

# **Bedsores And Pressure Ulcers, Unveiling Nursing Management And Interventional Approaches For Control And Prevention**

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## **Abstract**

Bedsores of pressure ulcers are the most prevalent complication among bedridden patients in all statuses, nursing interventions may improve the pressure ulcers and then improve the whole patient's quality of life. This study aims to assess the impact of nursing interventions to prevent bedsore and pressure ulcers in bedridden cases during their home care disciplines. A case control study design was conducted among elderly patients diagnosed with bedsore or pressure ulcers, they were obeyed to homecare nursing interventions, the study consisted of development of nursing interventions to cases and after 2 weeks of that intervention, a skin Assessment Observation Checklist with using Braden Scale for Assessing Pressure Ulcer Risk were reported. All data was then collected to be analyzed using appropriate statistical tests by SPSS program version 26.0. Among 138 subjects were considered as participants in this study, divided as, 70 cases and 68 controls who were not received any nursing interventions, they are normally distributed according to their age ranges, and with approximately equality in gender, most of them are married and have high education ( $p > 0.05$ ). After 2 weeks of nursing interventions, the skin condition was varied according to its health status and physical appearance, cases showed a significant difference than controls ( $p < 0.05$ ). The assessed burden scale reported that there is a significant difference in pressure ulcer health condition before, during, and after interventions by nurses ( $p < 0.05$ ) with high mean change in controls as compared to cases. The assessment of pressure ulcers/or bedsore was reported by 5 stages after the interventions made by nurses to report that the cases reported that most of cases had stage 0 with complete remission as compared to controls ( $p < 0.01$ ). The risks after the interventions were also reported to show that most cases had no risks. In conclusion, nursing interventions are the most effective approaches in homecare patients to improve their pressure ulcers and alleviate the risk of being returned.

**Keywords:** Bedsore, pressure ulcers, nursing management, nursing interventions, home care, Jazan, Saudi Arabia.

## **Introduction**

Bedsore are a prevalent issue in most healthcare facilities [1]. Bedsore and ulcer come from the instant pressure in one of the skins with cutting blood flow, lacking blood flow may cause more injuries to the skin and more development of the wounds, infections [2] in bedridden patients [3-5]. Despite the abundant data published on the prevalence of bedsore globally, research is deficient about the use of nursing treatments for their prevention in hospital settings and home care centers too. Bedsore are characterized as localized injuries to the skin and/or underlying tissue occurring over the bony prominence due to pressure or a combination of pressure and shear forces [3-5]. Bedsore are a considerable issue for hospitalised patients, diminishing their quality of life and correlating with substantial mortality rates [6]. The global prevalence of bedsore in hospitalised people is reported to be 12.8% [7]. Annually, around 2.5% of those susceptible to bedsore in the United States succumb to consequences, including sepsis and osteomyelitis [8]. The predominant predisposing factors for bedsore in hospitals include immobility, sensory loss, diminished consciousness, and friction and shear [9,10]. Moreover, patients in intensive care units are at an increased risk of developing bedsore due to invasive interventions like central vascular lines and mechanical ventilation [11-14]. The occurrence of bedsore is regarded as a metric indicating inadequate treatment quality, and nursing practices significantly influence the onset and prevention of bedsore, as nurses are at the forefront of healthcare delivery [15-19]. An adequate foundation of knowledge and practical experience is crucial for enhancing the quality and safety of nursing care besides the novel antibodies-based treatment [14,20-26]. People who underwent care in their homes because of many comorbidities such as the late stages of renal, hepatic, or cancerous diseases [20] may need a special home care, their being always in beds and unable to perform any daily activities by themselves, may be integrated and under scope for home care nurses to give the suitable care to alleviate and control the risk of bedsore and then control its consequences [27-34].

In Saudi Arabia, there are few studied discuss the nursing management and novel approaches to control and treat bedsore for nursing care and home care fields. As Hallaj [12] study reported from a population consisting of 40 hospitalised elderly people. The implemented nursing interventions encompass a repositioning plan, utilization of pillows to safeguard bony prominences, bi-daily bed making, moisture prevention for the skin, sufficient fluid intake, cleanliness maintenance for the elderly, and application of cream on bony prominences. As well as Awad and Hewi [7], reported that nurses' inadequate knowledge, unfavorable attitudes, and substandard interventions significantly contribute to the increased occurrence of decubitus ulcers, particularly among elderly patients, so, this study determined that the nursing staff's knowledge, practices, and attitudes concerning the prevention of pressure sores in hospitalized elderly patients were markedly enhanced following the implementation of the research treatments. Therefore, this study aims to assess the impact of nursing interventions to prevent bedsore and pressure ulcers in bedridden cases during their home care disciplines.

