Healthcare Associated Conditions, the Case of Pressure Ulcers as a Quality Metric among Healthcare Staff

Emadeddin Sherif Tamb   Hassen Abdelaziz Mahmoud   Madani Ebneouf Elata

Abstract

The study discusses pressure ulcers' awareness and practice among healthcare staff, including procedures and policy, assuming those staff members are fully aware and have efficient policies. The study also explores what health care staff suggest in order to improve patient safety practices in their establishments. Descriptive analytical approach applied in this paper, to explore multiple aspects of the topic. The researchers use (Google Docs) online platform to create, distribute, and collect the questionnaire, which contain seven phrases. Statgraphics Centurion version 19 is used to carry out the statistical analyses of responses gathered from 118 participant. Statistical analysis includes several tests: Likert scale, and analysis of means (ANOM), and text mining using R. Results show that respondents are confidently sure about their knowledge about pressure ulcer. Patients in participants' institutions does not get examined upon admission nor during their stay, for pressure ulcer. Patient safety policy, and procedures are not fully deployed nor communicated in participants' institutions. There are no documented work instructions, neither a procedure to handle pressure ulcer in respondents'' institutions. Respondents do not get systematic continuous training programs regarding patient safety. Awareness, quality, training, and courses are areas for improvement, as suggested by the participants. The study also arrived to some recommendations such as training staff in order to accurately identify pressure ulcers and tissue damage from pressure, designing and executing adequate patient safety programs, policies, and procedures, and finally more commitment to quality.

Key Words: Quality metrics, Healthcare Quality, Policies, Procedures, Pressure Ulcer.

مستخلص

تناقش الدراسة مستوى الوعي لدى العاملين بقطاع الرعاية الصحية، بقرحة الضغط والممارسة العملية لمكافحتها، بما في ذلك الإجراءات والسياسات ، وتنطلق الدراسة من افتراض أن أولئك العاملين على وعي تام ولديهم سياسات فعالة فيما يخص قرحة الضغط. وتستكشف الدراسة أيضا ما يقترحه المبحوثين من العاملين بالرعاية الصحية، من أجل تحسين ممارسات سلامة المرضى في مؤسساتهم. لاستكشاف جوانب متعددة من هذا الموضوع. إستخدم الباحث تطبيق (مستندات قوقل) لتصمبم وتوزيع وجمع بيانات الاستبانة، التي احتوت يحتوي على سبع عبارات، على عدد (118) مستجيب. تم استخدام برنامج (ستاتقرافيكس) النسخة 19، واختبارات الإحصاء الوصفي, وتحليل مدرج ليكرت، وتحليل المتوسطات (ANOM) ، بالإضافة الى تحليل النصوص باستخدام برنامج (R) للبرمجة الإحصائية . تظهر النتائج أن المستجيبين واثقون بشدة من مستوى معرفتهم بقرحة الضغط. كذلك بحسب استجابة المبحوثين فإن المرضى في المؤسسات لا يتم فحصهم عند التنويم ولا أثناء إقامتهم بالمسنشفى. من ناحية سياسة سلامة المرضى، والإجراءات الخاصة بقرحة الضغط فإنه لم يتم تمليكها للعاملين بالمستشفى ولا نشرها بالصورة الكافية. كما أنه لا

توجد أي تعليمات عمل أو إجراءات موثقة للتعامل مع قرحة الضغط في المؤسسات التي ينتمي إليها المبحوثين. كذلك فإن المبحوثين لا يحصلون على برامج تدريبية منتظمة بشأن سلامة المرضى. وأخيراً فالوعي والجودة والتدريب والدورات هي مجالات التحسين التي اقترحها المشاركون. أوصت الدراسة ببعض التوصيات منها تدريب الموظفين من أجل التحديد الدقيق لقرحة الضغط ومكافحتها ، وتصميم وتنفيذ برامج كافية لسلامة المرضى تشمل السياسات والإجراءات ، وأخيراً المزيد من الالتزام بالجودة.

