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THE SCALE DEVELOPMENT OF NURSING REPOSITIONING PRACTICE FOR BEDRIDDEN PATIENTS, SAUDI ARABIA

Mr. Abdul Kareem Suhel Hamadeh Iblasi

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

A Dissertation Submitted in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy in Nursing Science
Field of Study of Nursing Science
FACULTY OF NURSING
Chulalongkorn University
Academic Year 2021
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การพัฒนามาตรวัดการปฏิบัติการพยาบาลในการจัดท่าผู้ป่วยติดเตียง ซาอุดิอาระเบีย

นายอับดุล การีม ซูเฮล ฮามาเดะ อิบลาซี

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาพยาบาลศาสตรดุษฎีบัณฑิต
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Thesis Title	THE SCALE DEVELOPMENT OF NURSING REPOSITIONING PRACTICE FOR BEDRIDDEN PATIENTS, SAUDI ARABIA
By	Mr. Abdul Kareem Suhel Hamadeh Iblasi
Field of Study	Nursing Science
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อับดุล การีม ซูเฮล ฮามาเดะ อิบลาซี : การพัฒนามาตรวัดการปฏิบัติการพยาบาลในการจัดท่าผู้ป่วยติดเตียง ซาอุดิอาระเบีย. (THE SCALE DEVELOPMENT OF NURSING REPOSITIONING PRACTICE FOR BEDRIDDEN PATIENTS, SAUDI ARABIA) อ.ที่ปรึกษาหลัก : รศ. ร.ต.อ.หญิง ดร.ยุพิน อังสุโรจน์, อ.ที่ปรึกษาร่วม : รศ. ดร.อารีย์วรรณ อ่วมตานี

การศึกษาครั้งนี้ มีวัตถุประสงค์ เพื่อพัฒนาและทดสอบคุณสมบัติการวัดทางจิตวิทยาของมาตรวัดการปฏิบัติการพยาบาลในการจัดท่าผู้ป่วยติดเตียงของพยาบาลในประเทศซาอุดิอารเบีย การศึกษานี้ประยุกต์ใช้แนวทางพัฒนาเครื่องมือวิจัยของ DeVellis ซึ่งเริ่มจากการทบทวนวรรณกรรมและสัมภาษณ์ผู้เชี่ยวชาญจำนวน 6 คน เพื่อให้ได้แนวคิดการปฏิบัติการพยาบาลในการจัดท่าผู้ป่วยติดเตียงที่ชัด หลังจากนั้น พัฒนาเป็นข้อคำถามได้ทั้งหมด จำนวน 103 ข้อ นำข้อคำถามดังกล่าวให้ผู้เชี่ยวชาญตรวจสอบ 2 รอบ ได้ข้อคำถามที่ยอมรับได้จากผู้เชี่ยวชาญ จำนวน 61 ข้อ โดยมีค่าดัชนีความตรงตามเนื้อหารายข้อเฉลี่ย เท่ากับ 0.91 และค่าความตรงตามเนื้อหาโดยรวมทั้งฉบับ เท่ากับ 0.81. วิเคราะห์ความตรงเชิงโครงสร้างด้วยวิธี exploratory factor analysis (EFA) และ confirmatory factor analysis (CFA) จากกลุ่มตัวอย่างที่เป็นพยาบาลที่ดูแลผู้ป่วยติดเตียง ในประเทศซาอุดิอารเบีย จำนวน 306 คน และ 323 คน ตามลำดับ

ผลการศึกษามีดังนี้

1. ผลการวิเคราะห์ EFA พบว่า มาตรวัดการปฏิบัติการพยาบาลในการจัดท่าผู้ป่วยติดเตียง ประกอบด้วย 50 ข้อคำถาม แบ่งเป็น 4 องค์ประกอบ ได้แก่ 1) ด้านการเตรียมผู้ป่วย จำนวน 13 ข้อ 2) ด้านการพลิกตะแคงตัวผู้ป่วย จำนวน 18 ข้อ 3) ด้านการประเมินผล จำนวน 6 ข้อ และ 4) ด้านบันทึกทางการพยาบาล จำนวน 13 ข้อ

2. ผลการวิเคราะห์ CFA พบว่า หลังจากปรับโมเดลแล้วข้อมูลตามสมมุติฐานสอดคล้องกับข้อมูลเชิงประจักษ์ (Chi-square ratio = 1.82, CFI = 0.968, TLI = 0.959, RMSEA = 0.051, SRMR = 0.023) และคำนวณค่าความเที่ยงด้วยวิธี Omega ได้ค่าความเที่ยง เท่ากับ 0.8

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สาขาวิชา	พยาบาลศาสตร์	ลายมือชื่อนิสิต .....
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Abdul Kareem Suhel Hamadeh Iblasi : THE SCALE DEVELOPMENT OF NURSING REPOSITIONING PRACTICE FOR BEDRIDDEN PATIENTS, SAUDI ARABIA. Advisor: Assoc. Prof. Pol. Capt. YUPIN AUNGSUROCH, Ph.D. Co-advisor: Assoc. Prof. AREEWAN OUMTANEE, Ph.D.

This study aimed to explore, develop and test the psychometric properties of repositioning practice measures among nurses in Saudi hospitals and explores its components' psychometric properties. The study adopted the DeVellis scale development framework. Initially, the study clarifies the concept by literature review and interviewing six experts. Then a pool of 103 items was generated as the first draft. Over two rounds of expert revisions, the experts accept 61 items with content validity index means (I-CVIs) equal to 0.91 and scale content validity = 0.81. later, the reliability with alpha Cronbach was 0.98. Next, this survey was passed for construct validity. The author distributed it to 306 nurses in Saudi Arabia taking care of bedridden patients at hospitals for the exploratory factor analysis (EFA) and 323 nurses for confirmatory factor analysis (CFA).

The study shows findings as are followed:

1. The EFA presents four underlying factors with 50 items (preparing 13 items, posturing 18 items, evaluating 6 items, and documenting 13 items) explained around 80.637% of variance.

2. The CFA showed the statistical needs to modified the model to show fit parameters (Chi-square ratio = 1.82, CFI = 0.968, TLI = 0.959, RMSEA = 0.051, SRMR = 0.023). The tool shows Omega reliability = 0.89.

The Findings exhibited that the repositioning practice scale supports clinical and administrative nursing care in Saudi Arabia. The study found that repositioning practice measurement tools consist of four components: preparing (13 items), posturing (18 items), evaluating (6 items), and documenting (13 items).

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Field of Study:	Nursing Science	Student's Signature .....
Academic Year:	2021	Advisor's Signature .....
		Co-advisor's Signature .....

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Abdul Kareem Suhel Hamadeh Iblasi

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CHAPTER I
INTRODUCTION

Background and Significance of the Study

Pressure ulcer/injury refers to tissue death due to the gravitation pressure over a boney prominence or medical device, and it is associated with shear and friction (EPUAP/NPIAP/PPPIA., 2019). Although it is a prevented injury, statistics show a high prevalence among bedridden patients (Hebert & Rosalyn Jordan, 2020; Kottner et al., 2020; Mervis & Phillips, 2019; Moore et al., 2020; Ratliff, 2020; Sousa et al., 2020) to make it the second death leading factor among spinal code injury patients (Cao et al., 2019). And responsible for 41.1% to 66% of geriatric death (Espejo et al., 2018; Jaul & Calderon-Margalit, 2015).

Repositioning accompanied with proper deductions for the risk - by scales such as the Braden - skincare, offloading mattresses, and nutritional support prevent pressure ulcers. Although repositioning stays the cornerstone for pressure ulcer prevention, studies variant in the compliance level from 1.4% (Tayyib et al., 2013) to near 100% (Schutt et al., 2018; Tannen et al., 2009; Wogamon, 2016b). However, the comparisons are not possible due to lacking a valid, reliable, and agreeable tool for measuring the repositioning practice (Hanna et al., 2016).

Even with lacking a valid and reliable tool for repositioning, the literature employed techniques estimate repositioning by revising nursing documentation (Vanderwee et al., 2011), observing nursing performance (Tayyib et al., 2016), measuring the value of the pressure on the patients beds (Pickham et al., 2018) or measuring the consequence of the repositioning absent – through pressure ulcer rate -

(Behrendt et al., 2014). However, these techniques failed to present acceptable agreements rather than validation support among experts due to conceptual disagreements and steps debates.

Firstly, conceptual disagreements, literature employs several terms in referring to repositioning - "rolled over″ (Trumble, 1930), "turning" (Hanna et al., 2016), "positioning" (Berman et al., 2016; Kozier, 2009), "changing patient positioning" (Rich et al., 2011; Weiner et al., 2017), "postural change" (Herman & Rothman, 1989), "patient positioning" (Haesler et al., 2012), "patient handling" (Baillie & Thomas, 2009), "moving patients on the bed" (Kozier, 2008), "passive positioning (not done by the patient)" (O'Neil, 2004), "shifting patient on the bed" (U.S Department of Health and Human Services, 1992), "change of posture" (Lam et al., 2018), "weight shifting" (Stinson et al., 2018), and "changing body position on the bed" (Balzer et al., 2014). Although these terms are overlapped on many points, the conceptual defragmentation restricts crossing the benefits. To the best of the available knowledge, there is no exact differentiation between these terms in the nursing pressure ulcer context. Which challenge building a valid conceptual validation.

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The second challenge is the step debates. Although nurses have practiced repositioning over the last 200 years to prevent pressure ulcers (Butcher et al., 2003), the evidence shows inconsistency in describing the set of behaviors that reflect the practice. For instance, several authors formulate repositioning over a 73-identified step (White, 2011), while others assume 21 steps achieve the required meaning of the repositioning (Cooper & Gosnell, 2014). The lack of step agreement makes the quantification process vague and hard to achieve and affect the validation efforts.

Further, Due to the nature of the repositioning as a process, scientists rely on measuring a limited number of steps, and generalizing the results. For instance, several studies estimate the repositioning based on the documentation of nurses (Chaboyer et al., 2016; Courvoisier et al., 2018; Gunningberg et al., 2015; Gunningberg et al., 2016; Mehta et al., 2015; Sving et al., 2012; Sving et al., 2014; Tannen et al., 2009; Webster et al., 2017). Among those studies, researchers assumed that if the nurse documented the repositioning, all other steps were achieved – which is not necessarily true as the possibility to forget the documentation can happen.

Others consider it based on observing the patients move (Hall & Clark, 2016; Sving et al., 2012; Tayyib et al., 2013), while observing all steps all the time hard to achieve. Other part relies on the pressure distribution changes over the bed or mattress as the measurement (De Meyer et al., 2019a; Källman et al., 2016; Peterson et al., 2013; Renganathan et al., 2018; Schutt et al., 2018). In contrast, the pressure changes might result from repositioning or any other interventions and only present a reflection for a limited number of steps not all. These measurements lack an essential logical condition: repositioning practice steps are independent. Nurses may perform some and ignore some. So, measuring a limited number of steps and generalizing the result over all others shows low trust and not lead for the intend benefits from the intervention (pressure ulcer preventions).

Repositioning practice in Saudi Arabia is not an exception, Tayyib et al. (2013) reported low repositioning practices (1.41%) by the observational tool. Amr et al. (2017) reported 70% of compliance by using different observation methods. In comparison, the yearly reports from King Saud Medical City showed that 33% of bedridden patients had not received the required repositioning by open chart review

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tools (King Saud Medical City [KSMC], 2019). Saleh (2007) concluded that "repositioning practice" was less than the required standards by relying on the chart revisions tool for discharge patients. Although the organization settings are similar among these studies, the variation was high with limited chance to validate any of these measures. Also, studies failed to present measurements for all components of the repositioning practice. The chart review that relays only on the documentation with no information about the quality of the procedure is unable to assure the presence of the intervention as required, as seen in Saleh (2007) and (King Saud Medical City [KSMC], 2019). Similarly, observational approaches show a wide range of variations – 1.4% in Tayyib et al. (2013) and 70% in Amr et al. (2017). These studies raise questions about the actual situation as these studies are not comparable between each other and hard to assure the validity of the collected data.

To the best of our knowledge, no previous study has investigated repositioning measurements in Saudi Arabia. Studies approach repositioning practice measure failed to measure all aspects. As repositioning consists of steps, the accumulation of these steps prevents pressure ulcer development. Therefore, quantifying the repositioning according to these steps is crucial in assuring the measurement validity.

In Saudi hospitals, developing valid and reliable measurement tools is a clinical and administrative need. Clinical in term of confirming the proper patient's safety measures. As repositioning prevent pressure ulcer, assuring the proper performance is safety measures. From an administrative point of view, hospitals cannot estimate the actual performance in repositioning practice; experts cannot compare the findings of the results. Several projects failed to prove the usefulness of improvement projects or bundles of care on the repositioning practice. The current

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study suggests a measurement tool that satisfies the clinical and administrative needs in providing a valid and reliable measurement approach. However, for clarity, the present study adopted the term “repositioning practice” as the central construct that reflects the actual nursing performance and minimizes the suspected overlaps with other used words in the literature.