## **Methods**

### **Design and Setting**

A case-control study was conducted on selected patients with bedsore to apply certain interventions and assess the quality of sores before and after interventions during their home care disciplines.

### **Sample and population**

A random sample technique was used to select about 68 cases with bedsore and 70 control subjects, and the G power sample size calculator was used to get the final sample size as presented.

### **Assessment Tools**

Skin Assessment Observation Checklist

This checklist was developed by the Boston University Research Team in 2016. This assessment evaluates skin condition to identify abnormalities over bony prominences, including alterations in skin temperature (hyperthermia), skin color (erythema), moisture levels (hydration status), skin turgor (oedema), and skin integrity (intactness).

#### Braden Scale for Assessing Pressure Ulcer Risk

This measure was created by Barbara Braden and Nancy Bergstrom (2012) to identify people at risk for pressure ulcers. The assessment consists of six enquiries that examine the elder's sensory perception, skin hydration, activity level, mobility, typical dietary intake, and exposure to friction and shear forces. Scoring system

The highest score is 23, with total scores ranging from 6 to 23.

The overall score categories the risk into three classifications:

15 to 18 Low risk, 12 to 14 Moderate risk, and

Less than 12 is considered elevated risks

The Braden scale has exhibited remarkable sensitivity and specificity in hospital settings. It has also been validated in numerous research investigations including older individuals in hospitals and nursing homes. Research has shown internal consistency and inter-observer reliability ( $r=0.89$ ).

#### Development of nursing interventions

This was formulated by a researcher following an extensive literature assessment. The protocol encompassed a repositioning schedule, utilization of pillows to safeguard bony prominences, meticulous bed-making twice daily (ensuring taut sheets to avert wrinkles), moisture prevention for the skin, sufficient fluid intake, cleanliness maintenance for the elderly, and use of cream on bony prominences. The nursing intervention was administered to each senior individual in the experimental group for a duration of two consecutive weeks.

- Altering the position hourly (check with a physician for the appropriate posture).
- Elevate the head of the bed to 30 degrees.
- Utilize pillows or dressings to avert skin-to-skin contact and safeguard bony prominence.
- Make the bed twice daily (ensure bed sheets are taut under the mattress to avoid wrinkles) and replace the sheets when soiled.
- Ensure the patient consumes an adequate daily fluid intake of 2.5 liters, either orally or by intravenous infusions if necessary.
- Nutrition (the meals offered by the hospital encompass all nutritional needs).
- Skin hygiene: maintain cleanliness and dryness of the skin; apply cream (panthenol) once day on bony prominences.
- Encourage the patient to ambulate every day for 15 minutes, either in the room or corridor, starting with 5 minutes and increasing based on the elder's tolerance.

#### Assessment of nursing interventions

Following the execution of nursing interventions over a two-week period, each participant in both groups underwent reassessment (four times with three-day intervals) to anticipate the progression of pressure ulcers utilizing the "Skin Assessment Observation Checklist," and the "Braden Scale for Predicting Pressure Ulcer Risk."

#### **Ethical considerations**

An IRB approval was obtained from Jazan health cluster with no. 24115. In addition, written consent was obtained from cases and controls before conducting the study with approving to participate in this study with saving all their personal and health data secret and private. All participants have all rights to withdraw at any time

## Statistical analysis

SPSS program version 26.0 was used for the statistical analysis; after collecting all data, they will be represented in descriptive forms (Means, frequencies, percentages, and standard deviations) using excel sheet, all inferential statistics were performed using ANOVA and unpaired t-test at a significance level 0.05.

## Results

In this study, a total of 138 subjects who have different degree of pressure ulcers, divided as, 70 cases and 68 controls who were not received any nursing interventions, they are normally distributed according to their age ranges, and with approximately equality in gender, most of them are married and have high education (Table 1).

Also, by default they have a various chronic disease, the majority is cardiovascular diseases and endocrine disorders such as diabetes mellitus), they are adequately taking various types of drugs such as anti-hypertensive, anticoagulant, anti-diabetics, and Beta blockers (Table 2).