الكلمات المفتاحية: مؤشرات الجودة، جودة الرعاية الصحية، السياسات، الإجراءات، قرحة الضغط

Introduction

Pressure ulcer (PU), also known as Pressure sore or Bed sore is one of the hospital- acquired conditions (HACs). Those (HACs) – as the name implies- are connected to health care services, in which the long term of sitting on a wheelchair or lying on a bed rises the possibility of developing a harmful pressure points on the skin. Later, accompanied by other variables, skin begins to develop that situation of color change and evolving sore, some studies show that pressure ulcers are a leading cause of preventable medical error in the United States, and state and federal regulators now consider their presence an indicator of poor-quality health care. (Institute of Medicine, 1999) P1

Problem and goal of the study

The study discusses pressure ulcers' awareness and practice among healthcare staff, including procedures and policy, assuming those staff are fully aware, and policies are efficient. The study also explores what health care staff suggest in order to improve patient safety practices in their establishments. Special attention is drawn about the procedural side that deals with patient safety policy, staff training, (HACs) prevention and mitigation procedure, and finally documentation.

Theoretical Framework

Panel (NPUAP), a multidisciplinary group of experts in pressure injury, shows that Pressure ulcers occur with a frequency between 10 and 18% in intensive care units, between 2.3 and 28% in long-term care units and between 0 and 29% in home care units (Kaşıkçı & Aksoy, 2018), however, they are eminently preventable and treatable in their early stages. Consequently, the reduction of (PUs) in acute care has been identified by the National Quality Forum (NQF) and the Agency for Healthcare Research and Quality (AHRQ) as an important quality metric, and both agencies have published frameworks for tackling this issue. (Berlowitz et al, 2011) p 7. Efforts to improve quality and reduce cost often focus on reducing complications that patients develop during hospitalization, known as hospital-acquired conditions (HACs) (Wikipedia, 2020).
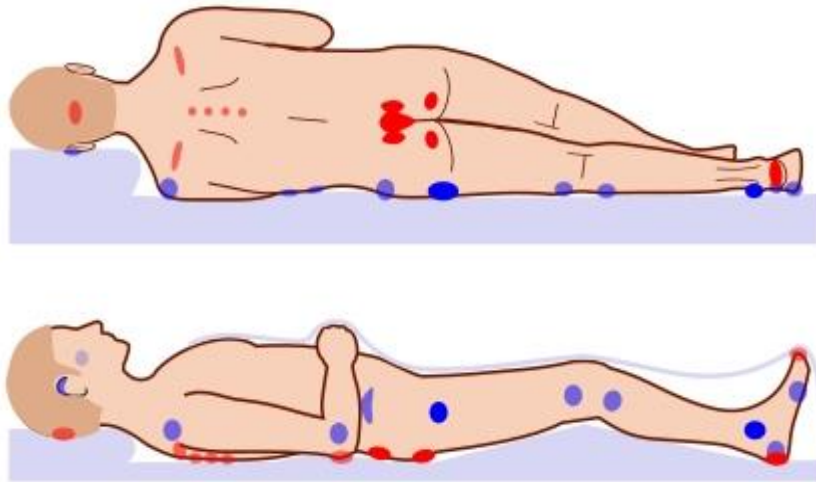
Exhibit (1) Pressure Points sides and back – (Par JMarch Bnm-Sante, 2021)

Complications

Pressure ulcers can cause patients serious harm and can affect their ability to function. Caused by pressure most often over a bony prominence, these ulcers can cause serious infection and require plastic surgery as well as long-term intervention. Chronic ulcers can take months to years to heal and may require long-term nursing care. It is therefore important for the medical staff to understand how pressure ulcers occur, to have a clear means of identification, and to understand why prevention is necessary. (Dziedzic, 2014) P3.

