

## Prevalence and Features of Pressure Ulcers among Patients in ICU Department of Governmental Hospital in Palestine: Cross Sectional

Jamal A. S. Qaddumi\*<sup>1</sup>  
Omar Almahmoud <sup>2</sup>

### Abstract

---

**Overview:** Different studies have examined the prevalence of pressure ulcers in acute care settings, but few have provided information on features of pressure ulcers that develop in the hospital stay. This issue is important to hospital care providers because it has implications for the timing of preventive interventions.

**Aim:** Determine the prevalence rate and the features of pressure ulcers among patients' in ICU departments of government hospitals in Palestine.

**Method:** A cross-sectional design has been used to measure the prevalence rate of pressure ulcers in ICU departments of governmental hospitals and to assess the features of pressure ulcers.

**Results:** The prevalence of pressure ulcers in ICU department was 33%, also the prevalence of pressure ulcers stage 2 or more was 7.34%. Most common stage for pressure ulcers was stage 1 (73.77%). The most common sites of pressure ulcers are different site of vertebra 35 (28.6%) heel 19 (15.5%), shoulder 9 (7.7%), and ischium 9 (7.7%). Most of pressure ulcers sized between 1-3cm and depth of 0.5-1cm 21 (72.4%). Unusual locations of pressure ulcers such as forearm (0.8%), hand (2.4%), and neck (5.7%).

**Conclusion:** The prevalence of PUs was 33% most of them was in stage I, when excluded the stage I prevalence was 7.34 %. The author observed that the prevalence of PUs was significantly higher at vertebrae, sacrum and heel of ICU patients consequently, therefore, nursing protocols and skills that aimed at preventing the development of PUs may benefit from increased attention on these regions. The need for comprehensive skin assessment as PUs may develop in usual and unusual locations of patient's body.

---

**Key words:** Pressure Ulcers, PUs features, Prevalence, Palestine.

### Introduction

Different studies have examined the prevalence of pressure ulcers (PUs) in acute care settings, but few have provided information on characteristics of PUs that develop during the hospital stay. This issue is important to hospital care providers because it has implications for the timing of preventive interventions. The goals of this study were to estimate the prevalence of PUs among ICU patients and to identify PUs characteristics in that population. PUs have been found as a disease entity since Centuries. PUs have been discovered in Egyptian mummies, some of which are more than 5,000 years old (Agrawal and Chauhan, 2012). PUs are described as localized injury to the skin and/or underlying tissue, usually over a bony prominence, as a result of pressure or pressure in combination with shear. Pressure ulcer vary in size and severity of tissue layer affected, ranging from skin erythema to damage to muscle and underlying bone (Coleman et al., 2013). The impact PUs have on the quality of life and a financial perspective is influenced by their severity, it is caused financial burden for health care organization PUs have stages, stage 1: area in the body have redness, stage 2: occur destroy in the skin, stage 3: PU reach to fat tissue, stage 4: PU reach to muscle and bone, unstageable PU: full thickness tissue loss and the main depth of PU was unknown, deep tissue injury:

---

\*<sup>1</sup> Corresponding author, Assistant Professor, Faculty of medicine and health sciences, An-Najah National University, , PO box 7, Nablus, Palestine, E mail: [jamal9877@najah.edu](mailto:jamal9877@najah.edu) <sup>2</sup> RN, MSN, Instructor, Pharmacy, Nursing and Health professions college, Birzeit University, , Birzeit, Palestine, E mail: [oalmahmoud@birzeit.edu](mailto:oalmahmoud@birzeit.edu)

When the skin intact, the depth unknown, just localized area have purple or macron color as shape of blister but fill with blood result from damage underlying tissue from pressure or shear (Coleman et al., 2014).

**Aim of the study:**

The objectives of this study were to examine the prevalence of pressure ulcers (PUs) among patients in ICU departments of government hospitals in Palestine and to identify the features of PUs in that population.

**Study design:**

A cross sectional study was used to identify the prevalence rate of PUs and the features that associated with PUs development among ICU patients in Palestinian governmental hospitals.

**Study setting:**

The study conducted in the intensive care units (ICUs) of five governmental hospitals (Rafedia hospital, Al - Watani hospital, Darwish Nazal hospital, PMC hospital, and Alia hospital) in four different cities in Palestine.