Table 1 Demographic Data among cases and controls in this study

Demographic Data	Control (n=68)		Cases (n=70)		p-value
	Frequency	%	Frequency	%	
<b>Age</b>					0.78
45-50	13	18.57	11	16.18	
51-60	21	30.00	19	25.00	
61-70	22	34.29	26	38.24	
>70	12	17.14	14	20.59	
<b>Gender</b>					0.998
Males	34	51.43	32	47.06	
Females	34	48.57	38	52.94	
<b>Social level</b>					0.61
Single	1	1.43	1	1.47	
Married	54	80.00	49	69.12	
Widowed	23	32.86	20	29.41	
<b>Educational level</b>					0.45
Secondary school	12	17.14	11	16.18	
High education	45	67.14	46	64.71	
Post graduate studies	11	15.71	13	19.12	

Table 2 Diseases and drugs distribution and incidence among cases and controls

Diseases and Drugs	Control (n=68)		Cases (n=70)		p-value
	Frequency	%	Frequency	%	
<b>Diseases</b>					0.68
Cardiovascular diseases	29	44.29	28	39.71	
Endocrine diseases (e.g Diabetes mellitus)	25	35.71	29	41.18	

Asthma and/or COPD	2	2.86	1	1.47	0.997
Renal diseases	3	4.29	4	5.88	
Liver diseases	9	12.86	8	11.76	
<b>Drugs</b>					
Anti-hypertensive	12	17.14	15	19.12	
Anticoagulant	18	27.14	17	25.00	
Beta blockers	13	20.00	12	17.65	
Anti diabetics	24	34.18	28	38.1	
Diuretics	7	10.00	6	8.82	
Analgesics	6	8.57	7	10.29	
Corticosteroids	12	17.14	13	19.12	

The distribution of cases and control according to the stage of ulcers before nursing interventions was assessed to find an equality between cases and controls in the distribution of 5 stages of ulcers, except for stage III as most of controls have stage III than cases (Figure 1).

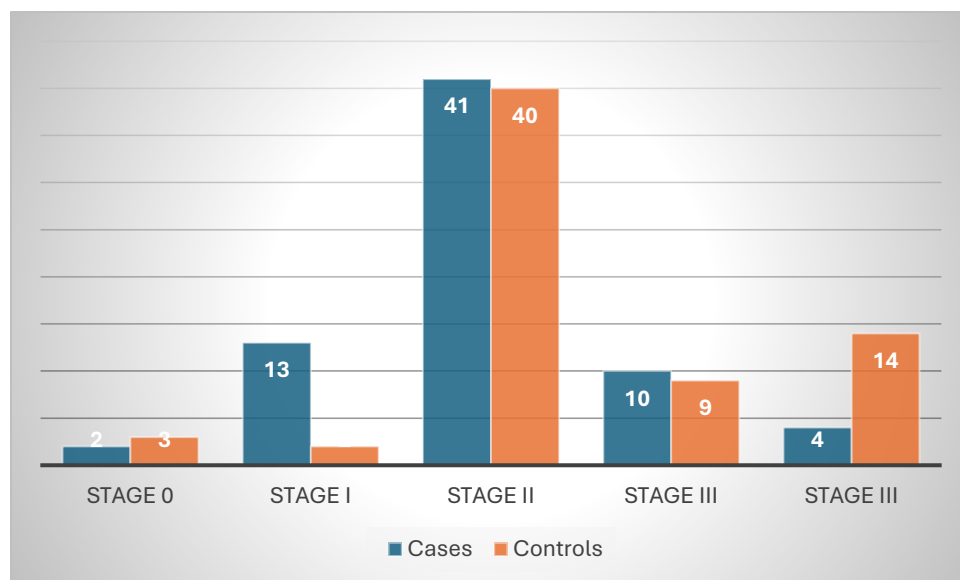


Figure 1 Distribution of cases and control according to the stage of ulcers before nursing interventions

After 2 weeks of nursing interventions, the skin condition was varied according to its health status and physical appearance, cases showed a significant difference than controls ( $p < 0.05$ ), with a great improvement in skin conditions in all parameters than control (Table 3).