Measuring & Scoring of (PUs)

The Braden Scale for Predicting Pressure Sore Risk was developed during a Robert Wood Johnson Teaching Nursing Home project and while writing an NIH proposal to study pressure ulcer risk factors. The Braden Scale was initially tested for reliability and validity and these results were published in Nursing Research in 1987. Grading from severe risk (less than or equals to 9), to mild risk (15-18) considering six factors, Sensory Perception which is the ability to respond meaningfully to pressure related discomfort. Moisture, the degree to which skin is exposed to moisture. Activity, degree of physical activity. Mobility, ability to change and control body position. Nutrition, usual food intake pattern. Friction and Shear. All factors divided into levels each reflect a designated score, by summing scores up to total one determines the severity. The total risk for each person to develop PUs can be estimated in accordance with different scales: one of these is the Braden scale, which is based on several risk factors, such as poor motion activity, but also temperature, skin humidity and malnutrition. (Hayn et al, 2015) p 106,537:2, the other is Waterlow scale, which provide guidance in preventing also (Waterlow, 2005) p 1. The Braden Scale is a summated rating scale made up of six subscales scored from 1-3 or 4, for total scores that range from 6-23. A lower Braden Scale Score indicates a lower level of functioning and, therefore, a higher level

of risk for pressure ulcer development. A score of 19 or higher, for instance, would indicate that the patient is at low risk, with

no need for treatment at this time. The assessment can also be used to evaluate the course of a particular treatment. (Brigg, 1988) p1

Exhibit (2) Waterlow Scale Policy (Waterlow, 2005)

Policy & procedures

"People tend to reach for written standards during 'a crisis,' when their focus is divided. So things need to be simple. Bottom line: you shouldn't need an interpreter to read a written standard." (RLDatix, 2019) p2. As per (PUs), policies may differ according to various factors, but usually consists of common outlines which could be summarized in: table of contents of the policy document, a clearly defined scope, and introduction. Then, explains the statement of intent, definitions, and responsibility of clinical staff. details of the policy contains risk and skin assessment, preventing damage to the skin, positioning, seating, nutrition, grading pressure ulcers, monitoring, reporting, caregiver and patient education, and training. Policy also contains related procedures, policies, forms and records. Final part is appendices which completes the needed exhibits, documents, and references. (Comberia Foundation, 2017) pp 3, 4. There are three practice metrics to assess implementation of best practice guideline recommendations:

i. Nurse compliance with use of a validated pressure ulcer risk assessment and intervention checklist;
ii. Accuracy of risk assessment scoring in usual-care nurses and experienced injury prevention nurses;
iii. Use of pressure ulcer prevention strategies. (Barker et al, 2012) p313.

Turning schedule

Turning schedule may be used to organize care on nursing units with large numbers of patients who are at risk for pressure sores. Patients on a team or unit can be

assigned to one of three schedules in a balanced manner, e.g. if six patients are at risk, 2 would be assigned to each of the three schedules. These schedules may have to be adjusted to each

day, depending on other components of the patient's schedule. Example below (Cumbria Trust, 2017):

Direction of Turn	Schedule 1	Schedule 2	Schedule 3
Back (breakfast/bath)	7:00 – 9:00 am	7:30 – 9: 30 am	8:00 – 10:00 am
ight side	9:00 – 11:00 am	9:30 – 11:30 am	10:00 – noon
ack (lunch)	11:00 – 1:00 pm	11: 30 – 1: 30 pm	12:00 – 2:00 pm
Left side	1:00 – 3:00 pm	1: 30 – 3: 30 pm	2:00 – 4:00 pm
ight side	3:00 – 5:00 pm	3: 30 – 5: 30 pm	4:00 – 6:00 pm
ack (dinner)	5:00 – 7:00 pm	5: 30 – 7: 30 pm	6:00 – 8:00 pm
eft side	7:00 – 9:00 pm	7: 30 – 9: 30 pm	8:00 – 10: 00 pm
ight side	9:00 – 11:00 pm	9: 30 – 11: 30 pm	10:00 – midnight
Back	11:00 – 1:00 am	11: 30 – 1: 30 am	Midnight – 2:00 am
eft side	1:00 – 3:00 am	1: 30 – 3: 30 am	2:00 – 4:00 am
ight side	3:00 – 5:00 am	3: 30 – 5: 30 am	4:00 – 6:00 am
eft side	5:00 – 7:00 am	5:30 – 7: 30 am	6:00 – 8:00 am

