# RISK FACTOR OF PRESSURE ULCER AMONG SURGICAL PATIENT AT HOSPITAL UNIVERSITI SAINS MALAYSIA

by

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## TABLE OF CONTENTS

## LIST OF TABLES

## LIST OF FIGURES

## ABBREVIATIONS

| | |
|---|---|
| ADLs | Activities Daily Living |
| BMI | Body Mass Index |
| Hospital USM | Hospital Universiti Sains Malaysia, Kubang Kerian Kelantan |
| KPI | Key Performance Index |
| MOH | Minister of Health, Malaysia |
| PMR | *Peperiksaan Menengah Rendah* |
| PT3 | *Pentaksiran Tingkatan Tiga* |
| SOP | Standard of procedure |
| SPM | *Sijil Pelajaran Malaysia* |
| TPN | Total Parenteral Nutrition |
| WHO | World Health Organization |

**Faktor Risiko Kudis Tekanan Terhadap Pesakit Surgikal Di Hospital USM**

## ABSTRAK

Kudis tekanan adalah tisu dan kulit dalam keadaan yang luka disebabkan oleh terdedah pada tekanan yang terlampau lama di permukaan kulit . Kudis tekanan terjadi apabila tekanan yang terlalu lama lebih daripada dua hingga ketiga jam menyebabkan gangguan pengaliran darah ke bahagian tisu dan kulit akhirnya menyebabkan kematian sel tisu. Kajian keratan rentas untuk mengenalpasti faktor risiko kudis tekanan terhadap pesakit surgikal telah dilakukan di Hospital USM. Kajian ini melibatkan 150 responden melalui persempelan rawak sistematik. Soal selidik kendiri telah digunakan untuk pengumpulan data dari bulan Februari 2021 hingga Mac 2021. Umur min responden adalah 51.6 ± tahun, dengan usia antara 18 hingga 90 tahun. Hasil kajian menunjukkan bahawa 84(56%) responden telah berisiko untuk mendapat kudis tekanan, manakala 25(16.7%) telah terdapat kudis tekanan. Terdapat dua perkaitan signifikan sosiodemografik antara mendapat kudis tekanan dalam kalangan pesakit surgikal dengan jenis penyakit kronik (p =0.032 ) dan BMI (p=0.037). Faktor risiko kudis tekanan daripada keterangan 'Braden Scale' telah menunjukkan semua perkaitan enam keterangan tersebut signifikan antara ramalan risiko kudis tekanan dan persepsi deria (p=0.000), kelembapan kulit (p=0.000), status nutrisi (p=0.000), mobiliti (p=0.000), aktiviti (p=0.000), serta geseran dan ricih (p=0.000). Kesimpulannya semua faktor risiko tersebut boleh dielakkan melalui pendidikan kesihatan oleh jururawat kepada pesakit yang dikenal pasti berisiko. Langkah pencegahan juga perlu dilakukan dengan rawatan dan intervensi awal untuk mengelakkan terjadinya kudis tekanan yang boleh mengganggu kualiti hidup dan boleh terdedah kepada pelbagai komplikasi lain.

**Risk Factors of Pressure Ulcer Among Surgical Patient at Hospital USM**

## ABSTRAC

Pressure ulcer are tissues and skin in a wound condition caused by exposure to excessive pressure on the surface of the skin. Pressure ulcer occurs when excessive pressure for more than two to three hours causes disruption of blood flow to the tissues and skin eventually causing the skin and tissues ischemic. Pressure ulcer will start to occur starting with redness and if left untreated the wound will form over time will become large involving tissues, muscles and bones and prone to bacterial infections. The objective this study is to identify the risk factor of pressure ulcer among surgical patient in Hospital USM. The study involved 150 respondents through systematic random sampling. Self -questionnaires were used for data collection from February 2021 to March 2021. The mean age of the respondents was 51.6 ± years, with ages ranging from 18 to 90 years. The results showed that 84(56%) of the respondents were at risk of getting pressure sores, while 25(16.7%) of them had had pressure sores. There were two significant sociodemographic associations between getting stress sores among surgical patients with chronic disease type ($p = 0.032$) and BMI ($p = 0.037$). Pressure ulcer risk factors from the 'Braden Scale' evidence have shown that all six evidence correlations are significant between pressure ulcer risk prediction and sensory perception ($p = 0.000$), skin moisture ($p = 0.000$), nutritional status ($p = 0.000$), mobility ($p = 0.000$), activity ($p = 0.000$), as well as friction and shear ($p = 0.000$). In conclusion all these risk factors can be prevented through health education by nurses to patients identified as at risk. Preventive measures should also be taken with early treatment and intervention to prevent the occurrence of stress sores which can interfere with quality of life and can be prone to various other complications.

# CHAPTER 1: INTRODUCTION

This thesis represents details explanation on the study of risk factor of pressure ulcer among medical-surgical patient at Hospital USM. The background of the study, problem statement, study objective, study hypothesis, significant of the study and conceptual framework will be outlined in this chapter.

## 1.1 Background of the Study

Pressure ulcer is common condition among acute and chronic patient in hospital, impact a lot of burden to patient, family members, caregiver and hospital. Pressure ulcers are described as very costly and have bad complication since 20th century (Nuru et al., 2015). Pressure ulcer know as bedsore, pressure sore, pressure injury and decubitus ulcer (McInnes et al., 2015). Pressure ulcer involves damage to the soft tissues of the skin including epithelial cells, dermal layer and subcutaneous layer, adipose tissue and muscle layer. Pressure ulcer is a localized injury to the skin or underlying tissue at prolong time usually at the prominent bone, as the result is the pressure combination with torn (Iian & Kimberley, 2017). This also includes pressure from the outer surface in between the affected body tissues such as mattresses, rough clothing, hard seats and in contact with medical equipment that has a rough surface over a long period of time (Kotter et al., 2020).