Table 3 The Skin condition after 2 weeks of intervention among case and control groups

Skin condition after 2 weeks of intervention	Cases (n=70)		Controls (n=68)		p-value
	Frequency	%	Frequency	%	
Skin temperature (hotness)	1	1.43	1	1.47	0.002
Skin intact (integrity)	0	0.00	15	22.06	

Skin color (redness)	2	2.86	12	17.65	0.03
Skin turgor (edema)	1	1.43	13	19.12	
Skin moisture (wet or dry)	0	0.00	27	39.71	

Also, the area which was affected by the pressure ulcers was investigated, to report that most of cases an improvement in all areas with an exception to Ischium, trochanter, and malleoli (with only 1 case did not receive improvement after intervention), when compared to controls who did not show a significant improvement in affected areas ( $p < 0.05$ ) (Table 4).

Table 4 Distribution of cases and control groups according to affected areas by pressure ulcers after nursing interventions with 2 weeks

AFFECTED AREA	CASES (N=70)		CONTROLS (N=68)		P-VALUE
	Frequency	%	Frequency	%	
ISCHIUM (BUTTOCKS)	1	1.43	9	13.2	0.004
SACRUM	0	0	11	16.2	0.04
GREATER TROCHANTER	1	1.43	26	38.2	0.001
HEELS	1	1.43	17	25	0.005
LATERAL MALLEOLI	0	0	5	7.35	0.02

The assessed burden reported that there is a significant difference in pressure ulcer health condition before, during, and after interventions by nurses ( $p < 0.05$ ) with high mean change in controls as compared to cases (Table 5).

Table 5 The Barden scale assessment for cases and controls for bedsores and pressure sores

Barden scale	Cases (n=70)	Controls (n=68)	p-value
	Mean± S.D	Mean± S.D	
On admission	23.4 ± 0.12	19.4 ± 3.1	0.0004
Fifth day	25.4 ± 1.12	20.14 ± 2.2	0.002
One week	21.3 ± 0.91	18.7 ± 0.91	0.001
Two weeks	25.6 ± 4.3	21.4 ± 1.31	0.02
Mean change	1.3 ± 0.08	7.65 ± 0.1	0.01

The assessment of pressure ulcers/or bedsores was reported by 5 stages after the interventions made by nurses to report that the cases reported that most of cases had stage 0 with complete remission as compared to controls ( $p < 0.01$ ). The risks after the interventions were also reported to show that most cases had no risks (Table 6, Figure 2).

Table 6 Distribution of cases and control according to the stage of ulcers, 2-weeks after nursing interventions

Stages of pressure ulcers/bedsores	Cases (n=70)		Controls (n=68)		p-value
	Frequency	%	Frequency	%	
Stage 0	67	95.71	7	10.29	0.000
Stage I	3	4.29	24	35.29	
Stage II	1	1.43	21	30.88	
Stage III	0	0.00	6	8.82	
Stage III	0	0.00	10	14.71	

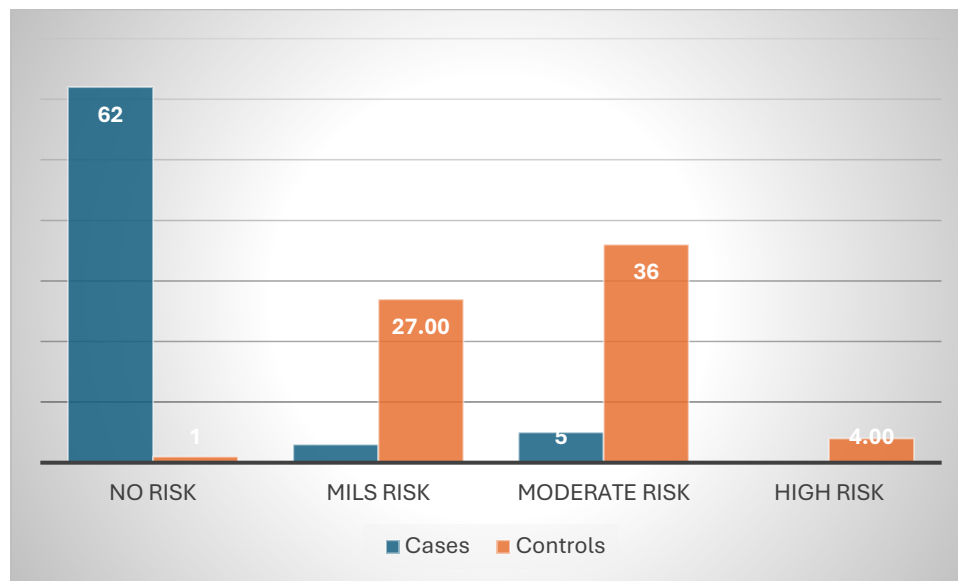


Figure 2 Predicting risk after weeks of intervention among cases and controls groups