Table (1) turning schedule

Prevention

Pressure ulcer prevention and management should be patient centred and an integral part of patient care, which requires a multidisciplinary approach. Many healthcare institutions as Sussex Partnership NHS Foundation Trust have a zero tolerance to pressure ulceration and it is everyone's responsibility to reduce the risk of a patient developing pressure ulceration whilst in their care. (Wikipedia, 2020). A pressure ulcer prevention program consists of several proven methods: proper identification of ulcers, assessing risk for development, using pressure ulcer prevention modalities, completing appropriate skin assessment on a regular basis, clear documentation, and appropriately caring for pressure ulcers that do occur so that they heal or do not get worse. The main issue with program development is having everyone do the same thing at all times without variance. (Dziedzic, 2014) P130. The use of emollients and moisturizers during skin care can also prevent friction. Moisturizers can ease cracked skin and provide comfort. The use of gentle barrier creams is an essential part of a skin care program (Lyder, 2008). Gentle daily skin cleansing is essential not only for health but to prevent skin issues. Humidification provides moist air and a moist environment for the skin. When the air inside is dry it removes moisture from the body. Dry skin is not protected and injury can occur. It is therefore necessary to put water back into the air through humidification. (Dziedzic, 2014) P61. It's been known that patient's level of risk for development of pressure ulcers.is based on six indicators: sensory perception, moisture, activity, mobility, nutrition, and friction or shear. (Brigg, 1988) P1. For that, Nutrition is another consideration in the prevention and treatment of skin ulcers.

Poor patient outcomes in general are a result of poor nutrition. The incidence of pressure ulcers increases when patients have significant weight loss or problems eating. Pressure

ulcers also increase in patients who have poor nutrition, protein deficits, and dehydration. Without appropriate nutrients or a means to obtain them, organs are not fed and

 can cease to function. (Dziedzic, 2014) P71.

Training

Training policy should be synchronizing with Pressure Ulcer prevention and management Policy. (Bergquist-Beringer et al, 2009) P 252 Most institutions relying on nurse-calculated risk scores such as the Braden score to identify high-risk patients. (Cramer et al, 2019) p 1. Education on pressure ulcers in undergraduate nursing programs is often inadequate. A 1993 review of nursing textbooks revealed that content on pressure ulcers was frequently sparse, incomplete, sometimes inaccurate, and often inconsistent. (Vogelpohl & Dougherty, 1993) p50

Machine Learning Approach

In Cramer et al study, researchers demonstrate that an EHR (Electronic Health Records)-based model can outperform the Braden score as a screening tool for PUs. This may be a useful tool for automatic risk stratification early in an admission, helping to guide quality protocols in the ICU, including the allocation and timing of prophylactic interventions. (Cramer et al, 2019) p 9. Researchers trained a range of machine learning algorithms using demographic parameters, diagnosis codes, laboratory values and vitals available from the Electronic Health Records (EHR) within the first 24 hours. A weighted linear regression model showed precision 0.09 and recall 0.71 for future PU development. Classifier performance was not improved by integrating Braden score elements into the model. (Cramer et al, 2019) p 2

Materials & Methods

Descriptive analytical approach applied in this paper, to explore multiple aspects of the topic. The researchers use (Google Docs) online platform to create, distribute, and collect the questionnaire, which contain seven phrases. Statgraphics Centurion version 19 is used to carry out the statistical analyses of responses gathered from 118 participant. Likert scale, and analysis of means (ANOM), and text mining using R statistical programming language in order to examine researchers' hypotheses

Analysis & Results

Likert Plot

Table (2) STATGRAPHICS Centurion 19

Phrase	Not sure	No	Yes
1. I've a good knowledge about pressure ulcer(PU)	0%	0%	100%
2.Patients in my workplace are usually examined and assessed for their probability to develop (PU)	42%	12%	45%
3.Bed sheets and bedlinen fabric materials are made as to prevent the development of (PU)	25%	41%	34%
4.When a patient is suspected vulnerable to develop (PU), a turning schedule (table) immediately put in place	47%	46%	7%
5. Steps and instructions to handle patients with tendency to develop (PU) are documented in a valid, and updated procedures within Patient Safety Policy	33%	59%	9%
6. Patient safety policy and procedures are deployed, and adequately communicated to the responsible medical staff	32%	35%	33%
7.Hospital management continuously provide systematic training programs for medical staff to acquire suitable knowledge and skills regarding patient safety	26%	27%	47%