Based on 42 previous systemic review and 39 meta- analysis study include the total of adult patient 1,366,848 the prevalence is 12.8% and the incidence 5.4 per 10,000 include total of patient 6,881,885. The highest prevalence of pressure ulcer is 14.5% in Europe and the lowest prevalence 1.1% in Asia (Li et al.,2020).

To complete this study, the data (Figure 1.1) of number patient with risk and patient got pressure ulcer from January to August 2020 has been taken from Nursing Department, Matron Wahida Daud, in Hospital USM. Pressure ulcer is the one of Patient Safety Goal requirement to the Hospital USM policies which should be reach the percentage of Key Performance Indicator (KPI) by Ministry of Malaysia (MOH). Achievement the KPI means absence of preventable harm to a patient during the process of health care in hospital (MOH.,2016).

There is not much change in the number of ups and downs, the highest number of patients at risk was in March (356) and the least was July (246), but the cases that have got pressure ulcer not with the highest case of risk on Mac, the higher number patient got pressure ulcer in August (14) whereas the number of risk not in the higher of risk (286). In conclusion, large number of risks are identified, the prevention will be done quickly, then the cases that will get pressure ulcer will be reduced. The in-charge team will monitor pressure ulcer case every month and the target the Key Performance Indicator (KPI) $\leq$ 3 % every month required by Ministry of Health Malaysia (MOH). That KPI of patient risk to pressure ulcer in Hospital USM on January to August (Figure 1.2) done for evaluate achievement of the number of patients at risk with the number of health workers involved. Percentage KPI of patient risk to pressure ulcer does not achieve at Jun, July and August. This indicates an increase in the number of patients at risk with the number of staff involved to perform treatment is incompetent.

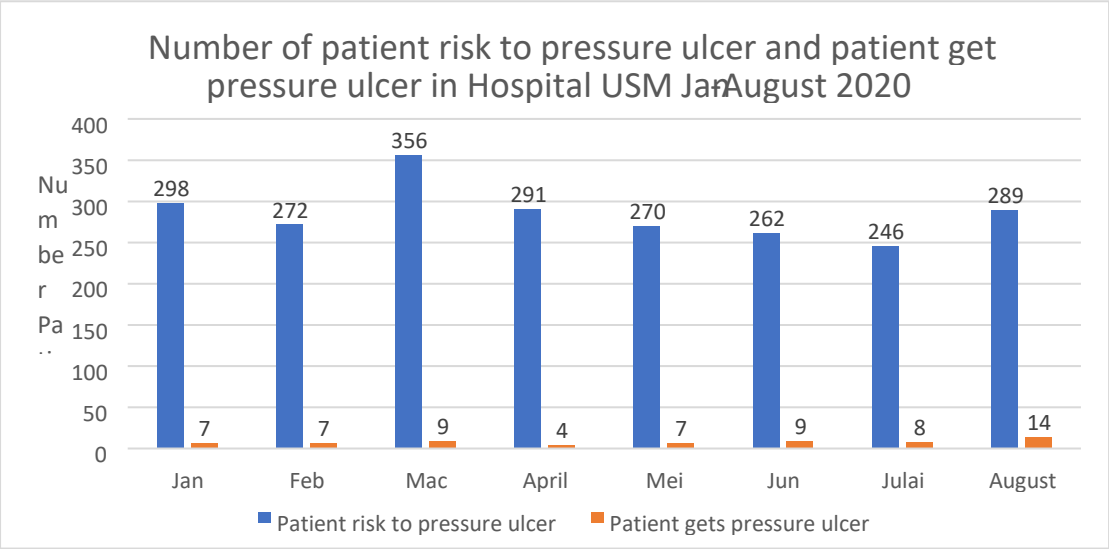


Figure 1.1 : Number of patient risk to pressure ulcer and patient got pressure ulcer at Hospital USM January-August 2020

(Source: Hospital USM,2020)

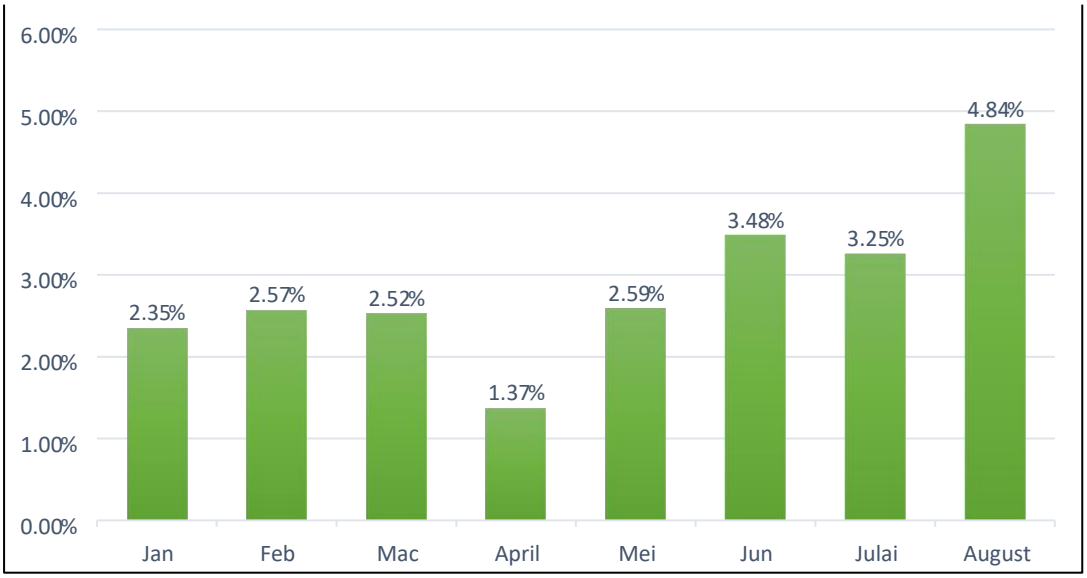


Figure 1.2: KPI of patient risk to pressure ulcer in Hospital USM on January to August 2020