### Discussion

Bedsore of pressure ulcers are the most prevalent complication among bedridden patients in all statuses, nursing interventions may improve the pressure ulcers and then improve the whole patient's quality of life. This study aims to assess the impact of nursing interventions to prevent bedsore and pressure ulcers in bedridden cases during their home care disciplines. To the best of our knowledge, this study the first report of nurses' intervention to bedridden patients who were obeyed to homecare in Saudi Arabia. In this study, a total of 138 subjects who have different degrees of pressure ulcers, divided as, 70 cases and 68 controls who did not receive any nursing interventions, are normally distributed according to their age ranges, and with approximately equality in gender, most of them are married and have high education. The nondifference between cases and control will enhance the study findings and reliability, elderly patients as the most cases obeyed to homecare with bedridden statuses and most of them need a high degree of nursing care with appropriate nursing interventions.

Also, by default they have a various chronic disease, the majority is cardiovascular diseases and endocrine disorders such as diabetes mellitus), they are adequately take various types of drugs such as anti-hypertensive, anticoagulant, anti-diabetics, and Beta blockers, these findings are very popular to be reported among elderly patients, as reported by previous studies, most geriatrics have many drugs and polypharmacy because of their different and polydisperse diseases [24-27].

The distribution of cases and control according to the stage of ulcers before nursing interventions was assessed to find an equality between cases and controls in the distribution of 5 stages of ulcers, except for stage III as most controls have stage III than cases. The non-significant difference between cases and control may show the complete assessing of the efficacy and effectiveness of nursing interventions in this study.

After 2 weeks of nursing interventions, the skin condition was varied according to its health status and physical appearance, cases showed a significant difference than controls ( $p < 0.05$ ), with a great improvement in skin conditions in all parameters than control. Also, the area which was affected from the pressure ulcers was investigated, to report that most cases an improvement in all areas with an exception to Ischium, trochanter, and malleoli (with only 1 case did not receive an improvement after intervention), when compared to controls who did not show a significant improvement in affected areas ( $p < 0.05$ ). It agrees with Tervo-Heikkinen et al. study, who reported that the skin condition after the assessment was high for 30% of all participants and reached 38% of the participants controls [15].

The assessed burden scale reported that there is a significant difference in pressure ulcer health condition before, during, and after interventions by nurses ( $p < 0.05$ ) with high mean change in controls as compared to cases. Ding et al. found that nursing interventions for elderly, cancerous, and all bedridden cases had a significant and successful impact on the improvement of the cases and skin condition with an improvement in pressure ulcers [31].

The assessment of pressure ulcers/or bedsores was reported by 5 stages after the interventions made by nurses to report that the cases reported that most cases had stage 0 with complete remission as compared to controls ( $p < 0.01$ ). The risks after the interventions were also reported to show that most cases had no risks. These study results are in agreement with Hallaj study, who reported that all nursing interventions applied to elderly patients can succeed in preventing bedsores as the study period found that all cases had no risk of pressure ulcers after that with a complete effectiveness to nursing interventions [12].

## Conclusion

In conclusion, nursing interventions are the most effective approaches in homecare patients in Saudi Arabia, these interventions are highly considered to improve the cases' pressure ulcers and alleviate the risk of being returned. Any conventional and careless approaches to bedridden cases may increase the risk of pressure sores and worsen their quality of life. Several interventions and sessions must be carried out to nurses to enable them to afford interventions for elderly patients who need homecare for their bedsores and pressure ulcers.