Research questions

1. What are the components of repositioning practice?
2. How is an instrument to measure repositioning practice for patients with bedridden?
3. What are the psychometric properties of an instrument to measure repositioning practice for patients with bedridden?

The objective of the study

1. To explore the repositioning practice components
2. To develop the repositioning practice scale for patients with bedridden.
3. To test psychometric properties of the repositioning practice scale for patients with bedridden.

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Scope of the study

This study aimed to develop the repositioning practice scale. The scale development procedures consist of 7 steps proposed by DeVellis (2016); (1) clarify the concept of measurement, (2) Generate item pool, (3) Format responses, (4) Review by experts, (5) Face validation, (6) Examine the internal consistency, 7) Evaluate the psychometric properties (explore and confirm).

Population and sample in this study were divided into 2 groups.

1) Interview group for clarifying concept of RP

The population was nurses and doctors who were experienced in pressure ulcer caring for patients with bedridden. The sample consisted of six experts whom purposively chosen for their clinical experience in repositioning practice as pressure ulcer preventions.

2) Psychometric properties testing of RPS

The population was nurses working in Saudi Arabia hospitals to prevent pressure ulcer among bedridden patients. Nurses in Saudi Arabia are geographical were categorized based on the hospital's location to (central, west, east north and south). Also, nurses were grouped based on their nationalities to local and expat nurses from different places such as Western, Asian and Arab countries. The sample consist from 306 nurses in the exploratory factor analysis and 323 in the confirmatory factor analysis study.

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Conceptual framework

Repositioning practice is a dynamic nursing intervention. It consists of a group of repeated behaviors that nurses do to redistribute the gravitation pressure and – as a result – prevent pressure ulcer development.

Conceptually, the current study adopted scale development in reforming the relations between the component of repositioning practice to a set of items. The repositioning practice personates the interactions between preparing the patient, posturing the patient harmonized, anchoring the patient to a new posture, and documenting the action. Those components appear in the literature content analysis

(chapter II) that formulate the conceptual relations. For scale development, a specific set of items personate the measurements.

Operational definitions

1. Repositioning practice refers to nursing activities of nurses in purpose to redistribute the gravity pressure on the bedridden patient tissues to prevent pressure ulcer development. Repositioning practice allow the tissue revisualization and minimize the chance of developing a pressure ulcer. According to literature review, it includes four components.

1.1 **Preparing** refers to activities of nurses to assess the patients, safety of the environment, readiness of the nurse, the previous patient posture, and any contradiction for the posture change.

1.2 **Posturing** refers to activities of nurses to move the patients to the new posture either by lifting, rolling, or flapping the patients at the new posture.

1.3 **Evaluating** refers to activities of nurses to reassess the patient stability and comfort on the new posture and reconnect the patient to devices - if any that were off during the procedure.

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1.4. **Documenting** refers to the activities of nurses to write a report that who do the procedure, the time of change the posture, and the patient condition.

2. Psychometric properties refer to testing the validity and reliability of the measurement tool as follows:

2.1 validity refers to the ability to trust the data originated from the tool in measuring the actual nursing performance in the repositioning practice. The current study adopted two methods in exploring the validity.

2.1.1 Content validity refers to the ability of the instrument to present the universality of the concept of measurements. The author estimates the content validity by calculating the item content validity index (I-CVIs) from nine experts' evaluations (details in chapter III). The calculations also include the scale content validity items over the means of the sum of I-CVIs (S-CVIs) / Average. Scale-Content Validity Item/Average is the sum of I-CVIs is divided by the total number of items (mean of I-CVI).

2.1.2 Construct validity refers to the ability to trust in the central aspects of measurements. In this study, the author adopted factor analysis statistical test to explore (EFA) and conform (CFA) the construct validity.

2.2 Reliability of the current tool refers to the ability to produce stable and consist of measurements for the repositioning practice phenomena. In the current study, author adopted internal consistency of Cronbach's alpha and Omega reliability test for estimating the reliability.

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Expected Benefits

The current study proposes a clinical, administrative, and research tool for measuring the repositioning practice in Saudi Arabia. Clinically, the current tool serves the clinical trial by standardizing the repositioning practice in the clinical practice of Saudi Arabia. The standardization will enhance patient safety in pressure ulcer prevention.

From an administrative point of view, it satisfies the need to evaluate nursing performance. By assessing the nursing performance, leaders will have accurate data for the workload and the requirements for nursing care. That will have benefits in calculating the required resources in nursing units. As a result, it will evaluate the administrative efforts in monitoring nursing care.

To the best of our knowledge, this study is the first of its kind. Several trials and techniques were developed to measure the repositioning practice, but these efforts had not had the theoretical consistency with the repositioning practice purposes. Thus, the study's outcome supports nurse studies in evaluating and improving the repositioning practice. The expected result from the tool application will produce suitable policies procedures and improve the quality of care. The outcomes will also expand the scope of dealing with the repositioning practice phenomenon and provide further insights into the required changes in nursing administrative procedures. Therefore, the expected benefits of the current study will serve the developing nursing science in Saudi Arabia. The expected tool quantifies the repositioning practice by measuring the performance which facilities perceive the actual situation for the repositioning practice in the hospitals, which enhances pressure ulcer prevention in general.

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CHAPTER II
LITERATURE REVIEW

This chapter focused on literature reviews that related to develop the repositioning practice scale for patients with bedridden as the following contents

1. Patients with bedridden
2. Roles of nurses in caring for patients with bedridden
3. Repositioning practice
4. Existing tools
5. Scale development

1, Patients with bedridden

Bedridden is not a specific diagnosis or refers to unique conditions. Instead, it is a condition for patients who spend of their time on beds with no ability to move (Zegelin, 2008). Bedridden could be a temporal status, such as being under anthesis for a surgical procedure, or permanent status due to diseases process such as spinal cord injury, cerebrospinal injury, or others (Hinkle & Cheever, 2018). These conditions varied in their nature, from being associated with unconscious conditions for patients to be combining a conscious patient. Experts categorized the bedridden status as patients lacking stability during walking, such as dizziness or drowsy, which push the patient to lay in bed for many hours. Also, injuries that stop the ability to move. That combined, lacking the ability of the patient to go out of bed. The common factor among these conditions is that all in risk for pressure ulcer development (Hinkle & Cheever, 2018).

There physical consequences physical is creating pressure on the patient's body parts (Taylor et al., 2001), accompanied by a lack of appetite and general weakness (Hinkle & Cheever, 2018). Patients need a skin hygiene, nutritional support, and repositioning to prevent pressure ulcer development.

2. Roles of nurses in caring for patients with bedridden

Bedridden patients are experiencing several physicals, mental and social needs associated with the deterioration in health (Almutairi & Moussa, 2014) and inability to provide activity of daily living such as movements (Kalisch et al., 2011). Therefore, nurses need to provide a comprehensive set of care that maintains patients' health (Berman et al., 2016). Maintaining patients' health refers to the ability of nursing care to support the moral progress of patients to go out of the bedridden condition, support the human lives, and prevent the harm from the immobilization statue (Taylor et al., 2001).

Nurses are working based on a group of nursing-related interventions known as nursing intervention classification (NIC) (Butcher et al., 2003). Determine the purpose of care in bedridden patients in supporting the physiological functions, prevent patient harm. Therefore, nurses support bedridden patients' physiological functions through comprehensive nursing care for the cardiovascular systems, continuous monitoring, observing the oxygenation, intake, and output, and assure adequate nutritional support, rich with proteins and enhance the fluid intake (Krapfl, Langin, Pike, & Pezzella, 2017; Marsden et al., 2015; Ministry of Health [MOH], 2019; Moore, 2010).

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The second purpose of care is preventing harm (Lu et al., 2019). Patients in bedridden conditions will be under several risks for acquiring illness, diseases, or injuries that reduce their life status and even lead to death or complicated the treatment pathway such as getting the infection, pressure ulcer, fall. Therefore, nurses assure hand by hand, preventing the possibility of having the injury for patients.

The main risk for patients in the bedridden condition is getting a pressure ulcer (European Pressure Ulcer Advisory Panel et al., 2019). As mentioned above, bedridden patients are at a high risk of developing a pressure ulcer. Pressure ulcers will complicate the care pathway and reduce the patient's survival and, in many occupations, is the directly responsible factor for septic shock and death. For instance, fifth of critically traumatized death end by them to die either from the pressure ulcer or from its complications (Baldwin & Ziegler, 1998). This also reported the negative consequences of developing pressure ulcers among ventilated patients in intensive care or for patients who stay a long time in surgery and get better progress from the surgical intervention and stay at the hospital for pressure ulcer treatment (Tayyib & Coyer, 2017).

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Nurses protect bedridden patients from a group of activities that assure preventing the harm possibility for those patients (Collier, 2016). This by assuring the proper assessment for this category of patients. Nurse develops several tools and assessment frameworks to detect the bedridden condition and assure the patient's proper scaling for the risk of the bedridden level (Saleh, Anthony, & Parboteeah, 2009). A famous example of these tools known as the Braden Scale, which is a risk assessment tool developed to predict the chance of pressure ulcer development (Braden & Maklebust, 2005).

The second category of bedridden required care is going for ensuring the proper nutritional support for paints (European Pressure Ulcer Advisory Panel et al., 2019). Patients in the bedridden condition have complicated consequences over the digestive system and increase the catabolized processes (Byrne & Salzberg, 1996). This makes the need for patients for another adequacy of nutritional materials such as proteins and carbohydrates. The nurses are responsible for frequently assess the nutritional level of patients, provide the required nutritional support and enhance the fluid intake and evaluate the ability of patients to absorb the required material and consume the required amount of maintaining the physiological needs (European Pressure Ulcer Advisory Panel et al., 2019).

3. Repositioning practice

3.1 Definition of repositioning practice.

According to literature review, there are variety of RP definition, Nightingale, (1860) define it based on moving the patients, Trumble (1930) define it as turn the patients. Others deal with it as "postural change" (Herman & Rothman, 1989) or "shifting patient on the bed" (U.S Department of Health and Human Services, 1992). Later the repositioning practice became a complex stet of activities that include, turning, assessment, anchoring the patients and had a specified time frame for performance part (Moore, 2010; Moore & Cowman, 2015; Moore et al., 2020; Moore & Van Etten, 2014). In sum repositioning practice is the harmonized turn for bedridden patient that end by anchoring and repeated in predetermined time.

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3.2 Concept of repositioning practice

Bedridden means the status when patients cannot move from the bed (Taylor et al., 2001). Bedridden patient on bed in risk for pressure ulcer (Hinkle & Cheever, 2018). Nurses practice repositioning to prevent pressure ulcer development (Berman et al., 2016) in combination with other activities such as skin care, offloading mattress and nutritional support (Collier, 2016). Repositioning practice presents one of the oldest nursing interventions that pass through different forms of understanding. The most aged description of the repositioning practices mentioned before around 1400 years in the Muslim holy book (Quran) for (Ali, 2011) - The story descried a group of believers who slept for around 300 years and they received repositioning regularly. After that, nurses have practiced repositioning professionally but adopt different expressions to satisfy that meaning such as move out(Nightingale, 1860), turning, positioning and others (Berman et al., 2016). However, changes in the applied terms changes complicate the conceptual understanding for the repositioning phenomena and prohibit generating a common description term that satisfy the meanings. Therefore, clarifying the concept and its components will build a scientific description for the repositioning practice based on the state of nursing literature. The current study analyzes the repositioning practice through a hybrid methodology by using Rodger's evolutionary concept analysis and summative content analysis as following issues; 1) concept analysis exploration, 2) concept analysis result (summative content analysis), 3) repositioning practice antecedents, and 4) repositioning practice consequences.

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3.3 Concept analysis exploration

Nurses applied various terms and expressions throughout history. Nightingale used the phrase "moved about" (Nightingale, 1860). The term "rolled over" was used by Trumble (1930) to refer only to the action of "turning". Later, other terms such as "postural change" (Herman & Rothman, 1989) or "shifting patient on the bed" (U.S Department of Health and Human Services, 1992). These terms changed over time. Therefore, exploring the evolutionary nature of the concept serves in understanding the consequence of these changes in nursing practice.

Archaeology of the knowledge (Gutting, 1989) in combination with Rodger's evaluation concept analysis (Tofthagen & Fagerstrøm, 2010) helps nurses understand the conceptual changes over a period of time (Foucault, 2002). Archaeology of knowledge analyzes the available evidence based on the pre-conceptualization. Pre-conceptualization refers to context in a particular time. Foucault argued that pre-conceptualization analyze three forms; successions, enunciative, and procedure of interventions.

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Forms of successions is arranging the events, examining the dependences of each events, and examining the schemata (combination) between events (Foucault, 2002). The second aspect, forms of enunciative which refers to the nature of linguistic structure. Forms of enunciative revises where the text appears (field of presence), accompanied with what (filed of concomitance), and the amount to remember (filed of forgotten). Thirdly, the procedure of interventions which the techniques of rewriting, transcribing, translating, and systemizing particle concepts to actualization.

