
105. Jakobsen J, Christensen KS. Transcutaneous oxygen tension measurement over the sacrum on various anti-decubitus mattresses. *Danish medical bulletin*. 1987;34(6):330-1.
106. Rich SE, Shardell M, Hawkes WG, Margolis DJ, Amr S, Miller R, Baumgarten M. Pressure-redistributing support surface use and pressure ulcer incidence in elderly hip fracture patients. *Journal of the American Geriatrics Society*. 2011;59(6):1052-9.
107. Rithalia SV, Heath GH, Gonsalkorale M. Assessment of alternating-pressure air mattresses using a time-based pressure threshold technique and continuous measurements of transcutaneous gases. *Journal of tissue viability*. 2000;10(1):13-20.
108. Rithalia SV. Evaluation of alternating pressure air mattresses: one laboratory-based strategy. *Journal of tissue viability*. 2004;14(2):51-8.
109. Hickerson et al.. Comparison of total body tissue interface pressure of specialized pressure-relieving mattresses. *J Long Term Eff Med Implants*. 2004;
110. Pring J, Millman P. Measuring interface pressures in mattresses. *Journal of wound care*. 1998;7(4):173-4.
111. Goetz LL, Brown GS, Priebe MM. Interface pressure characteristics of alternating air cell mattresses in persons with spinal cord injury. *The journal of spinal cord medicine*. 2002;25(3):167-73.
112. Pring J, Millman P. Evaluating pressure-relieving mattresses. *Journal of wound care*. 1998;7(4):177-9.
113. Rithalia SV, Gonsalkorale M. Quantification of pressure relief using interface pressure and tissue perfusion in alternating pressure air mattresses. *Archives of physical medicine and rehabilitation*. 2000;81(10):1364-9.
114. Fleurence RL. Cost-effectiveness of pressure-relieving devices for the prevention and treatment of pressure ulcers. *International journal of technology assessment in health care*. 2005;21(3):334-41.
115. Hodge J, Mounter J, Gardner G, Rowley G. Clinical trial of the Norton Scale in acute care settings. *The Australian journal of advanced nursing : a quarterly publication of the Royal Australian Nursing Federation*. 1990;8(1):39-46.
116. Serraes B, Beeckman D. Static Air Support Surfaces to Prevent Pressure Injuries: A Multicenter Cohort Study in Belgian Nursing Homes. *Journal of wound, ostomy, and continence nursing : official publication of The Wound, Ostomy and Continence Nurses Society*. 2016;43(4):375-8.
117. Gunningberg L, Lindholm C, Carlsson M, Sjöden PO. Implementation of risk assessment and classification of pressure ulcers as quality indicators for patients with hip fractures. *Journal of clinical nursing*. 1999;8(4):396-406.