(Source: Hospital USM,2020)

Risk factors related to pressure ulcers in the medical surgical hospital area were assessed clinically from several instruments such as Pressure Ulcer Primary Or Secondary Evaluation Tool (PURPOSE-T), Risk Assessment Pressure Sore (RAPS), and Braden Scale. Among the risk factors for pressure ulcers are the general physical condition, chronic disease, gender, age, activity, mobility, moisture, fluid intake, sensation, friction and shear, body temperature, albumin serum, incontinence patient and prolong hospitalisations. However, the RAPS scale confirmed, the major risk factor of pressure ulcer among medical-surgical adult patients is immobility (Lindgren et al.,2004). The immobility patients get more the risk of pressure ulcer condition with major surgery, cerebrovascular accident, spinal cord injury, progressive neurological disorders and hip injury. The other result of study found the increased risk factors is an individual over the age of $\geq$70, female gender, prolonged hospitalization, incontinence problems and low Braden scale score $\leq$ 17 (Kasikci et al., 2018).

Surgical patients especially who will undergo surgery have low serum albumin, high lactate, long hospitalization, limited movement and low BMI is more at risk for getting a ulcer (Kim et al.,2018). There are patients in the surgery ward receiving surgical treatment sent to the operating room, patient who undergone long period of surgery in operating theatre which is more than 4 hours are confirmed higher risk of getting a pressure ulcer. This has been reported in study where pressure ulcer occurs in 5% of patients after surgery within 24 hours, while 58% occur after 5 days of surgery (Hayes et al.,2014). Patients who undergo major surgery such as laparotomy, cardiac surgery, spinal injury, hip surgery and brain surgery are more at risk of getting pressure ulcer

(Chou et al.,2015). This is due to the postoperative effects of anaesthesia, limited mobility, pain and other factors including age, nutritional status and diabetics.

Medical condition patients associated with the risk of major pressure ulcers are acute ischemic stroke and diabetes (Liao et al.,2019). Both this patient usually admitted in the hospital with longer time period to receive treatment whereas the glucose levels and blood pressure will be monitored until the patient is stable according with appropriate medication given by doctor. Stroke patients will experience limited movement problems risk to pressure ulcer. Diabetic patients it is easier to get a pressure ulcer because interference the blood circulation to the tissue causes the ischemia, easily skin breakdown at the same time the produce of new cell tissue very slow. Patient diabetes involve with the surgery more get the risk compare patient without surgery.

## 1.2 Problem Statement

Pressure ulcer is a major health problem worldwide affecting more than three million adult individual and society (Mervis & Phillips, 2019). The prevalence rate has not changed much since the 20th century (Mervis & Philips, 2019., Nuru et al.,2015). Increased or unchanged prevalence indicates that pressure ulcer problems should be considered seriously. This is a challenge to the health field to solve problems related to pressure ulcers. Dermatologist, wound team and health worker are involved mainly to know the population at risk factor. Whether the interventions performed are still acceptable or new innovations need to be made to avoid the risk of pressure ulcer, because now days the incidence is still the same rate or increase. Referring to the clinical, does the tool used during assessment and physical examination detect the risk of pressure ulcer factor needs to be renewed or is it still maintained the same risk tool previously.

Ideally, individuals with risk factors will not get pressure ulcers by doing early prevention. Early prevention will be done by health workers or relatives, if there is still pressure ulcer, do they carry out those responsibilities or lack of knowledge or less attitude (Farzi et al,2016).

The nurse is responsible for care of all patients in hospital, doing the intervention, documentation and manage the ward setting. They will prioritize more importance task involving life and urgent resulting less time to pay attention for palliative care as to do the intervention such as hourly positioning, change diaper frequently, dressing and provide the hygiene. Inadequate staffing is associated with increased missed care, which threatens the quality of care and nurse outcome (Cho et al.,2019). Making it worse, the patient does not have relative where it will patient the high risk of pressure ulcer can develop pressure ulcer faster.

Pressure ulcers cause burden to patients, families and hospitals (Li et al., 2020). The significant issue for the patient is economic impact, change of patients' physical and psychosocial, low quality of life and patient suffer from pain. A person with a pressure ulcer will not be able to perform the job as usual with the current situation having a wound that needs to be treated. The situation is worse if the person is self-employed, the economic situation will be affected more severely because the treatment period may be longer depending on the severity of the pressure ulcer add with other disease factors. At the same time, the family members is also involved during the patient process in the hospital, unable to do recent work and must pay attention to the patient for caring. Pressure ulcers can cause physical changes, there are wounds and the person will experience pain to perform daily activities. The impact to the life changes and

will disrupt the quality of life (Charalambous et al.,2018). All these changes and conditions will disturb the psychological and physiological burden, the person will be easily to get stress and depression.