**Population and sample:**

All patients admitted to the ICUs departments between September, 27, 2017 and October, 27, 2017. The total population derived from five hospitals in four cities included 109 patients. The number of patients of Rafedia hospital was 29 (26.6%) patients, Al-Watani hospital was 9 (8.2%) patients, Darwish Nazal hospital was 14 (12.8%) patients, PMC hospital was 45 (41.3%) patients and, finally, Alia hospital was 12 (11.0%) patients. All patients admitted to ICU departments who aged more than 18 year were included while patients who aged equal or less than 18years, patients who did not accept participation, or patients who refused sign informed consent were excluded.

**Data collection:**

The researchers used data collection sheets that contained three sections. Section one contains the demographic data such as age, gender, weight, height, BMI. Second section, based on EPUAP guidelines, contains the skin assessment such as skin color, temperature, moisture, absence of erythema, wound, and edema. Approval of Institutional review board at An-Najah National University and Ministry of Health was obtained. Data collection from selected hospital conducted daily for one month. Before began assessment, researcher explained the purpose of the study and got a consent form from each participant. Initially, all patients who admitted ICU were assessed to determine any abnormalities such as abnormal heat, redness and erythema. Assessment focused on bony prominence areas.

Initially, researchers took all patients who admitted ICU and observe their bodies to determine any abnormalities such as abnormal heat, redness and erythema. During assessment researchers focused on bony prominence because increased risk of PUs in these locations. We used many tools in this study: swap culture to determine depth of PUs, slide to observe blanchable or nonblanchable erythema, ruler to measure PUs and erythema size.

**Statistical Analysis:**

Descriptive analysis, mean, median, standard deviation, maximum, minimum, percentage and frequency, was used.

**Ethical Considerations:**

Ethical approval by IRB (Institutional Review Board) at An-Najah National University, and Ministry of health. The patient's consent before began the assessment and code number was used rather than name of participants to keep privacy.

## Results

### General data of patients

**Table1: Demographic data of the participants (N=109)**

Variables		Frequency	Percent		
<b>Gender</b>	Female	60	55.0		
	Male	49	45.0		
<b>Residency</b>	Nablus	35	32.1		
	Qalqilia	14	12.8		
	Ramallah	43	39.4		
	Hebron	12	11.0		
	Tulkarem	4	3.7		
	Jenin	1	0.9		
<b>Hospital</b>	Rafedia	29	26.6		
	Al Watani	9	8.2		
	Darwish Nazal	14	12.8		
	PMC	45	41.3		
	Alia	12	11.0		
<b>Weight categories</b>	Underweight	2	1.83		
	Normal	31	28.44		
	Overweight	46	42.20		
	Obese	30	27.5		
	<b>Mean</b>	<b>SD</b>	<b>Median</b>	<b>MIN</b>	<b>MAX</b>
<b>Age (years)</b>	54.7	21.0	55.0	19.0	105
<b>Weight (Kg)</b>	78.2	16.4	80.0	40.0	125
<b>Height (cm)</b>	169.0	8.4	170.0	145	188
<b>BMI</b>	27.3	5.2	27.1	13.0	42.9

**BMI:** body mass index    **SD:** standard deviation    **MIN:** minimum    **MAX:** maximum

**PMC:** Palestinian medical complex

Table 1 shows the characteristics of participants. Fifty five of participants were female, and most of participants were from Ramallah 43 (39.4%), in addition, most of participants were from PMC hospital 45 (41.3%). The mean age of participants was 54.7 years old and range from 19-105 years. The mean weight of participants was 78.2 KG, with mean height of 169 cm and range from 145 – 188 cm. The mean of BMI of participants was 27.3 and range from 13.0 – 42.9 for all participants. Most of participants (42.2%) were overweight, whereas 28.44% were normal BMI, 27.5% of participants were obese and 1.83% of participants were underweight.

**Table 2: Medical records of participants among ICU departments (N=109)**

Variables		Frequency	Percent
<b>Diagnosis</b>	Medical	72	66.1
	Surgical	19	17.4
	Traumatic	7	6.4
	Gyna	11	10.1
<b>Medical history</b>	Yes	70	35.8
	No	39	64.2
<b>Surgical history</b>	Yes	36	33
	No	73	67
<b>Medication</b>	Yes	109	100

**ICU:** intensive care unit.

According to table 2, most of participants (66.1%) were medical cases, 17.4% of participants were surgical cases, 6.4% of participants were traumatic cases and 10.1% were gynecological cases. Moreover, 35.8% of participants had medical history, 33% of participants had surgical history, and all participants were on medications.