Table (2) above shows the number of individuals in each Category and the percentage distribution. In the first phrase: I've a good knowledge about pressure ulcer (PU), (100%) all the participant respond with Yes. While (59%) respond with "No' to phrases five: Steps and instructions to handle patients with tendency to develop (PU) are documented in a valid, and updated procedures within Patient Safety Policy. In the third phrases: When a patient is suspected vulnerable to develop (PU), a turning schedule (table) immediately put in place, (47%) respond Not sure.

1. Analysis of Means (ANOM)
2.1 Chi-Square Test

Number of Questions	Sample size	Mean proportion	Chi-square	Df	P-Value
7	118	0.44994	231.57	6	0.00

Table (3) STATGRAPHICS Centurion 19

Table (3) above indicates mean proportion (0.45), with chi-square value (231.57) compared to (12.59) from chi-squared distribution table. P-value is less than (0.05), which suggests significant differences between the responses at the 95% confidence level,

2.2 Comparison of Proportions

Phrase	Count	Proportion	Median	Sig.	Interpretation
1. I've a good knowledge about pressure ulcer(PU)	118	0.0*	YES	0.00	Strongly Agree
2. Patients in my workplace are usually examined and assessed for their probability to develop (PU)	118	0.661972*	NO	0.00	Strongly Disagree
3. Bed sheets and bedlinen fabric materials are made as to prevent the development of (PU)	118	0.325843*	NO	0.00	Strongly Disagree
4. When a patient is suspected vulnerable to develop (PU), a turning schedule (table) immediately put in place	118	0.903226*	NO	0.00	Disagree
5. Steps and instructions to handle patients with tendency to develop (PU) are documented in a valid, and updated procedures within Patient Safety Policy	118	0.493671	NO	0.00	Moderately Disagree
6. Patient safety policy and procedures are deployed, and adequately communicated to the responsible medical staff	118	0.439024	NO	0.00	Moderately Disagree
7. Hospital management continuously provide systematic training programs for medical staff to acquire suitable knowledge and skills regarding patient safety	118	0.325843*	NO	0.00	Strongly Disagree

* = Beyond Limits Table (4) STATGRAPHICS Centurion 19

Table (4) above shows the observed proportion for each of the 7 phrases. In this case, there

are 5 phrases of which responses are significantly different from the grand mean at the 95% confidence level. These proportions are indicated by asterisks and are the samples which fall outside the decision limits, suggesting that participants overwhelmingly agree to the phrase: I've a good knowledge about pressure ulcer (PU). In fourth question respondents disagree to the phrase: "When a patient is suspected vulnerable to develop (PU), a turning schedule (table) immediately put in place". Participants moderately disagree to the phrase: "Patient safety policy and procedures are deployed, and adequately communicated to the responsible medical staff".
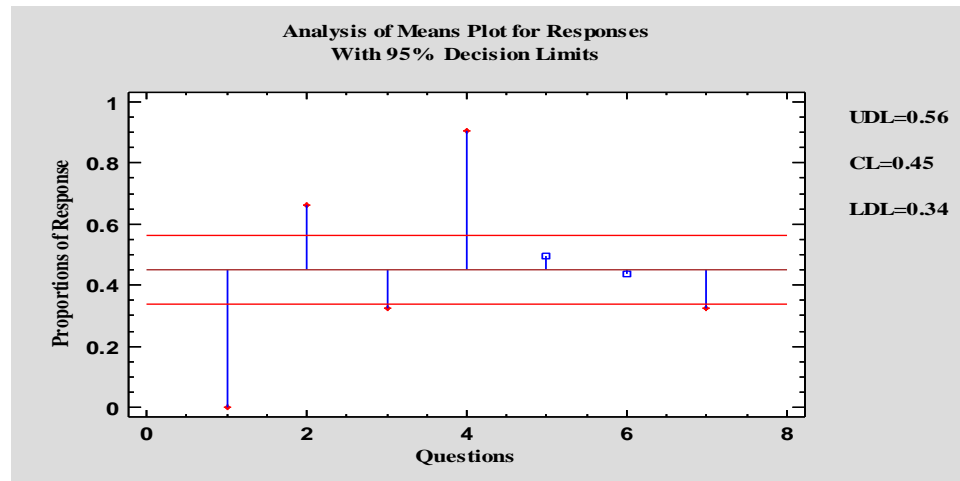
Analysis of Means Plot for Responses
With 95% Decision Limits