For proper pre-conceptualization understanding, the analyzer tracks the effect of magnificent events on the concept. The event - in scientific context- is an

epistemological incidence that changes people's perceptions toward the concept of interest. The current study identified three events that overlapped the way nurses deal with repositioning practice to form three pre-conceptualization eras; classical (until 1929), modern (1930 – 1974), and research (1974 – 2020) as it comes below with more details below.

3.3.1 Classical era until 1929

Seven articles represent the classical era of nursing understanding for the repositioning practice. During the classical era, Florence Nightingale wrote; "moved about" (Nightingale, 1860) to refer to repositioning practice. Others adopted; moved out, changed position, turn, and move. Conceptualizing the meaning shows that the story provided in the texts as the patients who are unable to move will have bedsores in the form of successions. So, nurses have to do the intervention "move out". If the nurse fails to do the "move out," the patient will have a pressure ulcer "bedsore," which is a nurse's error. This understanding influenced blaming nurses (feelings of) about pressure ulcer development. This understanding might be responsible to make the repositioning practice measurement a sensitive matter as it comes in part four in this chapter. Also, the practice depended on personal, or situational analysis with no clarification on the meaning of bedridden patient. Furthermore, repositioning practice had weak scientific rationalizations on when and how it should happen. Additionally, one voice denies any role in repositioning practice in the pressure ulcers (Scanlan, 1886).

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3.3.2 Modern era (1930 – 1974)

The first epistemological events pinout in the current study in 1930 due to appearance of pressure sore to refer to bedsore (Grossman & Lightfoot, 1945).

It shows changes in pressure ulcer etiological understanding. In 1975, showed invented the first well classification system for pressure ulcers (Shea, 1975). So, the current study determined it as the second epistemological point that end of the modern era. These two events are not directly related to repositioning practice, but it influences the changes in the presence of "pressure ulcer," which change the nurses understanding for the concept of interest (repositioning practice) (Foucault, 2002).

It appeared as a teamwork intervention (Bliss et al., 1967), not an individual task (Carpendale, 1974; Exton-Smith, 1961). Also, the frequency within two hours appears as a mandatory (Silver, 1967). The description of two hours is covered by a scientific rationalization (Bardsley et al., 1964; Exton-Smith, 1961; Matheson & Lipschitz, 1956). Also, the presence of documentation and timetable sheets was presented as a requirement (Silver, 1967). The aim of repositioning practice (at the begging of that era) was to expose the skin of the patient to light, which (light) would help in the pressure ulcer management (Grossman & Lightfoot, 1945).

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Literature – during this era - mentioned the need to offload the pressure by pads, mattresses, or other devices and joined it in a frame to reduce the workload of the nursing staff (Bliss et al., 1967). Also, the literature did not contain any description of the techniques for fixing the patients on a posture "after the turn". For instance, Trumble (1930) ignored fixing the patient in a new position despite describing all aspects of other interventions. Finally, literature eliminates expressions that blame nurses for pressure ulcers which means a significant transfer to the field of memory "disappears". In general, during the modern era, repositioning practice contains the meaning of turn, documentation, signs for team cooperation, and the

frequency every two hours. However, there were no further descriptions about how this should be documented.

3.3.3 Research era (1975 – 2020)

In 1975, scientists classified pressure ulcers on the anatomical aspect (Shea, 1975). later, the risk assessment tools – such as Braden was appeared (Braden et al., 1987). International advisory panels of experts played a crucial role in revising evidence and recommending guidelines (Moore, 1988). Those events remodified the epistemological thoughts for pressure ulcers which impacted repositioning practice understanding. These changes modify the clinical, academic, and organizational meaning of repositioning practice. The endpoint was chosen as 2020, where the coronavirus disease 2019 (Covid-19) (Tripathi et al., 2020) had an impact on pressure ulcer management that includes the repositioning practice (Moore et al., 2020), and until the time of analysis, this consequence is not precise yet.

Repositioning practice appears more explicit and well-defined in the research era. The analysis explores the meaning of repositioning practice based on the written format in these texts. Additionally, literature focused on nurses' compliance in applying it in proper frequency (Bergstrom et al., 2013; Cyriacks & Spencer, 2019; Jocelyn Chew et al., 2018) and acceptable quality (Schutt et al., 2018). Moreover, literature explains performance methods and combines texts with pictures (Berman et al., 2010; DeWit & Williams, 2013; Kozier et al., 2018; Wilkinson, 2016).

It appears that literature had not shared a similar field of memory, either for the frequency or reminding. For instance, international guidelines propose an individualized plan (for each patient) for the frequency of repositioning practice (EPUAP/NPIAP/PPPIA., 2019), so there is no definite cut point to determine the time

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between each repositioning practice. While, nursing textbooks still consider the repositioning practice every two hours (Kozier et al., 2018). Similar to the reminders, as international guidelines present their importance, it almost disappears from nursing textbooks. The studies were applied in the archology of science analysis appears in Appendix E.

3.4 Concept analysis result (summative content analysis),

For exploring the attributes, the study analyzed only the references from the research era. That is due to the belief about the accumulation nature of the pre-conceptualization. After evaluating all retrieved literature. The author uploaded the literature on MAXQDA 2020 software (Screen window for the program in Appendix E).

MAXQDA 2020 is a qualitative assistance analysis software that supports the researcher in writing memos (notes) on the text, generating codes, and re-arranging the codes in different frames, tables, or contextures for any design to create themes. The software also can count the number of words, statements, and phrases in texts and generate different output formats and visualizations for the analysis (Kuckartz & Rädiker, 2019). It shows usefulness in assisting researchers in qualitative and mixed methods (Oliveira et al., 2013). The initial software version appeared in 1989, and since then, several projects and studies have been designed to improve its applicability in the qualitative analysis (Kuckartz & Rädiker, 2019). All these documented uploads to MAXQDA are based on standard registration available for Ph.D. students for one-month use. The study extends from April 2021 until May 2021. The study adopted it in literature review content analysis. Concept figure appears in Appendix E.

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The first revision produced 581 highlights (directives). Each highlight referred to a code related to the repositioning practice. Six codes were excluded later after discussion with professors and considered as antecedents.

These codes were revised in the second analysis round to create the themes based on mentioning of the point of concern. For example, all issues related to preparing the bed for turning to consider as one point regardless if refers it was "flatten the bed" (Berman et al., 2016) or "elevate the bed" (Rhoads & Meeker, 2008) as much as these points describe what nurses will do for the bed to prepare to for the turn. These two points are categorized as bed-related preparation.

The coding also was similar for the time, as the time of repeating the interventions, regardless of the references present the frequency every two, three, or four hours all grouped as time-related issues. The third round grouped the themes into subscales. For instance, all points related to what nurses perform, how they will perform, and the kind of physical activities and called the "turn" sub-scale.

3.4.1 Preparation

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The literature presents several actions that nurses do at the bedside with patients before initiating the turn. These points are repeated among the revised literature in 90 different locations to equal around 15.7% of the overall recorded locations in the literature. The "preparation" refers to the activities that nurses do to make patients ready for their turn. Which consist of 15 codes:1) prepare the patient bed, 2) adjust the patient's arm, 3) draw sheet, 4) incontinence area, 5) knees, 6) legs, 7) remove the pillows, 8) explain the procedure, 9) side rail, 10) hand hygiene, 11) privacy, 12) appropriate starting position, 13) identify the patients, 14) introduce the nurse, and 15) considerations for the prone position.

1) Prepare the patient's bed.

The literature presented issues related to arranging the patient's bed (Rhoads & Meeker, 2008), fixing the bed (White, 2011), flattening the bed, putting the head of the bed, raising the bed to an equal level of nurses' waistline and ensure the suitability of the bed condition before initiating the turning (Wilkinson & Van Leuven, 2016). These points appear in17 locations equal to 18.9% of the overall points. It was apparent from the literature that nurses have to revise the bed condition (Kozier et al., 2018), adopt the highest of the patient bed to the waistline of nurses (White, 2011), fix the wheels so it will not move during the turning (White, 2011). Literature assumes that beds in hospitals are fixable, adjustable beds (Kozier et al., 2018).

2) Adjust patient arm

Fix the arm (Berman et al., 2010), cross the arm over the chest (Potter et al., 2013), secure the arm, and inspect the palm of the arms (Kozier et al., 2018) are all expressions that appear refers to specific activities' nurses performed for patient's arm before initiating the turn. There are seven different locations, which equals 7.8%, highlighting the nursing actions toward the patient arm before the turn. The literature presents the nursing responsibility to secure the arm before initiating the turn. From the physiological understanding of the nature of the bedridden condition, the patient's arm might fall below the patient's body which makes it at risk for pressure ulcer developments (Collier, 2016), alteration of an intravenous line (IV) which in many cases is located in the arm or minimizing the smoothness movements of the body during the turning (Kagel & Rayan, 2004). Also, the unconscious and quadriplegic patients do not have any arms control, and inspecting the arm statues is a

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basic nursing care (Kozier et al., 2018). In general, the nurses have to secure the arm to satisfy the meaning of repositioning practice.

3) Draw sheet

A draw sheet is a nursing expression used to describe a small bed line or sheet used in the middle line of the bed (Taylor et al., 2001). Usually, it will be white or blue in color, solid in texture (Kozier et al., 2018). Also, it will be vital for lifting patients, and it is very and calm and soft when touching the human skin. These sheets are manufactured from a material that is able to absorb the humidity and balance the temperature (Berman et al., 2010). Nurses use these sheets for lifting patients and turning, a barrier between patients' body fluids and the original bed linen. Literature expressed the importance of drawing sheets as a tool used in turning, helping nurses in fixing the patients in the new posture (anchor), and balancing the skin microclimate (Salcido, 2016). The draw sheet was mentioned eight times in preparation, which equals 8.9% of the total points. Nurses must ensure the presence of this sheet and assure it is suitable for use among all patients in need for repositioning practice the presence of this sheet and assure it is suitable for use among all patients in need repositioning (Berman et al., 2010; Burton & Ludwig, 2014; Kozier et al., 2018; Nugent & Vitale, 2014; Potter et al., 2013; Wilkinson, 2016).

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4) Incontinence area "Buttocks."

On one occasion, a reference mentioned that nurses should inspect the "Buttocks" area before initialing the turning (Berman et al., 2010) as the incontinence area (Buttocks) has been in risk for stool or urinary exposure. Although this point is mentioned only one time among all available references for its clinical importance in preventing incontinent dermatitis, this is included in the current list.

Incontinence-associated dermatitis (IAD) is a very harmful skin condition among bedridden patients (Beeckman et al., 2018; Beeckman et al., 2017). So, miss inspects this area (including the buttocks) and performs the turn with incontinency, violating pressure ulcer prevention principles.

5) Knees

Nurses evaluate the patients' knees conditions. The literature presents the nursing role in inspecting, observing, checking, securing, and evaluating the knees condition in six places overall revised literature (Berman et al., 2010; Kozier et al., 2018; Potter et al., 2013; Wilkinson & Van Leuven, 2016). The knee is an anatomical site that refers to the area of the knee joint. The knee joint is connecting four bones; the femur (the longest bone in the body), patella, tibia, and fibula, with a group of tendons and muscles (Boore et al., 2016). This specific anatomical condition makes the knee has three boney prominences; anterior from the patella, fibula, and tibia, an interior part from the femur and fibula, and an exterior part from the femur and tibia (Boore et al., 2016). This makes it at high risk for pressure ulcer development even with exposure time (in a short period, a pressure ulcer can develop). Furthermore, bedridden physiological changes that lead to rigidity of extremities, muscle contraction, and hardness of tendons, bedridden patients are at risk for bone fractures (Agbo & Igbo, 2013; Faria et al., 2016; Lu et al., 2019). Therefore, repositioning practice needs specific techniques to deal with the knees (as will come below). Nurses must inspect the knees each time before performing the turn. So, checking knees is an essential component of repositioning practice.

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6) Legs.

Legs are the part of the human body from the knees to the ankle (Boore et al., 2016). It has a unique anatomical feature consisting of two bones, the fibula, and the tibia. The shinbone part from the tibia extended in the interior leg makes it all a bony promise with no muscular protection like the posture leg part. Therefore, pressure ulcer formation risk is higher if patients lay on the lateral side for a long time. Also, the legs have a large muscle called the gastrocnemius and plantaris tendon, which are wide extended organs that originated in the knees and travel to the heel. These organs are all affected by contractions, stiffness, and hardness during bedridden status. Several studies report leg fracture incidence during a turn and pressure ulcer over the tibia bone (Heyneman et al., 2009). Logically, nurses must care it during the procedure (Berman et al., 2010).

7) Remove pillow from patients' surroundings.