**Table 3: Skin assessment of participants among ICU departments (N=109)**

Variables		Frequency	Percent
Color of the skin	Normal	25	22.9
	Pale	70	64.2
	Yellowish	9	8.3
	Redness	32	2.8
	Cyanosis	2	1.8
Erythema	Yes	59	54.1
	No	50	45.87
Blanchable	Yes	52	47.7
	No	57	52.3
Non-Blanchable	Yes	27	33.9
	No	72	66.1
Body temp	Normal	54	49.5
	Warm	31	28.4
	Cool	24	22
Abnormal temp in body	No	66	60.6
	Yes ( hotness )	43	39.4
Texture	Smooth	75	68.8
	Rough	34	31.2
Moisture	Normal	51	46.8
	Dry	44	40.4
	Wet	14	12.8
Wound	Yes	30	27.5
	No	79	72.5
Blister	Yes	3	2.8
	No	106	97.2
Skin indurations	Yes	5	4.6
	No	104	95.4
Edema	Yes	29	26.6
	No	80	73.4
Friction	Yes	29	26.6
	No	80	73.4

**Temp:** temperature    **ICU:** intensive care unit.

The results in table 3 show that most of participants (64.2%) had pale color, also exhibit that prevalence of nonblanchable erythema was 33.9% (n= 27), as well the findings appear that body temperature for most of participants was normal temperature 49.5%, the abnormal temperature in the body recommended in 43 (39.4%) of participants which have hotness in specific location in the body.

The results also reveal that 68.8% (n=75) of participants have normal skin moisture and 68.8% (n=51) of participants have smooth skin texture, the results also show that 79 (72.5%) of participants did not have wound in the skin, blister appear in 3 (2.8%) of participants and 95.4% of participants did not have indurations in the skin. The results also display that 29 (26.6%) of participants have edema and 29 (26.6%) of participants exposed to friction.

**Table 4: characteristic of Nonblanchable erythema of participants among ICU departments (N=109)**

Variables		Frequency	Percent
Location	Ear	1	1.06
	A round neck	6	6.38
	Scapula	8	8.51
	Vertebra	18	19.14
	Sacrum	7	7.44
	Shoulder	9	9.57
	Humor	2	2.12
	Elbow	1	1.06
	Forearm	2	2.12
	Hand	1	1.06
	Hip	1	1.06
	Ischium	6	6.38
	Lower thigh	6	6.38
	Tibia	3	3.2
	Heel	16	17.02
	Foot	7	7.44
	Size	1- 3	67
4- 6		21	22.34
7- 10		6	4.38

ICU: intensive care unit.

The results in table 4 show that most common sites for nonblanchable erythema was vertebra (19%) , also exhibit that most size for nonblank hable erythema was range from 1-3 (71.06%)

**Table 5: Most common location for abnormal temperature of participants among ICU departments (N=109)**

Variables	Frequency	Percentage
Occipital	1	1.56
Scapula	2	2.70
Vertebra	34	45.94
Sacrum	6	8.10
Shoulder	3	4.05
Elbow	3	4.05
Ischia	2	2.70
Lower thigh	5	6.75
Knee	3	4.05
Tibia	3	4.05

ICU: intensive care unit.

According to results in table 5, the most common sites for abnormal temperature was vertebra 45.94%, follow it the sacrum 8.10%.

**Table 6: Blister location of participants among ICU departments (N=109)**

Variables	Frequency	Percentage
Right arm	2	25.0
Left arm	2	25.0
Right thigh	1	12.5
Left thigh	2	25.0
Back	1	12.5

ICU: intensive care unit

The results in table 6 exhibit that blister distributed on right arm, left arm and left thigh as common location for blisters.

**Table 7: Characteristic of skin indurations of participants among ICU departments (N=109)**

Variables		Frequency	Percentage
location	Head	1	25.0
	Upper extremities	2	50
	Lower extremities	1	25.0
Size	1cm	1	25.0
	2cm	1	25.0
	4cm	1	25.5
	5cm	1	25.5
Height	1cm	3	75.5
	3cm	1	25.5

**Cm:** centimeter **ICU:** intensive care unit

Table 7 displays that 50% from indurations in the upper extremities, and the most common height for indurations it is 3cm.