## References

1. Castelino, F., Hephzibah, D., Dayananda, C., Geethanjali, S., Shilpa, H. M., Divya, V., & Wani, Z. A. (2024). Nursing Interventions to Prevent Pressure Ulcers in Critically Ill Patients: A Review of the Evidence. *Asian Journal of Research in Infectious Diseases*, 15(6), 34-43.
2. Hemdan M, Mageed SS, Abulsoud AI, Faraag AH, Zaki MB, Mansour RM, Raouf AA, Ali MA, Mohammed OA, Salman A, Salah AN. Approaches based on miRNAs in Behçet's Disease: Unveiling pathogenic mechanisms, diagnostic strategies, and therapeutic applications. *Life Sciences*. 2024 Aug 9:122950.
3. Abdelaziz, A. A., Doghish, A. S., Salah, A. N., Mansour, R. M., Moustafa, Y. M., Mageed, S. S. A., ... & Doghish, Y. A. (2025). When oral health affects overall health: biofilms, dental infections, and emerging antimicrobial strategies. *Infection*, 1-22.
4. Wei, W., & Ma, N. (2022). Bedsores. In *Encyclopedia of Gerontology and Population Aging* (pp. 606-611). Cham: Springer International Publishing.
5. Alshahrani, B., Sim, J., & Middleton, R. (2021). Nursing interventions for pressure injury prevention among critically ill patients: A systematic review. *Journal of Clinical Nursing*, 30(15-16), 2151-2168.

6. Liuima, V., Karanevskytė-Buckiūnienė, A., & Jaselionienė, J. Effectiveness of bedsore prevention interventions. *REDAKCIJOS SKILTIS*, 27.
7. Dweekat, O. Y. (2023). *An Integrated Framework of Multifaceted Machine Learning, Metaheuristics, and Braden Scale to Predict Hospital-Acquired Pressure Injuries (Bedsore)* (Doctoral dissertation, State University of New York at Binghamton).
8. Awad, W. H. A., & Hewi, S. A. H. (2020). Effect of pressure ulcer preventive nursing interventions on knowledge, attitudes and practices of nurses among hospitalized geriatric patients in Alexandria, Egypt. *J Nurs Health Sci*, 9(2), 1-12.
9. Salah AN, Alshakhs AM, Alshakhs NM, Bajaber JF, Alshakhs SW, Baobaid RA, Alqahtani RH. Novel Biotechnology and Immunotherapy Trends in Cancer Therapy. *Haya Saudi J Life Sci*. 2024;9(12):526-35.
10. Ghosh, P., Vachana, M. N., Pavish, S. R., Pereira, P., Tejeswini, C. J., Ramesh, M., ... & Chalasani, S. H. (2024). Advances in technology-driven strategies for preventing and managing bedsore: A comprehensive review. *Archives of Gerontology and Geriatrics Plus*, 1(3), 100029.
11. Salah AN, Elleboudy NS, El-Housseiny GS, Yassien MA. Cloning and sequencing of *IsaE* efflux pump gene from MDR Enterococci and its role in erythromycin resistance. *Infection, Genetics and Evolution*, 94, 105010.
12. Mustafa El Kotb, W., & Oliman Behairy, A. S. (2020). Pressure Ulcers Prevention through Applying Evidence-Based Nursing Intervention for Patients with Orthopedic Disorders. *Egyptian Journal of Health Care*, 11(1), 1382-1397.
13. Yun, H., & Park, J. (2020). Pressure ulcer preventive intervention and risk factors for pressure ulcers: a review of the literature. *Journal of Digital Convergence*, 18(2), 323-331.
14. Salah, A. N., Hashem, A. H., Zaki, M. B., Abulsoud, A. I., Atta, A. M., Elkalla, W. S., ... & Doghish, A. S. (2025). Targeted Therapies: The Role of Monoclonal Antibodies in Disease Management. *Journal of Biochemical and Molecular Toxicology*, 39(2), e70163.
15. Hallaj, F. A. (2017). Effect of Applying Nursing Interventions for Preventing Pressure Ulcers among Hospitalized Geriatric Patients. *Alexandria Scientific Nursing Journal*, 19(2), 57-68.
16. Salah, A. N. & Alwabsi, H. A. (2024). An Overview of the Antimicrobial Activity of Some Microbial Enzymes. *American Journal of Biochemistry and Biotechnology*, 20(2), 140-150
17. Akram, J., Samdani, K., Afzal, A., Khan, T. M., Umar, W., Bibi, S., ... & Javed, K. (2022). Bed Sores And Associated Risk Factors Among Hospital Admitted Patients: A Comparative Cross-sectional Study. *American Journal of Health, Medicine and Nursing Practice*, 7(4), 17-25.
18. Tervo-Heikkinen, T., Heikkilä, A., Koivunen, M., Kortteisto, T., Peltokoski, J., Salmela, S., ... & Junttila, K. (2023). Nursing interventions in preventing pressure injuries in acute inpatient care: a cross-sectional national study. *BMC nursing*, 22(1), 198.
19. Sarikahya, S. D. (2024). Investigation of factors associated with pressure ulcer in patients receiving home care services via path analysis. *Journal of Tissue Viability*, 33(2), 152-159.
20. Alaseem, L., Almuhaimeed, M., Alshehri, M., El Sheikh, A., Mohamed, M. M., Albattal, S., ... & Kofi, M. (2024). Risk Factors Associated with Pressure Ulcers among Home Health Care Patients; Riyadh, Saudi Arabia. *European Journal of Medical and Health Research*, 2(3), 22-31.
21. Yoshikawa, Y., Maeshige, N., Tanaka, M., Uemura, M., Hiramatsu, T., Fujino, H., ... & Terashi, H. (2024). Relationship between cleaning frequency and pressure ulcer healing time in older people receiving home care. *Journal of Wound Care*, 33(6), 418-424.
22. Gao MM, Wang LP, Zhang LL, Li YY. The effects of evidence-based nursing interventions on pressure ulcers in patients with stroke: a meta-analysis. *International Wound Journal*. 2023 Dec;20(10):4069-76.
23. Louis, F., & Mohamed, S. (2024). Pressure Ulcers (Bedsore): A Comprehensive Overview for Nurses Caring for Seniors.
24. Deng, G. L., Lei, Y. L., Tan, H., Geng, B. C., & Liu, Z. (2024). Effects of predictive nursing interventions on pressure ulcer in elderly bedridden patients. *International Wound Journal*, 21(3), e14690.