Pillow is a cloth bag made from covenant material and full of soft material that distributes the pressure over it (Tymec et al., 1997). It has different shapes, designs, and colors that all aim to make a support. In hospitals, pillows are usually used to support the head or any other organ of patients during sleep, fix the posture, or give relaxation. Pillows are essential for bedridden patients to ensure fixing the patient in the new pose (anchor). Therefore, nurses arrange pillows over different arrangements to support patients in their current posture. However, literature initially focused on the need to remove all pillows from patients' surroundings (from the bed) before initiating the turn (Cooper & Gosnell, 2014; Kozier et al., 2018; Potter et al., 2013; White, 2011; Wilkinson & Van Leuven, 2016). The literature presents

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removing all pillows from the patient's bed without mentioning the rationale for not initiating the patient's turn with pillow presence.

8) Explain the procedure to patients or significant others.

"*What will happen*?" "*What is going on*?" "*What will nurses do?"* Are all expressions applied to show the nature of the procedure for the patient (conscious or unconscious), companions, families, attendees, or significant others (Treas & Wilkinson, 2013; White, 2011). Repositioning practice, such as any nursing intervention requires the nurse to explain to patient (Treas & Wilkinson, 2013). In the current analysis, specific mentions for explaining the procedure for the patients and relatives appear five-time which equals 12.2% of times over the pre-turn points (Cooper & Gosnell, 2014; White, 2011). This shows the importance of explaining the procedure to patients each time that happens. Also, references present the need to explain the procedure for all patients, even unconscious, under full sedative, or on mechanical ventilators (SM Mogotlan, 2015) as this is a patient's right in the universal standards (Joint Commission International [JCI], 2015).

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9) Siderail of the bed.

Elevate the side rail of the bed, secure the guardrails, elevate the bedsides (Berman et al., 2010; Potter et al., 2013; Taylor et al., 2001; Wilkinson & Van Leuven, 2016) are all expressions that appear in the literature to express the need to elevate the rail of patient's bed. Patient beds in hospitals (in general) contain a metallic out layer part, called rails designed to prevent patients from falling from the bed (Tzeng & Yin, 2015). Usually, the side rail is adjustable to be lower down or upward by elevation, providing falling protection. Works of literature present the need to elevate this both side rail (from both sides) before initiating the turn. However, the

revised references were not consistent due to side rail elevation. Part argues that side rail elevation should be done before removing the pillow, with pillow removal or after. However, the agreement for the need to elevate the side rail consistent with-it logicality to protect the patient from the fall during the turn. This was also consistent with the sixth international patient's safety right in the fall prevention (Allen & Wallace, 2020).

10) Hand hygiene.

Wash hands or hand hygiene are expressions that appeared as the initial step that nurses should follow for repositioning. However, even the references did not mention hand hygiene as a specific step for repositioning practice stating clearly that nurses are responsible for applying hand hygiene before and after any nursing procedure based on the international recommendations of the world health organization (WHO) (Barnum, 1992; Berman et al., 2010; DeWit & Williams, 2013) in approved the five moments (WHO, 2009).

11) Privacy.

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Privacy protection is a broad term in health care that refers to patients' right to have dignity, information, and physical exposure protection (Johnston & Warkentin, 2008). In the repositioning practice, the nurse needs to remove the bed line, covers, and sheets that cover the body of patients, which makes the patients physically exposed to anyone near the patient's bed. So, the literature presents the need to buy attention to it before removing the line and tell the patients to assure privacy of patients either by using curtain (Kozier et al., 2018), asking other people who are not participating or essential to leave the patients room before the exposure (SM Mogotlan, 2015).

12) Appropriate starting position.

Centralize patient fixing patient posture to the middle of the bed, and arranging the patient alignments are all expressions used by literature to indicate the need to make the patients in a posture ready for performing the turning (Berman et al., 2010; Wilkinson & Van Leuven, 2016). Over 4.4% of the points referred to preparing issues that focused on the need to make the patient in proper posture before the turn. It appears logically patient might be away y from the bed center due to the previous posture, or moved during the time from the last posture, or for any other reasons, the patient might not be located in the proper posture for the turn. So, assuring the bed's location is serving the purpose of a right turn. Therefore, an appropriate starting position indicates proper preparation for the turn, and it is an essential part of the repositioning practice.

13) Identify the patient.

Patient identification is a fundamental nursing procedure before any nursing procedure that includes repositioning practice. Literature mentioned the patient's identification as a necessary aspect based agency policy (SM Mogotlan, 2015), primary nursing task (Rhoads & Meeker, 2008), or as it the fact of being the first international patient safety goal (Joint Commission International [JCI], 2015).

14) Introduce the nurse.

The patient has the right to know the name of responsible nurses for their care (Joint Commission International [JCI], 2015). Although the literature did not expand on the methods, words used, or statement format for how the nurses have to introduce themselves to patients is it the primary assigned nurse has to do that.

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In general, the patient has the right to identify names and professional ranks for nurses taking care of him.

15) Prone position consideration.

A frequent issue repeated in the literature over six different locations, which equals around 1% of total 575 points related to focus on prone position (Kozier et al., 2018; Rhoads & Meeker, 2008). The horizontal position "prone" is posturing the patient with a face-off and back upward (White, 2011). Although this posture is rarely applied in hospitals, mainly for cases of several lung problems (Moore et al., 2020), spinal surgeries (Leibovitch et al., 2006), or specific medical interventions. However, this revision happens during the severe acute respiratory coronavirus (COVID- 19) pandemic(Huang et al., 2020). Posturing patients in a prone position is widely applied after approving its benefits over increasing lung expansion and enhanced chance of patient in life (Moore et al., 2020). Therefore, the current review considers these points are essential issues for further investigation.

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3.4.2 Patient assessment

Assessing the patient physical, emotional, and spiritual part is primary nursing care. Assessment is the first step in any nursing care plan (Doenges et al., 2019), it helps the nurse to determine the need for care (Potter et al., 2013), evaluate the risk of the intervention, and enhance the overall nursing processes (Soban et al., 2011). In the current reviews, references mentioned in 41 locations (7.1%) issues related to assessment and repositioning practice. The review counts only issues associated with performing an assessment with no immediate actions on the nurses. For instance, if the text describes patient assessment issues combined with an

immediate action or decision, the review counts it as preparing themes; such as arms, legs, and knees, which all include assessment part and quick actions nurses should do in: ability of patient to assist, pressure ulcer risk area, turn restriction, and skin condition.

1) The ability of the patient to assist

The literature presents the fact that not all bedridden patients are sharing same features. For instance, an unconscious ventilated patient in intensive care units is considered a bedridden patient (Lynn, 2018) even he is in a different condition of paraplegia patient admitted in a medical-surgical ward who still had some ability to assist the nurse during the turning (Doenges et al., 2019). So, nurses assess the ability of patients to help during the turn; if the patient gets a level of ability to assist, it is recommended to ask the patient to participate. Patients' participation had a positive effect on the patient's psychological status, enhanced the patient's trust in his abilities, and reduced the nursing required efforts (Johansson et al., 2002). The ability of the patient to assist is requiring nurses to have proper clinical judgments for the requirements for the turn as well as an understanding of the ability of the patient. The nurse might ask the nurse to cross the arm over the chest (Kozier et al., 2018), ask the patient to hold her hand (Wilkinson & Van Leuven, 2016), push the bed by legs (Rhoads & Meeker, 2008).

2) Pressure ulcer risk area

Over around two hundred years of pressure ulcer studies, evaluations, and progress, science developed a framework for the highest possible area for developing a pressure ulcer. Experts call it boney prominences area (Collier & Moore, 2006) or anybody in contact with medical devices. The bony prominences area such

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as the sacral, trochanter, knees, heel, occipital, elbow, ear, and shoulder. Also, comment medical devices such as traction, foley catheters, endocranial tubes, and nasogastric tubes produce pressure on different body parts. Nurse shave to evaluate these areas before initiating the turn for two main reasons(Cooper & Gosnell, 2014; White, 2011).

3) Turn restriction

Different medical conditions, treatment plans, or medical procedures restrict movements (Baldwin & Ziegler, 1998). For instance, moving the hip directly after the hip surgery negatively affects the surgery outcome (Rich et al., 2011), moving the back after vertebral procedure (Kleinman et al., 2015), turning patient after head trauma, and so on (Rafiei et al., 2014) are all contraindicated. There are hundreds of recommendations to fix specific body parts due to the disease process or treatment protocols. Nurses should revise these recommendations before the turn(Jankowski & Nadzam, 2011). Nurses modify the turning techniques, change the anchoring posture (final posture) or adopt other tools (lifting devices) for the turn. Studies started that even with the most burdensome restrictions, repositioning practice is a must as much as the patient needs to have pressure offloading (Schwartz & Gefen, 2019). Therefore, evaluating the turn restrictions is a mandatory issue for appropriate repositioning practice.

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4) Skin Assessment

Skin is the largest body part in the human body (Boore et al., 2016); it covers all body and assures protection, gives the identity, keeps the humidity, controls the temperature, and isolates the human body from external hazards. Also, it is a biological indicator of internal body situation, as the skin sends signals of being under

pressure by changing the colors, texture, and shape. It shows the red wrinkles due to untidy bed linen, puffiness due to imbalance fluid management, weak and rigid nutation intake more minor than the equipment, and so on (Compton et al., 2008). Nurses have to evaluate the skin changes before the turn, and during the turn, and document these findings (as come below). Literature mentioned issues related to skin assessment 15 times for evaluation, and another 15 locations for documenting these changes (as it comes in the documentation section).

3.4.3 Posturing

Posturing is the most apparent feature of repositioning practice. It reflects the physical procedure of holding the patient and changing the posture (Lynn, 2010). However, studies show that even the nurse shave positive knowledge, skills, and attitudes toward turning, but this is not reflected in the clinical applications (Moore, 2010; Moore & Cowman, 2015; Moore et al., 2020; Moore & Van Etten, 2014). Producing the posturing required nurses to follow specific techniques all the time, while several factors interfere with the quality of turn production each time nurses do (Iblasi et al., 2021). Literature mentioned issues related to posturing in several places over 89 different locations. The review categorizes these points to assure its actualization that happens to match the requirements of repositioning practice. The categorization is designed as follows; Hand on Shoulder hand on hip, head and neck, Arm, one hand under the patient, legs, knees, monitoring patient condition during the turn, lifting by sheet or device, rolling, pressure mapping, range of motion, and heels.

1) Hand on shoulder hand on hip

In fourteens location, pieces of literature descript by text, pictures, or both the holding points between patient and nurse as shoulder and hip. Nurses put one hand

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on the shoulder and the other hand on a hip roll the patient from these parts and from the arm or leg, which might lead to fractures, pain, or injuries for the patients. Pulling or dragging the patient is contraindicated in all cases. Nurses roll or lift the patient to satisfy the posture change as one part that eliminates the expected muscle trauma from pulling patients or skin injuries from the drag. Also, nurses immediately turn the upper part first and then the lower part (Moore, 2010; Moore & Cowman, 2015; Moore et al., 2020; Moore & Van Etten, 2014).

2) Head and neck

The literature stressed the need to turn the head and neck together and be consistent with the patient's posture. Also, the literature presented the need to hold the head and neck as one piece and not make the turn soft and tough, which might lead to negative consequences for the muscles' cervical muscles. Also, as the head movements might differ from the overall patient posture, such patient be in the supine position while their head is on the lateral side, literature stress the importance to give further focus on the pressure ulcer over the ear (EPUAP/NPIAP/PPPIA., 2019)

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3) Arm

Arm gets specific concerns in the literature. it is essential for body parts to worry about it during the turn. The arm is the body part that extends from the shoulder to the elbow (Boore et al., 2016). Arms might complain of a high level of muscle tightness, tendon contraction, and rigidity. Also, during the turn, the arm would be at risk to fall under of body track which all need nurses to follow it movements and assure it had the proper turn movements and assure it proper final posture (Potter et al., 2013).

4) One hand under the patient

Turn is on pulling, withdrawing, dragging, or harsh moving rather and it will be a soft move by lifting the patient up sliding (Potter et al., 2013; SM Mogotlan, 2015). Therefore, nurses make one hand under the patient for producing a soft move. However, there is an inconsistency between “hand under the patient” and “hand on shoulder hand on hip”. However, as these two postures depend on the clinical decision-making based on the patient situation, and the target posture (patient will be anchored on).

5) Legs

As it appears above, legs required special preparation before the turn and need further attention during the turn. Nurses assure the turn for the legs happens after the upper part of the body directly, and also posture the leg in congruence with the expected turn. Also, the legs are turned by two hands to assure safety. Finally, legs movements had several alternations or cautions for different medical procedures such as, hip surgeries, fractures and tractions.

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6) Monitoring patient condition during the turn

Bedridden is a condition that happens due to other health problems such as cerebrospinal injuries (Cyriacks & Spencer, 2019), chest infections (Moore et al., 2020), or any other illness that make the patient unable to move (Sousa et al., 2020). Therefore, patients might show deteriorations during any changes in the posture during the turn, such patients on mechanical ventilators might show desaturation, leakages in the tubes or blockages of devices, secretions from a tracheostomy, direct hypotension or hypertension, or changes in the cardiac rhythm (White, 2011).

Therefore, the nurse is aware of these physiological changes during the turning (White, 2011).