**Table 8: characteristic of edema of participants among ICU departments (N=109)**

Variables		Frequency	Percentage
Location of edema	Right / Left arm	4	5.4
	Right hand	12	16.21
	Left hand	7	9.45
	Right thigh	5	6.75
	Left thigh	4	5.40
	Right / Left foot	30	40.54
	Right ankle	5	6.75
	Left ankle	7	9.45
Grades of edema	1	16	14.03
	2	14	12.28
	3	2	1.754
	4	2	1.754

**Table 9: measures used for prevention of PUs in ICU department (N=109):**

Variables		Frequency	Percentage
Change position	Yes	40	36.7
	No	69	63.3
Number of nurse did change position	0	69	63.3
	1	4	3.7
	2	36	33.0
Change position time per day	0	69	63.3
	1	3	2.8
	2	27	24.8
	3	1	0.9
	4	7	6.4
	7	1	0.9
	12	1	0.9
	Use of air matrix	Yes	8
	No	101	92.7
Other devices	Yes	4	3.7
	No	105	96.3
Name of other devices	Donut	3	2.8
	Elastic stock	1	0.9

**ICU:** intensive care unit

According to results in table 8, the most common location for edema was Right / Left foot (20.27%) , in addition the most common grade for was edema grade 1 (14,03%).**ICU:** intensive care unit The results in table 9, exhibit that change position done for 40 (36.7%) of patients, also show that two nurses participated in change position in 33.0%, most nurses do change position each 2 hour, in addition it appear that use of air matrix is very low in ICU

department, other devices used in 3.7% of participants that include the donut that used in 3 (2.8%) of participants and elastic shock that used in 1 (0.9%) participant.

**Table 10: Features of PUs of participants among ICU departments (N=109)**

Variables	Frequency	Percentage
<b>PUs</b>	Yes	36
	No	73
<b>PUs &gt; stage 1</b>	Yes	8
	No	101
<b>PUs stages</b>	Stage 1	90
	Stage 2	18
	Stage 3	10
	Stage 4	1
	Deep tissue injury	1
<b>PUs locations</b>	Unstageable PUs	2
	Ear	3
	A round neck	7
	Scapula	11
	Vertebra	22
	Sacrum	13
	Shoulder	9
	Humor	1
	Elbow	4
	Forearm	1
	Hand	3
	Hip	1
	Ischium	9
	Lower thigh	8
	Tibia	5
<b>PUs sizes</b>	Ankle	1
	Heel	19
	Foot	5
	1-3cm	72
	4-6 cm	38
<b>PUs depths</b>	7-15cm	12
	0.2 cm	5
	0.5 cm	14
	1 cm	7
	2 cm	2
	4 cm	1

**PUs:** pressure ulcers

**ICU:** intensive care unit

The results in table 10 exhibit that prevalence of PUs in ICU department was 33%, also the prevalence of PUs stage 2 or more was 7.34%. Most common stage for PUs was stage 1 (73.77%). The most common sites of PUs are different site of vertebra 35 (28.6%) heel 19 (15.5%), shoulder 9 (7.7%), and ischium 9 (7.7%). Most of PUs sized between 1-3cm and depth of 0.5-1cm 21 (72.4%). Unusual locations of pressure ulcers such as forearm (0.8%), hand (2.4%), and neck (5.7%).

### Discussion:

PUs is frequently occurring in hospitalized inpatients especially in ICU patients all over the world. This study conducted to assess the prevalence of PUs in Palestine and to identify the features of PUs in this population. Although PUs distress and discourage the patients, provide a route for infection, complicate recovery, greatly increase nursing time, effort and costs of state, significantly delay discharge from the hospital, and may contribute to mortality in certain patients, but unfortunately, there is no study in Palestine on the PUs and its' features among ICU patients up to our search.

Our data show that the prevalence of PUs was 33% and prevalence of PUs more than stage 1 was 7.34%. the prevalence of PUs in Palestine are higher than that in European countries, as in comparison with Vanderwee et al. (2007) who did a research in 25 hospitals of the Europe and reported that the prevalence of stage I-IV PUs was 18.1% and the prevalence of PUs was 27% in Sweden teaching hospitals. This phenomenon can be interpreted with several reasons. Firstly, the institutions participated in survey are different. In European countries, the institutions include therapeutic hospitals, universities, teaching hospitals, long-term care units and nursing homes. In this study, 5 governmental therapeutic hospitals participated in survey; the total population derived from five hospitals in four cities included 109 patients, which is relatively a small sample than that of European survey.