UDL=0.56

CL=0.45

LDL=0.34

Exhibit (3) STATGRAPHICS Centurion 19

2. Text Mining:

Major themes have been identified through the comment of respondents in the section of open question. Using text mining techniques reveals that: "Quality" is the term used most frequently, seceded by "Awareness", then "Training". Also "Courses", "Hospital Quality Department", and "Workshops".
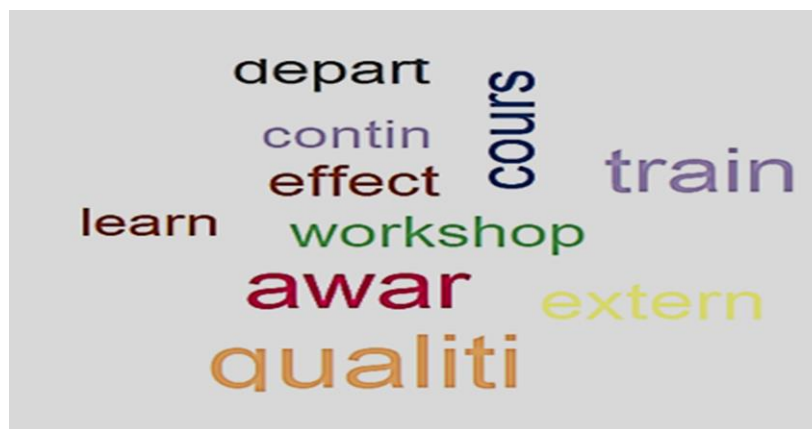

Exhibit (4) Word cloud (R Core Team, 2020) (Feinerer & Hornik, 2019)

Results
1. Respondents are confidently sure about their knowledge about Pressure Ulcer
2. Patients in participants institutions does not get examined upon admission nor during stay, for Pressure Ulcer
3. Patient safety policy, procedures are not fully deployed nor communicated in participants' institutions

4. There are no documented work instructions, or a procedure to handle Pressure Ulcer in respondents'' institutions

5. Respondents do not get systematic continuous training programs regarding patient safety.

6. Awareness, quality, training, and courses are areas for improvement, as suggested by the participants.

Recommendations

1. To train staff in order to accurately identify pressure ulcers, and tissue damage from pressure.

2. To design and execute adequate patient safety programs, policies, and procedures.

3. To more commitment to quality

References

1. Barker, Anna et al, 2012 "Implementation of pressure ulcer prevention best practice recommendations in acute care: an observational study "International Wound Journal ISSN 1742-4801, p311-314"

2. Berlowitz, D, Lukas, C, Parker, V, Niederhauser, A, Silver, J, Logan, C, et al. Preventing Pressure Ulcers in Hospitals: A Toolkit for Improving Quality of Care. Agency for Healthcare Research and Quality; 2011.

3. Braden Scale, Briggs, Des Moines, IA 50306 (800) 247-2343 www.BriggsCorp.com, Barbara Braden and Nancy Bergstrom. Copyright, 1988.