7) Lifting by sheet or device

Nurses do not drag patients over the bed or make any frictions between the bed line and patient (as explained above) rather, nurses pull up the patient up (lifting up) for the turn. That happens by draw sheet (explained above) as holding the sheet from the two studies and making the turning (Potter et al., 2013). In some cases, a nurse might use lifting devices that are variant in types and shapes but all have a drawsheet (Kozier et al., 2018).

8) Rolling

There is a conceptual overlapping between the word “rolling patient” and turning patient. However, rolling is defined as tuning over central points, so all rolling is turn, but not all turn is rolling. Therefore, rolling is turning the patient around his central line. In this way only, the upper part-turn is called the rolling while the other body part turn is not rolling. The nurse hold their hand on the attachment’s points mentioned earlier (should, hip, head, neck, and under the patient) and roll the patient around the center.

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9) Monitor pressure mapping

Monitoring the pressure by pressure map mentioned one location in the international pressure ulcer guideline (EPUAP/NPIAP/PPPIA., 2019). Based on studies conclude, nurses will produce better turns if they were aware of the pressure point on the mattress (Behrendt et al., 2014) or followed patients' posture changes (Pickham et al., 2018; Renganathan et al., 2018). These promising technologies assume the presence of these devices, and nurses are trained to use it. Based on the

available knowledge it is still not well adopted internationally and is only applied in limited hospitals in the western world. This point will not be considered as an attribute for repositioning practice.

10) Range of motion (ROM)

In one location, the reference mentioned that nurses during the turn have to check the range of motion of the patient for the elbow joint, knees, and hip (Diepenbrock, 2011). Range of motion is an expression that reflects the capabilities of joints to move, flex or abduct (Boore et al., 2016). Each body joint has a unique feature for movants. Evaluating the ROM did not appear as a basic component for the repositioning practice as it was located in one location among the revised literature, not directly related to offloading or pressure ulcer prevention and logically not required every two hours for pressure ulcer prevention purposes.

11) Heels

Heels had a very special consideration in the literature that presents the repositioning practice or pressure ulcer prevention efforts. The heel is the back portion of the foot, it locates below the ankle and behind the foot arch. It consists of very sensitive, soft, and light skin layers that cover the achilleas tendon, posterior tibia tendon, calcaneus bone, heel bone, flexor hallicuslongus (Boore et al., 2016). Which makes it a high-risk bony prominence, and unable to accommodate pressure (Heyneman et al., 2009; Tymec et al., 1997). Also, heels have less blood supply than the other foot part which reduces the ability of heels skin to resist the pressure-related death (Gefen, 2009). However, nurses have to make extra attention to all issues related to the heel including turning in a proper way also protecting the heel from friction with the bed line or any other body part. The current analysis includes heels as

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a crucial issue in repositioning practice in the turning phase, anchor phase as well as in documentation. Over 15 different locations, the literature stressed on the recommendations related to heels and turn.

12) Teamwork

Teamwork, team coordination, cooperation, assure the required personnel or assure having a proper number of nurses are all points motioned in the literature about the importance for a proper number of nurses joining each other for the turning (Berman et al., 2010; Burton & Ludwig, 2014; DeWit & Williams, 2013; Kozier et al., 2018; Nugent & Vitale, 2014; Potter et al., 2013; Wilkinson & Van Leuven, 2016; Wilkinson, 2016). References mentioned this as text and several pictures that show a number of nurses joining each other in doing the turn in different arrangements. Although the world harmonization was not applied among the revised references, the current review prefers this term as a proper description for the current theme meaning. Harmonization refers to two or more nurses working in the same physical location, at the bedside level, for the same patients with coordination and consistency in their body movements.

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Although in a few and scattered locations, literature presents the possibility of performing the turn by one nurse, the references mentioned this is not the proper technique and it depends on the patient's physical condition and the ability of the patient to help (Kozier et al., 2018). Some revised textbooks make a section for turning by one nurse (White, 2011), but the same references mentioned its risk on patients and possibilities to harm nurses if this was the routine practice (White, 2011). Therefore, harmonization is a mandatory attribute of repositioning practice. Harmonization-related issues appear over 62 locations in the revised literature which

is equal to 10.8% of overall repositioning practice points. These locations had been categorized over four codes as follows; two to three staff, count to three, body mechanics, and one on each side.

(1) Two to three staff

Repositioning practice assures patients safety, and proper benefits by presence of group of nurses doing it together. Two to three nurses achieve repositioning practice in a way that respects all requirements and ensures the patient's safety. The texts as well the pictures in the revised references present two to three nurses during all steps. Thus, much literature present the possibilities for using more than three nurses either for specific postures such as prone, bariatric patients, or high contraction conditions (Diepenbrock, 2011).

(2) Count to three

Nurses should lift, roll or log a patient's body in coordination with all nurses. So, there is no high weight on one nurse or further pressure on one side of the patient's body. This required a communication signal between them to determine the exact time for lifting or pulling. Literature refers to this as "counting to three". So, this communication signal might be counted to three by English, any other language, or any other signal that refers to this point. Also, this assumes the presence of predefined agreements between nurses about this signal. This also further emphasizes the importance of harmonization in satisfying the repositioning practice, protecting nurses from harm, and assure patient safety from harms or frictions. Also, it assumes that nurses have mutual communication skills, mutual understanding, and agreements for each move before it starts.

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(3) One on each side

Nurses are distributed over the patient side as one on the left side and the second on the right side regardless of the target posture (except for prone the number should be three at least) (Salcido, 2016). This appears clear from the written texts and available pictures in references. Also, if there were three nurses, so one nurse will hold the head, neck, and the endocranial tube or mechanical ventilator tubes if present (Diepenbrock, 2011).

(4) Body mechanism

Repositioning practice does not harm nurses' health. Experts emphasize a list of recommendations, aspects, and guidelines for allowing nurses to perform repositioning practices without harming their muscles, such as flexing the knees, making the weight on their legs, not backs, and testing their abilities before turning (Berman et al., 2010; DeWit & Williams, 2013; Kozier et al., 2018; Nugent & Vitale, 2014; Wilkinson & Van Leuven, 2016). These recommendations are to achieve nurses' and patient safety (Kirsner et al., 2019). Proper use of the body is an essential repositioning practice (Wiggermann, 2016).

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3.4.5 Anchor

Anchor is a heavy metal piece used by ships to assure stability over the sea (King, 2019). Although anchor is not a famous description for fixing patients on specific posture, the current review feels it reflect the intended meanings better than fixing or holding terms. The total points that present anchor meaning for patients appears over 116 different locations which is equal to one-fifth of the total points. Anchors consist of 13 codes as follows; assure the patient's comfort, support head and neck, support the leg, support the heel, feet, knees, hand, and forearm, wait to be sure,

patient bed angel, secure the device, eliminate sheet or line effect, secure bony prominences.

1) Assure comfort

Repositioning practice is unpleasant for patients experience (Rafiei et al., 2014). The physical changes that happen to patients during the procedure might lead to pain, discomfort or unpleasant feelings. These signs (if it happens) should be temporal and disappear after posturing the patients in the new posture. However, this is not always the case, patients stay on pain or complain of discomfort after posturing either for the presence of a medical device under the patients, further pressure on a weak area or pressure over the internal organ (Kozier et al., 2018). Nurses should assure the comfort of patients after posturing. There is no available tool for comfort measurements for repositioning practice or specified techniques to assure comfort. Some mentioned pain scoring as a useful tool. However, even the pain measurement might be useful in this situation, but it did not appear to be clinical logical to evaluate the pain score after conducting the turn. However, literature relay on the clinical nursing competencies to evaluate the comfort status. In general, there is a need for further studies and investigation about the comfort measurement after the turn to assure satisfying the repositioning practice objectives.

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2) Support head and shoulder

The literature presented in 14 locations the need for special support for the head, and neck of patients regardless of the posture type. As the head is vulnerable to ulcer development in shorter pressure duration on the nose, ear, and occipital as the skin layers is thinner over these areas (Berman et al., 2010; DeWit &

Williams, 2013; Kozier et al., 2018; Wilkinson, 2016). So, nurses need to secure the head and neck for patients after each posture to satisfy the repositioning practice.

3) Heels

As it presented above, heels had an essential part of the repositioning practice actualization. Nurses have to anchor the heel with the lowest possible pressure (Kozier et al., 2018). This can happen by fluting the feel by pillow under the leg or by heel protectors (White, 2011). Although there is a wide focus on the need to manage heel anchoring, references did not explain for the best tool for anchoring (pillow or heel protectors) and what are the expected characteristics of the heel protection, type of foam, and the frequency of change (EPUAP/NPIAP/PPPIA., 2019). Also, there was lacking in discussion the latest evidence about using dressing such as silicone dressing and if apply the dressing for heel is considered an intervention within the repositioning practice or separate intervention (Huang et al., 2015).

4) Feet

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The foot is the lower part of the lower extremities. It consists of three main parts which are; the forefoot which contains the five toes, and five longer bones (Boore et al., 2016). And the midfoot is an arch-like pyramid boney structure and has cuboid bone and navicular bone. Finally, the hindfoot means the heel and ankle (Boore et al., 2016). This anatomical structure gives the foot the fixability to distribute with the human weight, enhance the walking, ruing and other human activities in case of standing but not in bedridden status. In bed redden condition, the weight distribution is located at a different point. These points might be toes, heels, and ankles, which are weak areas compared to the midfoot area. Therefore, this area is

more vulnerable to developing a pressure ulcer. Also, these complex boney structures in the foot are connected with several tendons; in bed ridden conditions, the foot will be at risk to flap upward and hyperextend for extensor hallucis and retinaculum tendons which might lead to permitted damage if no proper support is provided for the base of the foot to the element that extension and assure appropriate offloading (EPUAP/NPIAP/PPPIA., 2019). Over four different locations, the need to anchor (fix) the feet of bedridden patients during the repositioning practice appears to be as crucial issue. The current revision considers the feet support an essential aspect in the anchoring phase of repositioning practice.

5) Knees

As presented above, knees are a very vulnerable body parts for developing the ulcer. Therefore, nurses must anchor the knees by signing an offloading tool such pillow. Literature stressed the importance of keeping knees protected either by a pillow or by specific devices that connect over the knees (Mogotlan, 2015).

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6) Hand and forearms

The hand is the end part of the upper extremities; it consists of different type of bones (phalanges, metacarpals, carpels), different stet of alignments, and tendons that connect the bones with a list of several smaller muscles that give a hand a comprehensive ability to perform a very complex task (Boore et al., 2016). However, in bedridden conditions, finger muscles and tendons intend to flex inside, creating pressure over the internal hand, injuries from the nails (Springhouse, 2006; Treas & Wilkinson, 2013). Works of literature assume that nurses are assuring the

fixating effect is eliminating the patient's figures in more relax positing even by putting the ball in the patient's hands or devices that reduce this effect.

7) Wait to be sure

Anchor aims to assure that patients are fixed on the new position and will not fall or slip to the previous posture. Although that is implicitly presents the anchor, some references mention that explicitly to assure its importance (Eckman & Megan L. Aldinger, 2013; Potter et al., 2013). Nurses have to wait and observe the patient after removing their hands from the patients to be sure that patients will stay in this posture or they will be in need of extra pillows or fixators to stabilize the new posture. However, there are no clarifications for this pause's duration, either 10 seconds or more. However, nurses should be sure that patients will stay on the current posture for the longest possible time, which is perfect until the next repositioning practice time.

8) Patient bed angel

Literature spends wide spaces in comparing different angles supported to be between patients and bed. Studies argue that 30 degrees is better than 45 and all eliminate the possibility to make the angle between the patients and bed being more than 60 (Avsar et al., 2019; Doenges et al., 2019; Moore, 2010; Moore & Cowman, 2015; Moore et al., 2020; Moore & Van Etten, 2014). However, the current paper is not going to compare or evaluate these evidences rather it will conclude that nurses have to be aware of the angels and have proper knows, skills to apply and estimate and to assure its applicability during the repositioning practice. The issues related to angles appear in the reviewed literature over 16 different locations, which is considered one of the highest repeated codes in the current review.

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9) Secure devices

As discussed above, the bedridden condition is not an illness by itself instead it related to a wide set of issues that make patients unable to go from the bed (Faria et al., 2016; Jocelyn Chew et al., 2018). So, it would be expected to connect the bedridden patient to devices, tubes, or machines that support treatment or reduce the disease consequences, such as folly catheter for urination, nasogastric tube for feeding, colostomy, or stool bouncy for fees, endorectal tube for oxygenation, peripheral or central intravenous line for medications and so on. These medical devices and equipment's types are manufactured from rubber, plastic, or metals, which has little fixability and extension but not a lot. During the turn movements, it might block, get out, or injure the patients or the nurse, cause fluid splashes or pain for patients.