Secondly, many studies show that the prevalence can be different in countries having different ethnic people. In Ireland, the prevalence of PUs in 3 University Teaching Hospitals was 18.5% (Gallagher et al., 2008). It was 21.1% to 23% in the teaching hospitals and general hospitals of Sweden and the British (Gunningberg et al., 2013; James et al., 2010; Vande rwee et al., 2007). The prevalence in Italy was 8.3% and in Portugal was 12.5%, the prevalence in Japanese was 3.5-69 %, and in India was 4.94% (Agrawal and Chauhan, 2012). In Palestine there are no different ethnic groups which may made prevalence higher. Thirdly, it is due to demographic characteristics. Wann-Hansson et al. (2008) reported that PUs prevalence was significantly higher in age over 70 years ( $P < 0.001$ ) in the University Hospital in Sweden. In this study, the mean age of participants was 54.7 years old which having a lower percentage of aged patients.

In the present study, 73.77% of the PUs were in stage I, which is consistent with the findings of other studies. Wann-Hansson et al. (2008) reported that stage I PUs accounted for 50.7% in Sweden teaching hospital. Vanderwee et al. (2007) found that stage I PUs accounted for 42.1% in 25 teaching and general hospitals of the five countries in Europe.

Visual cues for changes in skin appearance may be relatively easy to observe in Caucasian skin but with darker pigmentation it may be harder to spot visual signs of early changes due to pressure damage (NPUAP and EPUAP, 2009). As, the researcher uses visual cues to classify PUs, Palestinians are Caucasian (white pigmented skin), which may explains that the majority 73.77% of PUs detected were stage 1, which is dissimilar to other international studies.

The prevalence of stage I PUs in Palestine was higher than that in European countries as well as Arab country such as Jordan and Saudi Arabia. The reason may be due to different populations, preventive measures and different staging criteria of PUs. In this study, PUs stage used is the NPUAP update in 2007, which including stage I-IV, adding unstageable and suspected deep tissue injury two kinds of special classification. Wann-Hansson and Vanderwee used the 1999 EPUAP grading system (grade 1-4). Our results indicated that hospitalized patients' stage I and II PUs (73.77% and 14.75%) respectively, were major prevention targets in inpatients in Palestine.

Regarding the location of the PUs, in the present study, 18.03% of PUs occur in the vertebra, especially in sacrum followed by heel. the findings corroborate international studies, in which prevalence is evident of PUs in the sacral, trochanteric and calcaneal region, considered the location of support when the patient is in a supine or lateral position; common position in critically ill patients (NPUAP and EPUAP, 2009).

The study done in Jordan by Tubaishat exhibits prevalence of PUs was 16% and sacrum was the most common site among a total sample of 295 participants, in comparing with Tubaishat, gender and age variables, 58% of their sample were male and 42% were female and the mean of age in their study 49.1 years whereas in presents study the sample was 109 participants, 55% were female and 45% were male, the mean of age was 54.7 years and prevalence was 33%, and most common site was vertebra. Another study done in Saudi Arabia by Fiona Coyer (2017) found prevalence 11.5%, and prevalence of PUs > stage 1 was 11.2%, the most common site was sacrum. this can be explained as the sample in current studies was small in comparing with past study, the results of presents study appear that only 7.3% of nursing was used air matrix for prevent of PUs.

Also the results exhibits low knowledge level of nursing about how to prevent PUs (Qaddumi & khawaldeh, 2014) which evidenced by using inappropriate devices such as donut. In both studies, men had a significantly high percentage (58%, and 45%); older women have a lower waist-hip ratio (Shimokata et al., 1989) and larger hip circumference (Perissinotto et al., 2002) than do men.



Thicker gluteal subcutaneous fat may protect women from the effects of pressure on the part of the body that is most vulnerable to immobility-related PUs. These could explain the relatively high PUs prevalence in each study, and the differences in the results between presents study and past studies. Moreover, although, patients with low BMI is risky to develop PUs, those with obesity can develop sores in unusual places. Studies show that obese people have a 1.5 times higher rate of developing pressure ulcers. And this may explained the higher rate and unusual locations of PUs such as forearm, hand and neck in our study in addition to shear force due to improper change position when done by one nurse. Finally, the effect of climate especially the humidity nature in Palestine must also be considered, as skin assessment of the selected sample was done between September and October, Autumn season in Palestine, where humidity in Ramallah city (39.4% of the sample) about 65%, and the average temperature 75°F to 80°F, which considered relatively hot and humidified environment that may contribute to this trend.