4. Cramer, EM, et al. 2019 Predicting the Incidence of Pressure Ulcers in the Intensive Care Unit Using Machine Learning. eGEMs (Generating Evidence & Methods to improve patient outcomes), 7(1): 49, pp. 1–11. DOI: https://doi.org/10.5334/egems.307

5. Cumbria Partnership Foundation Trust - Tissue Viability Team, 2017 "Pressure Ulcer Policy". Retrieved February 6, 2021, from www. cumbria.nhs.uk

6. Google Docs, 2021 إستبانة قرحة الضغط https://forms.gle/5M6mv7gYAn7tv4DQ9

7. Graph: Word cloud (R Core Team, 2020) (Feinerer & Hornik, 2019)

8. Hayn D, Falgenhauer M, Morak J, Wipfler K, Willner V, Liebhart W, Schreier G (2015) An ehealth system for pressure ulcer risk assessment based on accelerometer and pressure data. J Sens 2015:106,537:1–106,537:8

9. Ingo Feinerer and Kurt Hornik (2019). tm: Text Mining Package. R package version 0.7-7. https://CRAN.R-project.org/package=tm

10. Institute of Medicine. (1999). "To error is human: Building a safer health system". Washington, DC: National Academy Press.

11. Joint Commission International, 2019 The Targeted Solutions Tool® (TST®) International Patient Safety Goals (IPSGs), http://www.jointcommissioninternational.org, Joint Commission Resources.

12. Kaşıkçı M, Aksoy M, Ay E (2018) Investigation of the prevalence of pressure ulcers and patient-related risk factors in hospitals in the province of Erzurum: a cross-sectional study. J Tissue Viability 27(3):135–140. https ://doi. org/10.1016/j.jtv.2018.05.001

13. Lyder, C. (2008). "Pressure ulcers: A patient safety issue. In R. Hughes (Ed.)". Agency for Healthcare Research and Quality. Retrieved December 28, 2020, from www.ncbi.nih.gov/books/NBK2650/

14. Mary Ellen Dziedzic, 2014, "FAST FACTS ABOUT PRESSURE ULCER CARE" Springer Publishing, New York

15. Par JMarch - Travail personnel, CC BY-SA 3.0, Points d'escarres. Rouge: en décubitus dorsal. Bleu: en position couchée sur le côté. retrieved from https://www.bnm-sante.fr/blog/173-soigner-les-escarres-le-miel-de-manuka-remede-naturel-bnm-sante.html?amp=1, October 2021

16. R Core Team (2020). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

17. RLDatix Whitepaper, 2019 "Six common mistakes to avoid when writing policies and procedures" Retrieved June 6, 2021, from www.rldatix.com

18. Sandra Bergquist-Beringer, PhD, RN, CWCN, Jan Davidson, MSN, RN, ARNP, Carolyn Agosto, BSN, RN, Norma K. Linde, MSN, RN, ARNP-C, Marla Abel, BSN, RN, CWCN, Kara Spurling, MSN, RN, NP-C, Nancy Dunton, PhD, and Angela Christopher, BSN, RN 2009, "Evaluation of the National Database of Nursing Quality Indicators (NDNQI) Training Program on Pressure Ulcers" The Journal of Continuing Education in Nursing · June 2009 · Vol 40, No 6, pp 252-258

19. The Joint Commission, 2021 Hospital National Patient Safety Goals simplified 2021 HAP NPSG goals final 11420 retrieved from www.jointcomissionresources.com

20. UK Department of Health & Social Care 2018 "Pressure Ulcer Protocol Pressure Ulcers and the interface with a Safeguarding Enquiry", London, United Kingdom.

21. Vogelpohl, T. S., & Dougherty, J. (1993). "What do nursing students learn about pressure ulcers? A survey of content on pressure ulcers in nursing school textbooks". Decubitus, 6(2), 48-50, 52.

22. Waterlow Pressure Ulcer Prevention/Treatment Policy 1985, Revised 2005, Retrieved March 30, 2021, from www.judy-waterlow.co.uk

23. Wikipedia, 2019, "قرحة فراش", Retrieved December 2019 from https://ar.wikipedia.org/w/index.php?"title=قرحة_فراش&oldid=51843899

24. Wikipedia, 2020 "Pressure Ulcer" https://en.wikipedia.org/w/index.php?title=Pressure_ulcer&oldid=999790020", Retrieved August 10, 2020. Content is available under CC BY-SA 3.0