Also, these devices types might lead to pressure on patients' skin, leading to devices associated with pressure ulcers. Medical device-associated pressure ulcer is a broad categories of pressure ulcer due to the weight of medical devices on the patient skin (EPUAP/NPIAP/PPPIA., 2019). Therefore, literature stressed the importance of securing these devices by anchoring it to not produce any pressure or irritations on the patient skin. However, there are no details on what or how nurses should perform these anchoring for these devices, type of fixators, or methods for tube anchoring; rather literature leaves it for the clinical nursing competencies and the nursing skills to satisfy this objective.

10) Eliminate sheet effect

Patients are laying on sheets or bed lines manufactured with specific materials that support the microclimate comfort for the patient's skin

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(EPUAP/NPIAP/PPPIA., 2019). Many hospitals worldwide use the white color to make it easy to deduct the directs or unwelcome compost and remind the nurses to change it. However, with the turn, there are possibilities to have shrink, wrinkles, and this might leave a marker on the patient skin. This has a negative consequence if it stays like that marks over the skin and make it much weak and easy injured (Collier & Moore, 2006). Literature focused on the need to eliminate this effect by ensuring fixing the line and tide it to be with no shrines or wrinkles.

11) Boney prominences

Boney promises expression used in pressure ulcer domains refers to anatomical site present the pressure point of the bone over the skin with weak or absent muscular structure (EPUAP/NPIAP/PPPIA., 2019). These provinces in higher risk of developing pressure ulcer as it located between the bone and the outside surface. Literature makes it mandatory to revise these points in the anchor phase to ensure specific off-loading techniques are applied to these areas away from any pressure (DeWit & Williams, 2013; Rhoads & Meeker, 2008; Springhouse, 2006). Although the literature did not provide further exploration about the required techniques nurses have to follow, it stressed in five different locations about it in describing the anchoring issues.

For supporting boney promises, several recommendations that discuss pressure ulcer prevention provide evidence about the need for specific dressing types for prevention such as silicon dressing and its impact on eliminating ulcer developments (Call et al., 2015). However, these references did not consider applying a prevent dressing on the heel or sacral as an intervention related to repositioning practice (Huang et al., 2015; Schwartz & Gefen, 2019); even if the dressing was

applied, the nurse shave to inspect it in each repositioning practice time (Schwartz & Gefen, 2019). So, the current review is considering the issues of anchoring the bony prominences without further specifications over the wound dressing if present.

3.4.6 Documentation

The documentation or information phase reflects what expected nurse to do for purpose of informing other healthcare professionals about actualization of repositioning practice. Documentation considers the most noticeable aspects in measuring the repositioning practice. Several studies rely on what nurses document as evidence of actual completion. Although there are several challenges in validating nurses' documentation regarding the repositioning practice, there is disagreement on what nurse should write to reflect the actualization of repositioning practice. The current revision discovered 60 different locations associated with the documentation procedure, which categorized as follows; How that happens, skin condition, and current posture, and when does that happen? Body alignment condition, who participate, any pain or discomfort, documentation based on the policy, ability of the patient to assist, equipment used, record physician notification, reminders, factors influencing the decision.

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1) How did that happen?

References highlight the importance to document how repositioning practice happens. That includes the technique of turn, features of the rolling, and the steps of action (Berman et al., 2010; Kozier et al., 2018) as all aspects are essential in assuring happening of the turn and provide the evidence of repositioning practice actualization (Potter et al., 2013; Suresh, 2017; Wilkinson, 2016). However, literatures did not expand in describing how nurses should reflect this in the medical

record. Around 5% of locations in the review that discuss the documentation mentioned “how that happened?” however, lack of clarifications for what nurses have to write or documents that can be written assume nurses will develop their protocols to answer these concerns. That means the repositioning practice from the starting point of pre-turn has to find a way in nursing documentation.

2) Skin condition

Skin observation is a crucial component in the repositioning practice (Burton & Ludwig, 2014; Collier, 2016; DeWit & Williams, 2013; Kozier et al., 2018; Potter et al., 2013; Wilkinson & Van Leuven, 2016). However, the observation is useless without documenting these observations that facility the tracking of the skin changes and suggest proper decisions based on the accumulated data. Pieces of literature keep the nature of documentation also depends on the nurse’s clinical decisions, and there were no clarifications for the format of reporting, nature of reporting, or the location of this reporting in the medical record.

3) What is the current position?

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Repositioning practice aims to redistribute the pressure over several body parts (Gefen, 2018; Schwartz & Gefen, 2019). So, nurses need to know what is the current posture then this will facilitate proper decision for the coming posture. Therefore, nurses have to state what is the current posture clearly.

4) When does that happen?

As the repositioning practice is a time-based intervention and nurses must be aware of the limited time for doing the procedure Field (Latimer et al., 2015), documenting the performance time is essential. Several studies rely in the nursing documentation for the time as evidence of measuring the repositioning practice.

5) Body alignment condition

As presented above, nurses must evaluate the body alignment to ensure proper repositioning practice. Therefore, nurses must document the findings of body alignment observations.

6) Who participates?

As presented above, repositioning practice is not one nurse show, and two or more nurses have to participate in the procedure (DeWit & Williams, 2013; Lynn, 2018; Perry et al., 2019; Rhoads & Meeker, 2008; Springhouse, 2006). Therefore, documenting the name of nurses participating is consistent with the nursing standards and satisfies the repositioning practice equipment. Document the name of nurses who participated in doing the procedure regardless of the nature of nursing care delivery.

7) Any pain or discomfort

As presented above, patients during the repositioning practice might comply with pain or discomfort either in the pre-turn phase in centralization in the middle of the bed (chose the appropriate starting posture), removing the pillow, or during the rolling and turn. The presence of pain or discomfort has to be a presence in the medical record. However, there are no clear standards or efficient statement that can reflect this assessment of the documentation requirements. It lifted for the clinical decisions of nurses to determine how that happen, earn it will be documented, and the correct statement to reflect that.

8) Documentation based on the policy

What is the appropriate medical recording, nursing forms that are efficient for all of these issues? That depends on the policy of the hospital (Mogotlan,

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2015). As in many locations in the literature, a referral for the turning sheet (Vanderwee et al., 2011), reposition sheet (Vanderwee et al., 2007) ,or repositioning sheet (Clark, 1998; Moore et al., 2011; Moore et al., 2013; Moore & Van Etten, 2014; Rich et al., 2011). Others refer to nursing assessment forms as the place of documentation. However, this all depends on the agency policy, and nurse have to follow the policies (Mogotlan, 2015). In general, hospitals should have clear answers for the issues related to repositioning practice documentation forms, locations, and statements to refer to actualization or lack the procedure.

9) The ability of the patient to assist

As presented above, evaluating the patient's ability to assist in the procedure is a crucial component of the repositioning practice. Also, documenting these findings is vital aspect in the repositioning practice.

10) Equipment used

As presented above, nurses might use lifting devices, offloading devices such as pillows or sheets to perform the procedure of anchoring the patients. This is also essential part of nursing care, and nurses must report that based on the approved policies.

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11) Record physician notification

Springhouse (2006) mentioned the need to notify the physician about any abnormal changes in the skin conditions. Although the hospital policy controls this, doctors have to revise the nursing notes, Field Springhouse (2006) assumes that nurses must inform the medical team about the findings. No other locations among the fixed literature highlight this issue. The need to notify the responsible nurse, such as tissue viability nurses, wound care nurses, or charge nurses,

about any changes to enhance proper prevention and faster treatment decisions appears much consistent with the nursing practice.

12) Reminders

The international pressure ulcer guidelines refer to the need to post a reminder, give signs, or make a strategy to alert the nurses about the need for repositioning (EPUAP/NPIAP/PPPIA., 2019). Which might be posted in the medical records or documented in the nursing forms (White, 2011). However, the need to remind nurses about repositioning practice is an area for improvement in nursing care, as several reports conclude that nurses miss the repositioning practice (Kalisch, Tschannen, & Lee, 2011), and there are several factors that enhance the compliance for repositioning practice rather than the reminding (Iblasi et al., 2021).

13) Factors influencing the decisions

Why were patients in need of the repositioning practice? It is an important question for identifying the risk of pressure ulcer development (Braden et al., 1987; Byrne & Salzberg, 1996; Ham et al., 2017; Lee et al., 2019; Pang & Wong, 1998; Stinson et al., 2018). Several tools help nurses deduct these risks, such as the Braden scale, and Norton (Thompson, 2005). These tools must be documented and present in the records.

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3.4.7 Time

Time is the most complicated issue in the repositioning practice analysis. Literature agreed that repositioning practice is a time-dependent intervention (Moore, 2010; Moore et al., 2020; Moore & Van Etten, 2014). But there is disagreement in counting the amount of this time. Literature started from 30 min the repositioning should happen (Baillie, 2011; Baillie et al., 2014; Bergstrom et al., 2013; Carpenito,

2013; Herman & Rothman, 1989) and others accept the six hours as duration (De Meyer et al., 2019a; Fragala & Fragala, 2014; Moore et al., 2013; Palfreyman & Stone, 2014; Peterson et al., 2013). However, several references agreed on the need for time specification, but there was no exact time as they left it blank. In 17 locations among the revised literature, the time specifications left for the decision of nurses to determine based on their clinical skills (EPUAP, 2009; EPUAP/NPIAP/PPPIA., 2019; Haesler et al., 2012; Smith et al., 2016; Soban et al., 2011). However, the current tool is going to measure the repositioning practice in Saudi Arabia, which accepts the time duration every two hours, this is a national guideline (Ministry of Health [MOH], 2019). So, no further expansion will happen to this level of content analysis.

3.5 Antecedents

Repositioning practice antecedents are; the bedridden patient who will receive the practice of repositioning. Also, repositioning knowledge, repositioning skill, and repositioning attitude among the assigned nurse on-duty and secondary nurse/s that help for the harmonization and secondary nurse/s help harmonize (Cooper & Gosnell, 2014; White, 2011). These antecedents are preconditional aspects as shown in figure (3) appendix (E).

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3.6 Consequences

The consequences of the repositioning practice are pressure ulcer prevention as a direct outcome, and secondary outcomes are quality of care, patient satisfaction, and patient safety (Berman et al., 2016; Burton & Ludwig, 2014; Collier, 2016; Donabedian, 1966; Kozier, 2009; Nugent & Vitale, 2014).

3.7 Factors influence the nurses' compliance for the repositioning practice

With the high impact of the repositioning practice on the bedridden patients regarding preventing the pressure ulcer, there are several challenges minimize the proper performance "compliance". Iblasi et al. (2021) presented three main categories of factors that affect compliance with the repositioning practice; nursing-related factors, patient-related factors, and environmental-related factors. Nursing-related factors such as the level of knowledge, skill, and attitude of nurses toward pressure ulcer prevention include the repositioning practice to the assumption that, with enhancing nurses' knowledge skill attitude, the performance of repositioning practice shall increase too (Wogmon, 2016).

The patients' related factors such as the age, weight, and severity of the patients' conditions appear to influence performance. The environmental-related factors such as the organizational structure and the available facilities also play a role in the level of compliance.

Several projects and interventional studies work to enhance factors in purpose to satisfy the required repositioning practice, such as advancing nurses' knowledge, skill, and attitude toward the repositioning practice or investigating the availability of several facilities on the nursing performance (Wogmon, 2016). However, the effect of educational programs was limited and led to short-term improvements and reports returning the situation to its initial results (Chaboyer et al., 2016). This also with a short effect of the availability of the facilities and repositioning of practice-related equipment (Iblasi et al., 2021) . Also, lacking exact measurements for the effectiveness of these projects over the repositioning practice limits the expanding or generalizability of the study results in improving the repositioning practice.

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4 Existing tools

The nature of repositioning practice complicates the measurement efforts. The current research revises the available evidence to explore the complexities of measurement requirements. The searching criteria focused on changing the references that considered repositioning practice a nursing intervention and providing a kind of measurement. Also, the authorities adopt repositioning or other terms such as turn, positioning, moving, change patient position to refer to what nurses will do in pressure ulcer prevention.

4.1 Inclusion criteria

To explore the measurement tools, this review included all available reports or studies published between 1987 and 2021, as this period falls between the first and the most updated international pressure ulcer guidelines issued by the most extensive pressure ulcer panel of experts. European pressure ulcer panel of experts, national pressure injury panel of experts and pan pacific pressure injury panel of experts published the latest pressure ulcer/injury recommendation (EPUAP/NPIAP/PPPIA., 2019). The search started in Google scholar, followed by Ovid MEDLINE, EBSCO CINAHL, Clinical Key database, and Ovid MEDLINE, using Chulalongkorn E-library database users. In addition, the student revised the reference lists of the included studies that matched the focus of investigating repositioning practice in the context of pressure ulcers. The searched word used was pressure ulcer/injury * to overcome the international references that accommodate ulcers and injuries (Edsberg et al., 2016), repositioning, turning, position*, repo*, and complia* turn*, press*, prevention.