Patients involved with pressure ulcers need long-term treatment and need to stay in the hospital for a long time to increase the quality of life back. More nurses, doctors and health workers need to pay attention to individuals who have pressure ulcers during treatment, this can lead to shortage of staff especially nurses (Muabbar &Alsharqi.,2020). Nursing shortage is a very serious issue because in order to care of patients with pressure ulcers, they need more time attention and more care g compared with patients who do not have pressure ulcers (Lyder & Ayello.,2008). Nursing shortage can also be seen at Hospital USM, when it does not achieve the KPIs that have been recommended by KPIs through data (Figure 2). A lot responsibilities and workload do not produce quality work, finally patient develop pressure ulcer. Assessing the risk factor of pressure ulcers is very important so that the incidence of pressure ulcers can be reduced. Health staff can perform other treatments and tasks. The beds in the ward will be reduced and not enough for other acute patients due to the long duration of treatment patient with pressure ulcer. Prolonged treatment is optimal pressure relief, increase the nutritional status, wound care, antibiotic treatment, as well as surgical treatment (Mervis & Philips.,2019). Patient after surgery will experience a slow recovery process and take time due to other factors such as age, diabetes, low BMI, and mobility problems.

Pressure ulcer that requires expensive treatment can cause financial burden to the healthcare system (Li et al., 2020b). The hospital needs to provide more equipment for the treatment of pressure ulcer patients such as dressing

equipment and medicines. The family will also bear the long-term medical costs which will indirectly burden the family as they must pay for other things. The family economy is also affected because they must take care of individuals with pressure ulcer in the hospital for a long time and limited to earning money.

## 1.3 Research question

Base on the background of the study and the research problem identified above, this study has proposed several research questions lists below:

1.3.1 How many surgical patients has developed pressure ulcer during hospitalization?

1.3.2 What are patient risk factors of pressure ulcer among surgical patient in Hospital USM?

1.3.3 Is there any association between patient risk factors of pressure ulcers and selected factors (sociodemographic, surgical factor, sensory perception, moisture, mobility, activity, nutrition status, friction and shear)?

## 1.4 Research Objective

### 1.4.1 General Objective

To identify the risk factor of pressure ulcer among surgical patient in Hospital USM.

### 1.4.2 Specific Objective

1. To identify pressure ulcers among surgical patient in Hospital USM.

2. To determine risk factors of pressure ulcers among surgical patients Hospital USM.

3. To determine the association between patient risk factors of pressure ulcers and selected factors (sociodemographic, surgical factor, sensory perception, moisture, mobility, activity, nutrition status, friction and shear)? among surgical patient Hospital USM.

## 1.5 Study Hypothesis

The hypothesis for this research is:

1. $H_0$ = There is no association between patient risk factors of pressure ulcer and sociodemographic factors.

$H_A$ = There is an association between patient risk factor of pressure ulcer and sociodemographic factors.

2. $H_0$ = There is no association between patient risk factor of pressure ulcer and surgical illness factors.

$H_A$ There is an association between patient risk factor of pressure ulcer and surgical illness factors.

## 1.6 Conceptual and Operational Definition

The term used this research study is referring to this definition as below:

### 1.6.1 Risk Factor

Risk factors define are the traits, characteristic and exposure of person that can increase the like hood of getting injured or getting disease

(WHO.,2017). Risk factor in this research associated with pressure ulcer is elderly age ≥ 70, male gender, BMI ≤ 23kg / m2, diabetes, stroke , immobility , post operation with diabetes, patient with major surgery, low sensory perception, less skin moisture, malnutrition, and less degree of physical activity. In his study risk factor focus to identify the pressure ulcer from sociodemographic collection data and to identify selected factor by using Braden scale descriptive which is sensory perception, skin moisture, nutrition status, mobility, activity, friction and shear.

### 1.6.2 Pressure Ulcer

Pressure ulcers refer as bedsore, decubitus, pressure injury or pressure sore of skin breakdown because of prolonged exposure to pressure, shear and to develop of wound, and then the progress lead to ischemia of the tissue and ultimately cell death. All stage pressure ulcers were included in this study. All stage pressure ulcers were included in this study, namely stage 1, redness on the skin surface, hard and warm, stage 2 involved soft tissue, partial skin breakdown, stage 3 involved complete the skin breakdown, skin loss, necrosis of the subcutaneous, and stage 4 involve necrosis has spread to muscles and bones. The locations of pressure ulcers which will be made a physical examination and evaluated is spinous process, sacrum, heel, back of head, side of head, scapula, elbow, ear, knee, toes, ischium, and malleolus. In this study risk factor focus to respondents who are at risk and still have not had a pressure ulcer, whereas the level of risk of getting a pressure ulcer will be categorized into severe risk, high risk, moderate risk, mild risk and no risk. The study also identifies the respondent who has get pressure ulcer from grade 1 to grade 4 and identity the anatomical site involve.

### 1.6.3 Surgical Patient

This study involved in male and female surgical adult patient age ≥ 18 in surgical ward at Hospital USM, Kubang Kerian, Kelantan, Malaysia. Male surgical patient was admitted at surgical ward located at 1 Selatan and 2 Intan while female surgical patient was admitted at 3 Utara. Surgical patient in the surgical ward has common disease such as gastrointestinal disease, neurosurgery, urology disease, and plastic surgery patient. In this study surgical patients are select from patient was admit in surgical wad more than 24 hour, who as with surgical procedure, major or minor operation, post operation to complete antibiotic, and patient with other medical illness such as diabetes, hypertension, cardiovascular disease and respiratory disease.