## Conclusion

The occurrence rate of PUs greatly depends on population, health care condition, and resources of country. The prevalence of PUs was 33% most of them was in stage I, when excluded the stage I prevalence was 7.34 %. The author observed that the prevalence of PU was significantly higher at vertebrae, sacrum and heel of ICU patients consequently, therefore, nursing protocols and skills that aimed at preventing the development of PU may benefit from increased attention on these regions .In this study change position was not effective related to dishonesty among nurses when ask them, not able follow up periodically and the most not use air matrix. The need for comprehensive skin assessment as PUs may develop in usual and unusual locations of patient's body.

## References

- Agrawal, K. & Chauhan, N. (2012). Pressure ulcers: Back to the basics. *Indian Journal of Plastic Surgery : Official Publication of the Association of Plastic Surgeons of India*, 45, 244-254.
- Coleman, S., Gorecki, C., Nelson, E. A., Closs, S. J., Defloor, T., Halfens, R., Farrin, A., Brown, J., Schoonhoven, L. & Nixon, J. (2013). Patient risk factors for pressure ulcer development: systematic review. *Int J Nurs Stud*, 50, 974-1003.
- Coleman, S., Nixon, J., Keen, J., Wilson, L., Mcginnis, E., Dealey, C., Stubbs, N., Farrin, A., Dowding, D., Schols, J. M. G. A., Cuddigan, J., Berlowitz, D., Jude, E., Vowden, P., Schoonhoven, L., Bader, D. L., Gefen, A., Oomens, C. W. J. & Nelson, E. A. (2014). A new pressure ulcer conceptual framework. *Journal of Advanced Nursing*; 70, 2222-2234.
- Coyer, F., & Tayyib, N. (2017). Risk factors for pressure injury development in critically ill patients in the intensive care unit: a systematic review protocol. *Systematic Reviews*, 6, 58. <http://doi.org/10.1186/s13643-017-0451-5>
- Gallagher, P., Barry, P., Hartigan, I., McCluskey, P., O'Connor, K., O'Connor, M.(2008). Prevalence of pressure ulcers in three university teaching hospitals in Ireland. *J Tissue Viability*. 17:103–9.
- Gunningberg, L., Hommel, A., Baath, C., Idvall, E. (2013). The first national pressure ulcer prevalence survey in county council and municipality settings in Sweden. *J Eval Clin Pract*; 19:862–7.
- James, J., Evans, J.A., Young, T., Clark, M. (2010). Pressure ulcer prevalence across Welsh orthopaedic units and community hospitals: surveys based on the European Pressure Ulcer Advisory Panel minimum data set. *Int Wound J*. 7:147–52.
- National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel (2009) *Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline*. Washington DC: National Pressure Ulcer Advisory Panel.
- National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance (2014). *Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline*. Emily Haesler (Ed.). Cambridge Media: Osborne Park, Western Australia.
- Perissinotto, E., Pisent, C., Sergi, G., Grigoletto, F., Enzi, G. (2002). Anthropometric measurements in the elderly: age and gender differences. *Br J Nutr*. 87:177-186.
- Qaddumi, J., & Khawaldeh, A. (2014). Pressure ulcer prevention knowledge among Jordanian nurses: a cross-sectional study. *BMC Nursing*, 13(1). doi:10.1186/1472-6955-13-6
- Shimokata, H., Tobin, J.D., Muller, D.C., Elahi, D., Coon, P.J., Andres, R. (1989). Studies in the distribution of body fat: I. Effects of age, sex, and obesity. *J Gerontol*. 44:M66-M73.
- Tubaishat, A., & Aljezawi, M. (2013). The prevalence of pressure ulceration among Jordanian hospitalised patients. *J Wound Care*, 22, 305-6, 308-10.
- Tubaishat, A., Anthony, D. & Saleh, M. (2011). Pressure ulcers in Jordan: a point prevalence study. *J Tissue Viability*, 20, 14-9.
- Vanderwee, K., Clark, M., Dealey, C., Gunningberg, L., Defloor, T. (2007). Pressure ulcer prevalence in Europe: a pilot study. *J Eval Clin Pract*. 13:227–35.
- Wann-Hansson, C., Hagell, P., Willman, A. (2008). Risk factors and prevention among patients with hospital-acquired and pre-existing pressure ulcers in an acute care hospital. *J Clin Nurs*. 17:1718–27.