Various techniques were used to measure repositioning practice. The most common methodology was a chart review (Beeckman et al., 2011; Chaboyer et al., 2016; Courvoisier et al., 2018; De Meyer et al., 2019b; Gunningberg et al., 2015; Meesterberends et al., 2013; Mehta et al., 2015; Rich et al., 2011; Sving et al., 2014; Tannen et al., 2009; Webster et al., 2017; Wogmon, 2016). Followed by the digital observation (De Meyer et al., 2019; Källman et al., 2016; Peterson et al., 2013; Renganathan et al., 2018; Schutt et al., 2018). Also, several experts applied the direct observation (Hall & Clark, 2016; Sving et al., 2012; Tayyib & Coyer, 2017; Tayyib et al., 2013), and others prefer the self-administered questionnaires(Hanna et al., 2016; Kalisch, Tschannen, Lee, et al., 2011; Kalisch et al., 2014; Moya-Suárez et al., 2017). However, these studies widely differ in the components and operational definitions of the repositioning practice even among the same measurement techniques as it is coming below. The study classified the tools according to the methods applied and measurement intention. For the methods applied, there were four groups (1) chart review, (2) observation, (3) digital observation, and (4) self-report questioners. For the intention of measurement, the analysis shows (1) tool measured repositioning practice, (2) tool measured the pressure ulcer prevention compliance including the repositioning practice, and (3) tools measured the missed nursing care including the repositioning practice. The analysis included revisions of the method of measurement, intentions, and evaluation of the expected measurement error for each measure.

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4.2 Tools classification according to methods applied.

4.2.1 Chart review

Measuring repositioning practice through chart review studies involved counting the number of times repositioning practice has been recorded in the

nursing records for a given patient, with the number of entries reported as a repositioning compliance score. Chart review is relatively inexpensive as a data collection technique; thus, this method presents a practical data collection solution (Wu & Ashton, 1997).

Fundamentally, the validity of the chart review data is questionable. The assumption that nurses always record repositioning practice when undertaken and vice versa is not a strong argument. Literature shows the presence of missed reports for several nursing procedures (Blair & Smith, 2012). Furthermore, there was no agreement on the type of documents to review to assess repositioning practice. For example, (Mehta et al., 2015a) extracted the data from nursing care plans.

In contrast, Webster et al. (2017) and Wogamon (2016b) gathered the patient's data by turning charts. Therefore, although these studies applied the same technical methodology (chart review) to collect repositioning data, they disagreed on the best source for locating these data, rather than their differences in the actual description for the repositioning practice documentation. This is further challenged because there are potentially several places where nurses could report repositioning practice, such as the turning sheet, the daily nursing sheet, and the nursing progress note (Blair & Smith, 2012).

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Although chart review studies are particularly prone to bias (Li, 2016), not all such studies are poorly performed. No universally accepted criteria for a "well-conducted" medical record abstraction process exists(Tang et al., 1994). Or even a standardized repositioning practice definition inside the nursing documentation. However, there are recommended strategies for enhancing the validity, reproducibility, and overall quality of data collected from clinical records(Tang et al.,

1994). These strategies include case selection, variable definitions, abstraction forms, training, monitoring, blinding, testing inter-rater agreements, and meetings to ensure inter-rater agreements. Given the ease of record extraction, robust chart reviews present an inappropriate strategy for measuring repositioning practice. Like the previous study examples and the fact that repositioning is documentation issue, complicate the trust level to relay in the chart review in assessing the repositioning practice. Therefore, chart reviews for assessing repositioning practice remain a researchable technique, but it will not cover repositioning practice; instead, it will cover only the repositioning practice documentation part.

4.2.2 Observation

Clinical observation was defined as the researcher or assistant directly observing nurses undertaking repositioning practice at the clinical level (Rich et al., 2011; Tayyib & Coyer, 2017). This method allowed the measurement of repositioning practice in taking care of the quality of performance and the actual frequency. Observation reflects psychomotor activities and does not rely on nurses' documentation only. Thus, clinical observation provides real-time validation of repositioning practice for the turning and timing components only with no descriptions of the actualization of other repositioning practice components such as harmonization or information.

Studies that applied direct observation had issues with the validity and reliability of the collected data because. The repositioning practice definition, as mentioned above, was not standardized. Issues of concern included: the studies did not standardize the repositioning practice definition in terms of observation time, the observation setting, the patient condition during the observation, the nursing condition

during the repositioning observation, or the fundamental components of the activities to be observed. For instance, Rich et al. (2011) consider fixing the patient in a new position is the evidence of having the repositioning practice, which is the anchor is an essentials component, while Tayyib and Coyer (2017) did not consider that point and stress on the timing and turning only.

For the reliability of observation techniques, the concerns become more apparent when data comparisons are needed. The applicability of observation data collection techniques in clinical studies has been raised as a general concern for further clarification. First, because of the potential for observation bias, where nurses are aware that they are being observed, their repositioning practice is at risk of being modified or changed. Second, directly watching nurses while caring for patients impacts privacy and raises ethical research issues. Despite these challenges, observation as a data collection technique can be employed if the researcher considers some essential reliability steps, including standardizing observation methods among the data collectors.

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Also, the internal validation facts among observations make further concerns as observer biases, known as the Hawthorn effect, did not manage appropriately among the evidence. However, there is a lack of agreement about standardized repositioning practice definitions. So, the applicability of observational techniques of repositioning practice is questionable. Furthermore, it will not fit the intended need to evaluate all repositioning practices, not part of it.

In summary, observation techniques face different issues that challenge observation techniques' ability to compare the studies and apply the results in the hospitals. Further, the observational method is also at risk of a Hawthorne effect

because nurses recognize that they are being observed; therefore, they may alter their responses. Given that the studies did not clearly describe how they dealt with this risk, this is an additional concern.

4.2.3 Digital observation

Digital observation involves using devices to measure repositioning practice by sending coded signals to a computer. The computer translates the signals into a measure of repositioning practice and shows each variable update's exact timing for five (Källman et al., 2016) to fifteen minutes (Schutt et al., 2018). The devices used different operational techniques and methods of communication and repositioning practice dimensions within the included studies.

The studies employing digital observation contained an extensive level of detail about the nature of the patient movements, which include the repositioning practice and any other activities performed on patient beds instead it from the patient himself, other staff, or victors in the purpose of pressure ulcer prevention or any other purpose. Thus, the collected data were considered reliable as they will show the consistency of movement over the bed over a while.

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Also, time-oriented information could be extracted (Schutt et al., 2018) and easily connected with the patient or nurse conditions (Källman et al., 2016). Consequently, a digital observation was the most convincing way to provide measures of repositioning practice. Furthermore, there is a consistent correlation between repositioning practice from digital observation and increased repositioning practice resulting from feedback from the staff (Behrendt et al., 2014; Källman et al., 2016; Renganathan et al., 2018; Schutt et al., 2018). Regardless of the type of system used or how the design captured the data, enhanced repositioning practice was reported.

Similar findings were noted irrespective of the clinical setting. Indeed, digital observation was employed across diverse locations, such as intensive care (Behrendt et al., 2014) and general clinical settings (Schutt et al., 2018). When nurses received digital feedback, repositioning practice increased by using this data collection techniques. However, relying on the reporting increase of movements over the patient bed as the repositioning practice denies other repositioning components that include the other nursing activities such as the documentation.

A challenge with digital observation is the inability to decipher whether nurses or the individuals themselves performed the movements. This was an issue among all the devices used within the digital method. Although digital observation was applied in several studies, this method has not yet, been readily adopted in nursing studies. This may be because the current systems are expensive and often challenging to apply within hospitals' complicated infrastructures. This is compounded by a need for a unique installation requirement in hospitals and secured electronic health records to combine all the information. Although helpful, digital observation can only be recommended if it is available, easily accessible, and compatible with the clinical setting and measure the repositioning practice in a standardized way consistent with the definition of repositioning practice in the nursing literature.

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4.2.4 Self-administered questionnaires

The self-administered questionnaires involved employing different Likert-type instruments to measure repositioning practice. Moya-Suárez et al. (2017) used a questionnaire to evaluate nurses’ adherence to recommendations for preventing pressure ulcers (QARPPU). Hanna et al. (2016) developed a questionnaire specifically

for their study. At the same time, Kalisch, Tschannen, Lee, et al. (2011) used the missed nursing care survey to measure the missing in repositioning practice from nurses' perceptions. And Kalisch et al. (2014) used MISSCARE to measure different elements of missed care from a patient perspective, which included repositioning practice. The remaining studies targeted nurses to measure their perceptions of their repositioning practice. These studies define the repositioning practice differently and apply different techniques in formulating the instruments.

The use of self-administered questionnaires is well respected in clinical studies because it is a relatively inexpensive and easy-to-use data collection method (DeVellis, 2016). Further, it is an ethically accepted method for collecting potentially sensitive data. Repositioning practice is a potentially sensitive issue because nurses generally do not like to appear as though they are not practicing critical care, such as repositioning. A self-administered anonymous questionnaire presents a solution to this issue because it protects the nurse's identity and gives free space for them to express the actual situation from their perspective (Mantas, 2017). However, self-administered questionnaires present only a moderate level of certainty related to the quantity and quality repositioning practice measurements. It did not provide a standardization format of instrument development but definitions for the requiring aspects of the repositioning practice. Given these challenges, it is unlikely that an accurate depiction of repositioning practice is missed among the used tools. In summary, the available studies did not provide a standardized description for the repositioning practice and did not make comprehensive measurements for the repositioning practice components.

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4.2.4 The measurement intention “Purpose”

According to the literature review, the existing questionnaires are classified into three types based on the purpose of measurement; questioner intends to measure the repositioning practice (Hanna et al., 2016), tools intended to measure the pressure ulcer prevention practice in general, and include the repositioning practice (Beeckman, Defloor, et al., 2010; Beeckman, Vanderwee, et al., 2010; Moore & Price, 2004; Moya-Suárez et al., 2017). Thirdly, tools intended to measure the missed nursing care, including repositioning the practice (Kalisch, Tschannen, Lee, et al., 2011). However, these instruments could not cover the repositioning practice dimensions or provide consistent definitions for the repositioning practice.

4.2.5 Tools measure repositioning practice

Hanna et al. (2016) developed an instrument to measure the repositioning practice titled " nurses work to reposition patient". The survey's purpose was to focus on the repositioning time and hidden factors of repositioning practice in clinical practice. The investigator-generated 95 items and used an additional 16 from revising the nursing workforce survey. The study intends to know more about the patient work environment, a patient situation that leads nurses to do the repositioning practice. The survey items were distributed as 26 questions about the patient work environment and 64 questions about four patient situations, include four questions for each case: minutes to gather the worker in four positions. Minutes to complete the tasks in four situations, an actual number of nursing workers and an ideal number of nursing workers. The researcher revised the contact validity by a group of specialized wound and ostomy nurses in the United States. Also, the chronic alpha shows that the tool’s reliability is 0.96.

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This survey focused on the performance of repositioning practice among nurses based on specific patient conditions. Therefore, it covers the aspects of time, harmonization, and turn. However, the tool did not clarify the anchor or information dimension of the repositioning practice.

4.2.6 Tools intend to measure pressure ulcer preventions that include repositioning practice.

The second category of surveys that intends to measure pressure ulcer prevention such as Beeckman, Vanderwee, et al. (2010), Beeckman, Defloor, et al. (2010), and (Moore & Price, 2004), and Moya-Suárez et al. (2017) while all of these tools intend to measure pressure ulcer prevention practice and measure the repositioning practice as part as following.

Beeckman, Vanderwee, et al. (2010) instrument is 33 knowledge questions with four options for each one of the "I don't know the answer" to avoid the possibility of guessing answers. The study develops the questionnaire over six themes; etiology of pressure ulcer, classification of pressure ulcer, nutrition risk assessment, reduction in the amount of pressure, reduction in duration of pressure. The last two themes provide questions intended to measure the repositioning practice. These two themes present eleven questions; five of them measured the repositioning practice. As the instrument designed to measure nurses' knowledge in pressure ulcer prevention, the dimensions of questions related to repositioning practice were turning (two questions), time (two questions), and anchor in one query. The tool presents excellent content validity and reliability with Cronbach alpha = 0.77.

The current tool did not intend to measure the actual repositioning practice. It measures nurses' knowledge of pressure ulcer prevention includes nurses'

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perception of the repositioning practice knowledge. Therefore, the current tool was not providing the intended meaning of the repositioning practice measurement.

Beeckman, Defloor, et al. (2010), Moreover (Moore & Price, 2004) develop tools to measure nurses' attitudes toward pressure ulcer prevention. Beeckman, Defloor, et al. (2010) instrument titled " attitude toward pressure ulcer prevention" consists of 32 questions distributed over five dimensions: personal competency, pressure ulcer priority, the impact of pressure ulcer, responsibility in pressure ulcer prevention, and confidence in the effectiveness. However, only two questions were intended to measure the attitude of nurses toward repositioning practice.

Moya-Suárez et al. (2017) invented a psychometric questionnaire titled "adherence to recommendations of pressure ulcer prevention." The questionnaire consists of 28 Likert scale questions and two patients' scenarios and options to choose from 14 interventions from the first and 18 from the second scenario. The questionnaire shows a high validation and reliability score with an alpha of 0.89. However, the questionnaire presents all four questions related to repositioning practice and the only measured dimensions.