## 1.7 Significance of Study

The finding of this study will contribute greatly to the healthcare worker important to be used practically to assess the early signs and risks of pressure ulcers on patients in the hospital. The best practise to assess and screen the risk of pressure ulcer suggest by National Pressure Ulcer Advisory Panel (NPUAP) and the European Pressure Advisory Panel (EPUAP) recommend a complete skin assessment using the standardized assessment tool or evaluating clinical factor such as mobility, moisture, and nutrition (Farren et al., 2011). Pressure ulcer assessment should be due on admission and repeat as regularly and frequently as required by the patient condition.

To the health worker, knowing the level of risk is important because it can take preventive measures against patients from the occurrence of pressure ulcers. All the nurses are expected to be able to prevent and manage pressure ulcer as a

result of the education they receive on maintaining skin integrity (Samuriwo R.,2012).

The risk of pressure ulcer can be reduced with appropriate interventions to patients. Pressure ulcer will not happen and can reduce the workload during the nursing shortage problem. The number of patients at risk for pressure ulcer can be reduced once the level of risk is identified and measured. As the result it can reduce the patient burden from pain, physical exchange, psychosocial and economical. The importance for every patient is to be established to enhance patient's quality (Norton et al,2017).

Knowing the risk factor and applying the preventing the pressure ulcer not only protects patient from reduce the quality of life but also reduces cost of caring for them (Sullivan & Schoelles ,2013). This study will help to increase knowledge through the learning process.

# CHAPTER 2: LITERATURE REVIEW

## 2.1 Introduction

This chapter will explain the literature review of pressure ulcer, risk factor of pressure ulcer and the risk factor involve surgical adult patient. To complete this study, researchers have looked at previous studies that have been made through literature using the Google Scholars, Research gates, MEDLINE (Pubmed), Scient Direct, Researh Gate and CINAHL, EBSOhost. Researchers use the keyword for searching this topic example “risk factor”, “pressure ulcer”, “bedsore”, “surgical patient” and “Braden Scale”. Combination the keyword also uses the technique using Boolean operator such as “AND” and “OR” were explore the database. This literature has completed relevant and up-to-date information related to the introduction topic, problem statement, objective research, hypothesis, theoretical and conceptual framework of this study.

A pressure ulcer defines as an ischemic change in the skin and subcutaneous layer over prominent bone it causes the shear (Tanaka at el.,2020). Pressure ulcer also refer as bedsore, decubitus, pressure injury or pressure sore of skin breakdown because of prolonged exposure to pressure, shear and to develop of wound, and then the progress led to ischemia of the tissue and ultimately cell death (Woo et al., 2017). Pressure ulcer are a significant problem in the worldwide challenge that started 20 years ago and is still not over which has involved more than 3 million adults in the United States each year. The prevalence rate has increased over 80% in the 13 years of the study (Muhammed et al., 2020). The prevalence rate has not changed significantly in recent years despite pressure ulcers being given attention, having a major impact on patient

and hospital care costs also need the prolong treatment (Mervis & Phillips, 2019).

A lot of instruments used to measure pressure ulcers risk factors such as Braden Scale-For Prediction of Pressure Sore Risk, Pressure Ulcer Primary or Secondary Evaluation Tool (PURPOSE-T), European Pressure Ulcer Advisory Panel (EPUAP) and Risk Assessment Pressure Sore (RAPS). This study review the literature focus on instrument Braden Scale- For Prediction Of Pressure Sore Risk, (Bergstrom, 1988) include six descriptive of the sensory perception, moisture, activity, mobility, nutrition, friction and shear. The low Braden Scale score which is $\leq$ 18 or equal is indicates a higher risk level of pressure ulcer.

## 2.2 Review of Literature

### 2.2.1 Pressure Ulcer

**Stage or Classification of Pressure Ulcer**

Pressure ulcer has classifications by National Pressure Ulcer Advisory Panel (NPUAP) staging system, newly revise in 2016 define there is six stage include Stage I, Stage II, Stage III, Stage IV, Unstageable pressure injury, Deep pressure injury (Marvis & Philips.,2019). The (Figure 2.1) show the figure of each stage the skin, tissue, muscle and bone involve.

Pressure ulcer Stage I are description as non-blanchable erythema of intact skin, the patient will experience sensory changes, pain under pressure, the skin will be warm skin discoloration from reddish to purple indicates deep tissue injury.

Stage II are description as partial-thickness skin loss with exposed dermis, but adipose or deeper tissues are not exposed, often caused by adverse microclimate and shear.

Stage III are description as full-thickness skin loss involves adipose tissue that will be visible on the wound which may have undermining and tunnelling; fascia, muscle, tendon, ligament, cartilage but bone is not exposed.

Stage IV are description as full-thickness skin and tissue loss, when this stage the fascia, muscle, tendon, ligament, cartilage, or bone is expose as we can see, there is also a tunnel that will enclose the inside involved.

Unstageable pressure injury are description as obscured full-thickness skin and tissue loss involve extent of tissue damage within the ulcer is obscured by slough and cannot be determined, the treatments need to removal of slough or eschar reveals a stage 3 or 4 pressure injury.

Lastly, Deep tissue pressure injury are description as persistent no blanchable deep red, maroon, or purple discoloration usually many will be unaware because there are no traces of skin lesions but can only be seen unhealthy skin structure from outside the skin, patient will be sent to operation for dislodging.