25. Boston University research team. Comprehensive skin assessment sheet. Boston: Boston University 2016.
26. Braden B. The Braden scale for predicting pressure sore risk: reflections after 25 years. *Advances in Skin & Wound Care* 2012; 25(2): 61-3.
27. El-Sharkawy FM, Reda NA. Predicting factors for development of decubitus ulcers in an ICU population. *The Alexandria Medical Journal* 1997; 39(1): 175-88.
28. Mohamed SS. Predicting pressure ulcer risk: a study of the predictive validity of the Braden Scale at El-kasr El-Aini Hospital. Unpublished Master thesis, Faculty of Nursing: University of Cairo, 2007.
29. Ibrahim YM. Skin care Intervention for pressure ulcer prevention among cardiac surgical patients. *ASNJ* 2007; 6(1): 1-9
30. Alsuwaidan A, Almedlej N, Alsabti S, Daftardar O, Al Deaji F, Al Amri A, Alsuwaidan S. A comprehensive overview of polypharmacy in elderly patients in Saudi Arabia. *Geriatrics*. 2019 May 15;4(2):36.
31. Salah AN, Aboelyazed AM, Waseem AM, Fouad S, Abdelfatah AM. The practice and knowledge among community pharmacists about dispensing antibiotics in Egypt; a cross-sectional study. *Microbes and Infectious Diseases*. 2024 Dec 3.
32. Vrettos I, Voukelatou P, Katsoras A, Theotoka D, Kalliakmanis A. Diseases linked to polypharmacy in elderly patients. *Current gerontology and geriatrics research*. 2017;2017(1):4276047.
33. Hosseini SR, Zabihi A, Amiri SR, Bijani A. Polypharmacy among the Elderly. *Journal of mid-life health*. 2018 Apr 1;9(2):97-103.
34. Ding L, Ding S, He C, Zhang Q, An J. Clarification of issues brought up by 'Is continuing nursing interventions reduce the incidence of intraoperative pressure ulcers for breast cancer patients?'. *Gland Surgery*. 2022 Aug;11(8):1445.
35. Salah AN, Al-Otaibi MB, Al-dhmashi AS, Mariee AA. Infection control practices and approaches in the dentistry field; a review. *Journal of Bioscience and Applied Research*. 2024 Mar 1;10(1):42-58.
36. Mariee AA, Obidan A, Alwabsi HA, Salah AN. A Reviewed Literature on the Effect of Global Warming on Infectious Diseases' Dissemination. *Haya Saudi J Life Sci*. 2024;9(11):408-18.
37. Salah A, El-Housseiny G, Elleboudy N, Yassien M. Antimicrobial stewardship programs: A review. *Archives of Pharmaceutical Sciences Ain Shams University*. 2021 Jun 1;5(1):143-57.