Figure 2.1: Stage of Pressure Ulcer. Stage I pressure ulcer. Stage II pressure ulcer. Stage III pressure ulcer. Stage IV pressure ulcer. Unstageable wound. Suspected deep tissue.

(Source: National Pressure Ulcer Advisory Panel.,n.d)

**Location Common Pressure Ulcer**

The location (Figure 2.2) where the pressure ulcer usually occurs over the sacrum, ischial tuberosity, greater trochanter, heel, and lateral malleolus the other parts is elbow, ear, nose, chest, and back (Marvis & Philips.,2019). Prolonged pressure will disrupt circulation around the stressed area eventually ischemia and hypoxia lead to develop pressure ulcer. While performing a

physical examination to identify at-risk patients at risk, this location must be checked.

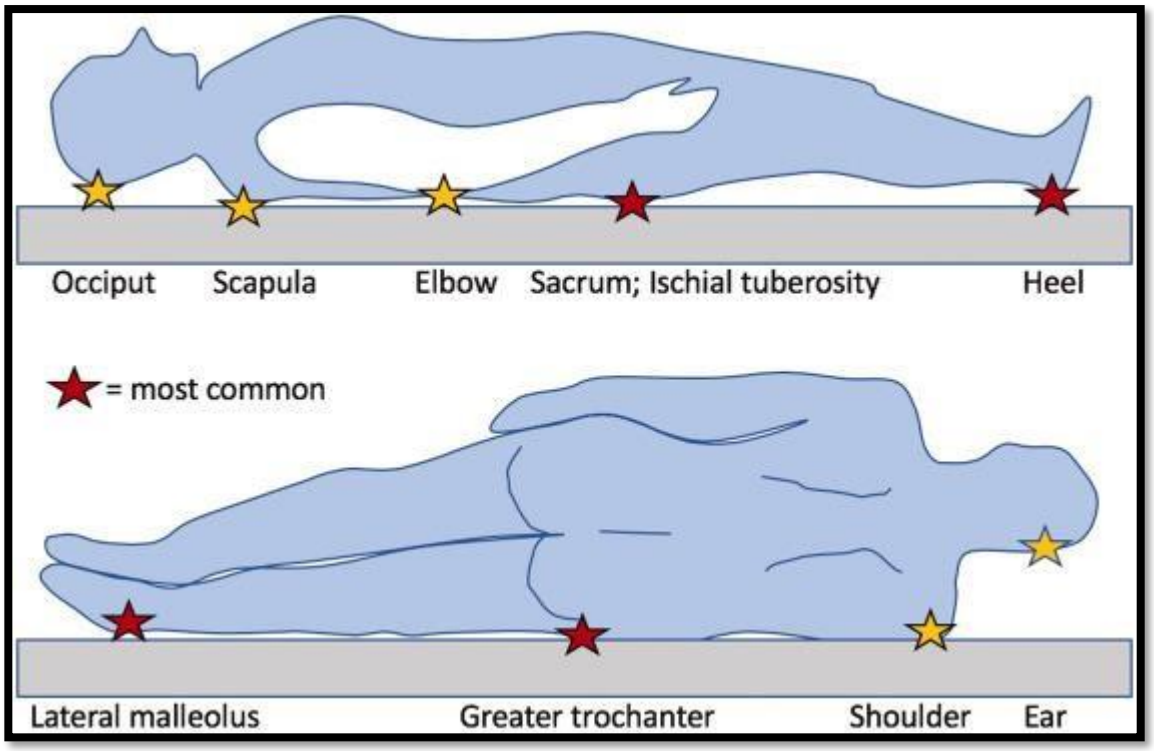


Figure 2.2: Common location of pressure ulcer

(Source: Mervis J.S., & Philips T.J., 2019)

### 2.2.2 Socio Demographic Risk Factor of Pressure Ulcer

**Age Risk**

Through a study conducted at Sou Poulo involve 365 institutions select the elderly people who are 60 above, it was found that there is no significant socio-demographic factor of the character from age resulting in pressure ulcer development (Oliveira et al., 2017). In contrast to another study, age factor significant risk factor pressure ulcer when age > 75 (Fazila et al,2018; Oliveira et al,2017). This age group is called the elderly who are more at risk with the condition of lack of fat, thin and thinner skin. They also suffer from malnutrition which can further increase the risk of pressure ulcer due to muscle congestion

and adipose tissue. People older with multiple comorbidities admit to the ward was greater risk of experiencing to get pressure ulcer during their stay.

**Gender**

Gender factors also influence the risk of getting a pressure ulcer. Decisions were made based on data collected by researchers who found that women (55.3%) were more at risk than men (44.7%) who got pressure ulcers (Fazila et al.,2018) . A systemic survey also agreed that women were more at risk than men (13% versus 10%) for postoperative cases of pressure ulcers. Women after surgery are more afraid to move and experience more pain than men, this condition causes slow ambulation, women are also said to need more emotional support before returning to their original life. The risk of pressure ulcer increases when this woman continues to be in bed, less mobilization and if there are other factors as well. However, gender factor is not the most important in facing the risk of pressure ulcer factor because one systemic review gave a different report that is, gender was not significant in the hospital acquired pressure injury model (Li et al., 2020).

**BMI**

The risk factors that are of concern to researchers are also the individual body mass index (BMI), through one of the evidence summaries, overweight individuals (BMI 25 to 30 kg / m2) and obese (BMI over 30 kg / m2) are less at risk of getting pressure ulcers (Haesler &Emily.,2018). Individuals with a BMI equal to or less than 23kg / m2 are more at risk of getting pressure ulcer (Fazila et al.,2018). This group is more at risk due to physical factors that are less adipose tissue, skin that is more susceptible to pressure, especially in prominent bone areas and can cause shear.

**Common Stage Involve of Pressure Ulcer**

Systemic review has been conducted involving 42 of studied reported (Li et al., 2020), pressure ulcer Level I and Level II commonly occurred accounting 54.3% and 29.0% respectively. Stage III and stage IV, less frequently, accounting for 12.8% and 9.9%. The percentage following the stage decreases because, after the person gets a Level I and Stage II pressure ulcer, the situation improves after getting proper treatment and the case is settled. Researchers also reported sociodemographic regarding anatomical location data, the most location affected were sacrum heel and hip (Li et al.,2020; Mervis & Philips.,2019). This part often occurs pressure ulcer because the part of the sacrum that holds the weight while lying down and sitting, most of it happens to person immobilization, constantly moist dam completely no sensory perception.

### 2.2.3 Component in Braden Scale

A lot of reviews are based on risk factors of pressure ulcer linked to Braden Scale characteristic. The Risk Factor is sensory perception, nutrition, mobility, activity, moisture and fiction and shear. Many researchers will take data from Braden scale characteristic factors to evaluate and find a solution this problem by studying ways for early prevention.

**Sensory Perception Risk Factor**

The sensory perception is the ability respond to the any pressure or discomfort. The people usually involve the sensory perception problem deal with the neuropathy such as resident with diabetes, paralysed or loss of sensation with spinal cord injury and dementia population (Hovan.,2017). The pathophysiology of nerve stimuli do not work well, therefore they cannot feel pain and discomfort. People with paraplegia experience a higher risk of getting a pressure

ulcer and due to loss of half-body sensation. Mostly diabetics automatically people loss sensation of the extremities, include the vascular assessment which is pulse extremities and capillary refill. Researchers also point out that very few patients in the hospital easily get the pressure ulcer and commonly they got because are exposed to other risk factors that will increase the risk. Therefore, those with perception sensation should be given attention and more often, health workers and family members should do various prevention to those with high risk.

**Malnutrition**

The risk of nutritional-related pressure ulcers is individuals with poor or severe nutritional status. Past researchers have conducted a study on the nutritional value of risk factors to ulcer pressure many are associated with malnutrition problems (Saghelian at el.,2018). Nutrition and level of hydration are important for skin health and tissue repair. Malnutrition will increase the body's metabolic rate eventually; muscles will start to shrink, and physical changes will occur. Malnutrition reduces the body's immune levels can easily lead to infection and slows down the wound healing process.

**The Limitation of Mobilization and Activity**

Based on the evident of immobility risk factors, a systemic review the condition of a person with limited mobility and activity is more fast the progress of wound development (Anita et al.,2018). They inability to move and change the position, surely need a maximum assistant. The cause of inability such as neurological disorder the example vegetative patient, severe stroke, and spinal cord injury, late-stage dementia; the musculoskeletal disorder especially involve hip; ventilator patient in Intensive care Unit (ICU) and patient post major

operation. This group is highly the risk to get pressure ulcer and need early prevention.

**Skin Moisture**

In that study has been done by (Anita et al.,2018) skin moisture especially in areas of prominent and depressed bony such as sacrum, ankle, heel and occiput more often to get the pressure ulcer. Continue moisture on the individual skin affect to break down the skin fragile and develop of pressure sore. The higher risk factor from bowel incontinent, urinary, diaphoresis, fistula leakage, oedema, excessive exudate from any wound and leaking ostomy. Through the results of other studies, it is concluded that dry skin is more at risk of getting pressure ulcers according to the anatomical location that is dry skin on the heel but not on the sacral location (Lechner at el.,2017).

**Mechanical Factor from Shear, Pressure and Friction**

The mechanical factor is from shearing, pressure and force can risk develop pressure ulcer. The pathophysiology of the tissue damage caused from prolonged combination shear, pressure or friction can lead the blockage of blood vessel and lymph node that will develop hypoxia and necrosis the smooth tissue (Mervis & Philips.,2019). The (Figure 2.3) show the example how patient to get the pressure ulcer by this situation while person shift down form bed during lying or sitting at bedside.

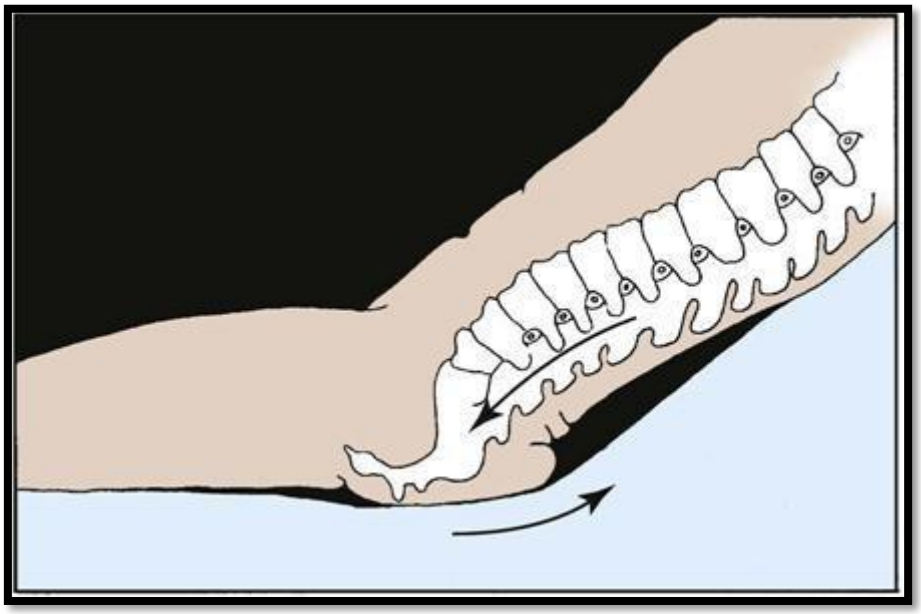

Figure 2.3: Shear exerted in sacral pressure ulcer

(Source: Diaz G.,2018)

### 2.2.4 Surgical Patient

Surgical patient with the surgery procedure especially major surgery with prolonged length of hospitalization more than 3.5 to 5 days or in severe case the length can longer than 15 days common case in pressure ulcer. From the meta-analysis of observational studies done by researcher report, type of surgery that patient with cardiac surgery had the higher risk (RR 1.98, 95% CI 1.41 to 2.79) than patients with general surgery or hip surgery, while patients with lower extremity amputations had the lowest risk (RR 1.44, 95% CI 0.93 to 2.24) (Liang et al.,2017). The surgical patient undergoing to the operation with morbidity diabetes more gets complication of pressure ulcer compared with non-diabetes patient (Liang et al.,2017). Patient with history of diabetics, they have neuropathy problem that will have loss of sensation due to damage nerve tissue, patient not able to feel the uncomfortable or pain at the long time can lead the

pressure ulcer. The most common pressure ulcer for diabetics is on the leg known as diabetic foot ulcer. Patient may involve the surgical procedure when sent for operation procedure. The factor associated with surgery and more risk of pressure ulcer is the length of surgery, patient position during surgery, warming or moisture device used.

## 2.3 Theoretical and Conceptual Framework of the Study

Theoretical schema (Figure 2.4) shows the risk of pressure ulcer occurring. The diagram shows the causal relationship of direct, indirect, and other potential pressure ulcer factors (Coleman et al., 2014). Thick arrows, indirect causal factors i.e., poor sensory perception and response, diabetic patient, condition patient with poor moisture, poor nutrition and low albumin indicate indirect factors, while the patient's condition of immobility, skin problems and having poor perfusion are direct causes which will outcome pressure ulcer. The part of the broken arrow that is older age factor, medication effect factor, oedema, chronic wounds, infection patients, acute illness and the effect of rising body temperature are other potential factors and are indirect causes of pressure ulcer. Diagram also shows the relationship between indirect potential causal factors and indirect causal factors for the risk of pressure ulcer. All points mentioned will also be assessed through Braden Scale throughout the study.

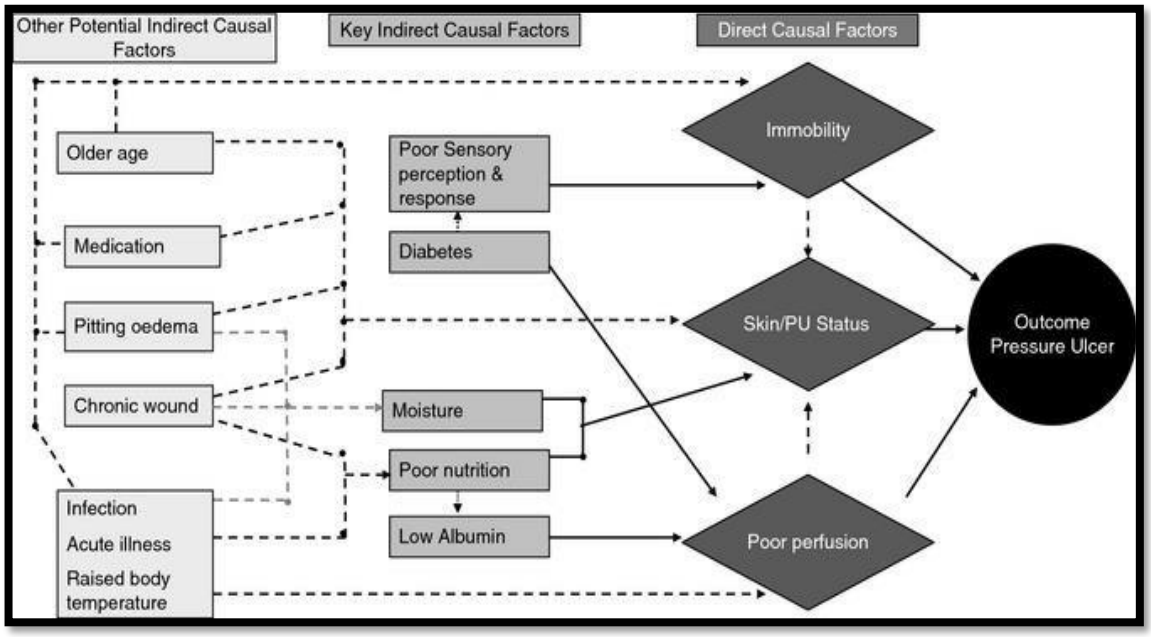


Figure 2.4: Theoretical schema of proposed causal pathway for pressure ulcer development

(Source: Coleman S et al.,2014)

Pressure ulcer conceptual framework (Figure 2.5) is to explain the theory of the critical determinant model of pressure ulcer development. This is important for studies that will use the framework as a support with what has been proven in the study made where the theory can be tested. This framework is also used to assess the risk factors of pressure ulcer from a clinical perspective and apply practical scales when performing clinical treatment to patients (Coleman et al., 2014).