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4.2.7 Tools intend to measure missed nursing care

Kalisch, Tschannen, Lee, et al. (2011); Kalisch et al., (2014) are a unique kind of instrument that intends to measure the repositioning practice. This questionnaire defines repositioning practice as one of the frequently missed nursing cares. Missed means the nurse intentionally or not intentionally did not perform this particular care while knowing its need. The instrument consists of 24 questions, and one question was related to repositioning practice by asking the nurses the frequency

of missed "turning patients every two hours.” The instrument shows excellent contact validity and reliability results with Cronbach alpha 0.89. However, the agency only focused on repositioning practice frequency and did not provide further insights into any of the repositioning practice components.

4.3 Measurement evaluation

The studies agreed on a general description of repositioning practice. Still, they used different terms to refer to it, techniques to measure it, and even among the same methods, different approach to refer to it. For instance, some studies used the term "turn" (Hanna et al., 2016)" and others used the term "position, (Renganathan et al., 2018)" with "repositioning" being the most common term (Hall & Clark, 2016; Källman et al., 2016; Peterson et al., 2013; Rich et al., 2011; Yap et al., 2018). Different terms were also used for repositioning practice, such as "compliance" (De Meyer et al., 2019a; Schutt et al., 2018)" and "adherence" (Moya-Suárez et al., 2017). The studies generally agreed that repositioning practice was low among nurses at the clinical level and stressed that this is a significant risk to patients concerning pressure ulcer development. Also, studies present several methods or procedures to improve the service. Still, these interventions are not comparable as they used different measurement options and refer to additional defining attributes among them.

Although all studies agreed on the importance of measuring repositioning practice, they did not settle on one method for quantifying it. Further, even the studies that applied the same data collection methodology differed in how data were extracted and how practice was calculated or by the applied survey (Renganathan et al., 2018; Schutt et al., 2018). Studies also differed in articulating the purpose of conducting repositioning practice measurement, with the majority of studies evaluating pressure

ulcer management programs and how they influence the repositioning practice (Beeckman et al., 2011; Chaboyer et al., 2016; Courvoisier et al., 2018; Gunningberg et al., 2017; Källman et al., 2015; Mallah et al., 2015; Mehta et al., 2015a; Moya-Suárez et al., 2017; Sving et al., 2012; Sving et al., 2014; Tannen et al., 2009; Tayyib & Coyer, 2017; Webster et al., 2017; Wogamon, 2016). Conversely, other studies focused on investigating research questions directly related to repositioning practice (Hanna et al., 2016) or evaluating devices for monitoring repositioning practice (Renganathan et al., 2018; Schutt et al., 2018; Weiner et al., 2017).

These studies had several limitations. Several repositioning practice trials contained low to moderate levels of evidence. Randomized controlled trials and blinding would be challenging in this research area, and the lack of such study designs reflects this. Additionally, the studies were not supported by a robust validation procedure, and they reported data from single centers. Differences in settings and policies in each institution make further comparisons and proper evaluations difficult rather than the absence of a standardized repositioning practice scale.

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The current literature reviewed repositioning practice uses chart reviews, digital observation, observation, and self-administered questionnaires. The present review evaluated the measurement approaches based on their ability to measure the repositioning practice dimensions and defining attributes. The measurement techniques varied in their ability to provide valid data. Moreover, their applicability to provide clinical studies comparisons. Each has strengths and limitations, so the repositioning practice measurement scale must follow constrictive validation processes. It is preferable to apply a self-administered questionnaire to validate

repositioning practice and assure high-quality data if a unified description of the repositioning practice is considered.

In general, experts assumed repositioning practice in hospitals is less than required by (Tayyib & Coyer, 2017; Tayyib et al., 2013). In terms of quality, frequency, or the accuracy of policy instructions, the actual practice cannot cover the patient's needs (Tayyib & Coyer, 2017). Reports indicate that only 40% of patients requiring repositioning take it (Schutt et al., 2018). This is also the case in India, where a study found that 70% of patients did not get the required level (Renganathan et al. (2018). Similar results have been obtained in Belgium (Beeckman et al., 2011), Sweden (Källman et al., 2016), Egypt (Ali et al., 2018), China (Feng et al., 2016), Australia (Chaboyer et al., 2016), Hong Kong (Kwong et al., 2016), and the Netherlands (Meesterberends et al., 2013). Therefore, low repositioning practice is a global nursing phenomenon.

4.3.1 Response process

Participants pass four steps in responding to any survey question; 1- comprehension of questions, 2- retrieving the information (related to that question), 3- Judgment over the options (if there are options) 4- Reporting the answers. Respondents may go back and forth over these steps until they finalize the answers and give the response (National Research Council, 1984).

Respondents understand questions differently. And might be even different from the intention of the investigator. Understanding is a complex process, people merge their feelings, thoughts, ideas, environment, concentration level, cultural background, and the current context during text (question) understanding (Tourangeau et al., 2000). For instance, (Suessbrick et al., 2000) asked participants

(sample of smokers) to count the number of cigarettes they consume per day. After they responded, the research team asked, "*when do you consider yourself have cigarettes? i. I consider it when I finish it until the end, ii. I consider it when I have it half or more, iii. I consider it even I take one puff from it*". The study discovered that half of the participants understood that even one puff is a smoking cigarette, while the other part understood it as they should finish all cigarettes to consider it as one cigarette (Suessbrick et al., 2000). This is an obvious example, as even what looks like a simple question about direct behavior (smoking) presents with this wide different variation. In this level of interpretation, the possibilities of having a high level of measurement errors contradict the trust in measurements. So, respondents understand the same question differently. Therefore, this question's actual measurements among these subgroups depend on the participants' understanding, not based on the question. Thus, the items generator should focus not only on the text structure of the question but also on how participants might understand the question and generate items that eliminate understanding variations.

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4.3.2 Retrieve the information (related to that question)

After they understand the question, people formulate a mental image about the requested jump to retrieve the suitable feelings, situations, or events associated with the question, the retrieval phase. Experts argue that fixed, short, and near range lead to accurate information retrieving for the participants (Suessbrick et al., 2000). Therefore, assigning a predefined memory range facility further accuracy of the reported information.

4.3.3 Judgment over the options

After they understand the question and retrieve the actual events (or more) that locate within the recall period, respondents will read the options for the questions and propose a matching between the mental image and the possibilities. Therefore, careful presentation of the options is crucial in supporting the respondents to keep answering the questions, not feeling stressed or even going away from the survey whole filaments also satisfying the purpose of the study in measuring the repositioning practice.

4.3.4 Reporting the answers

After understanding the question, respondents retrieve the events and make judgments they will answer (report it). In the first three phases, the data collector's "researcher" is unable to observe any result (it happens in respondents' minds) until the reporting happens (National Research Council, 1984). Reporting is the last phase in the respondent's activities in answering the question (Andrews, 1984; Fox et al., 1988; Pollack et al., 1993; Raghunathan & Grizzle, 1995; Tourangeau et al., 1997), which refers to transfer the judgment in mind to answers on the survey (Tourangeau et al., 2000).

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In general, several barriers that make the respondents intend to change their initial judgments before or during the reporting phase. For instance, variations between the mental image and response options (Tomášková et al., 2003; Tourangeau et al., 2000). When respondents do not see any similarities between what they have in the mind and the options, they will say their mind "*I do not see any suitable answer.*" Therefore, the respondents try to adopt the truth (in their mind) to the nearest options (Dillman, 2006), skip the question (Saris & Gallhofer, 2014), of even skip the survey

as all (National Research Council, 1984). (Kreuter, Yan, et al., 2008) report that "*there are no gold standards that can work with all participants,"* and whatever the methodology of the researcher in creating the options, there will be a group of participants who do not understand or get confused between options, either for language barriers, cultural misunderstanding, or something else. However, the researcher should make sure most participants in the sampling frame are able to understand the question consistently with the measurement purpose.

Another effect is related to the location of chosen option among other options. This is what is reported as primacy and recency biases. For instance, Tourangeau et al. (2000) found significant changes in the responses for "feeling thermometers" only by changing the location of options (from down to up or from up to down). And even the site of the question, among other questions. For example, Schuman et al. (1981) tested the effect of "*are you happy in your life*" if it comes first and if it is followed by "*are you happy in your marriage*". The study reported a significant influence for "married question" over happiness in general if it comes first. Therefore, changing the location of the question changing the question's location and starting in general questions then go for specific questions reduce this effect (Schuman et al., 1981).

Reporting socially desirable issues is a challenge. For instance, if the question was "*do you consume marijuana*?" and the options were yes and no, most participants would choose no as this more socially accepted answer in general even if this was not the actual (Tourangeau & Smith, 1996). And this is called under-reporting, as the events happen but did not appears in the collected data on the same level (Tourangeau et al., 1997). This is also observed in Yan & Tourangeau's (2008)

study as age, experience, language understanding, and social level all affect the perceptions toward any behavior as socially desirable to report or not report. Therefore, measuring socially desirable behavior is a critical point to consider (discussed in the following section). Also, arranging the questions in the original performance manner maintains the respondents' ability to follow the events and report the events.

4.3.5 Sensitive concern in repositioning practice reporting

Although there is no implicit information about the sensitive nature of repositioning practice reporting, it concludes from the repositioning perceptions. During the early days of professional nursing practice, it is missing the repositioning or developing pressure ulcer considered a nursing mistake (Nightingale, 1860). That makes nurses afraid form reporting the negative behaviors (Elder et al., 2008), which impacts the validity of the related collected data (Groves & Lyberg, 2010; Kreuter, Yan, et al., 2008; National Research Council, 1984).

Social desirable reporting refers to the tendency of respondents to overestimate their practice (Paulhus, 2002). That overestimation might be conscious or unconscious behavior (Paulhus, 2002) – when respondents do it in purpose or they aware called conscious. The nature of self-understanding influences the overestimation for any behavior for the importance of doing the behavior. Brenner (2011) identified frameworks for socially desirable reporting based on understanding the individual roles in the community. Humans intend to achieve the idealized self-picture by overestimating some positive behaviors such as religious activity (Brenner, 2011) and underestimating other activities such as drugs (Kreuter, Presser, et al., 2008; Rossiter, 2009) or multiple sex partners (Tourangeau et al., 1997).

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Experts connect the socially desirable responses with the importance of the behavior. As much the behavior is essential for the community, the chance of overestimating the reports is higher (Kreuter, Presser, et al., 2008; Rossiter, 2009). Also, experts notice that the feeling of social desirability increases the response time and plays the role of being filtered for the respondents before giving the answer (Holtgraves, 2004).

Many nursing studies failed to detect this fact in their investigation about nursing performance. In Van de Mortel (2008), reviews showed that 45% of revised nursing studies were not aware of the effect of social desirability on their collected data. Missing the social desirability affects the validity of the collected data and hides essential aspects on the researcher's (Tourangeau et al., 1997). Nurse intend to conceal their missed compliance (Kalisch, Tschannen, Lee, et al., 2011) or what they feel it harming their social image, either because they believe that they are the only part of the community misbehaving and if they report that it will invoke their self-identity (Elder et al., 2008). Others believe it is not a big deal to make some missing for a few practices. However, most nurses feel it is not good to report such behaviors as they intend to escape from the responsibility or as they afford from the power of leaders (Elder et al., 2008).

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Many factors might slow down the nursing performance, such as shortage or workload (Iblasi et al., 2021). Therefore, the nursing must deal with compassionate situations, they have to report common practice with their knowledge that it is harming the patients, which hurts their self-identity of being a caring person. This hurts the patients and makes their leaders unsatisfied or overestimate their actual behavior.

Overestimation is unintentional in regular behaviors (Paulhus, 2002). In many cases, respondents miss reporting the standard behaviors (Schwarz, 2007). Repositioning practice is a habitual behavior - every two hours. So, overestimation is possible to happen. Thus, measuring the repositioning practice challenges by these possibilities to reach a proper estimation.

Literature employed several strategies to reduce the sensitivity effect “social desirability”. These strategies by; adopting essential questions with a hidden implanted message about presenting of low performers, proxy techniques in the items, adopting online surveys, postpone the demographical items to the end (Taherdoost, 2016; Tourangeau et al., 1997; Tourangeau et al., 2000; Villar et al., 2013; Watson & Wooden, 2009; Weaver et al., 2019; Yan & Tourangeau, 2008).

Firstly, adopting an introductory question means beginning the survey with a question presenting information about showing the negative behavior. This helps the respondents in the study to reduce their sensitivity feelings. For instance, Tourangeau et al. (1997) found a significant increase in the number of sexual partners if the introductory message reduces the sensitivity about the sexual relations. Also, they noticed differences in the number of partners based on gender as the sensitivity is also associated. However, reducing the focus on the sensitivity and sending a message – even hidden or indirect in the survey – positively encourage respondents to report the actual behavior.

Secondly, the proxy technique refers to changing the focus of the human brain away from the individualized behavior (Elliott et al., 2008). Such strategy assumes that, asking the respondents about others' behaviors increases the validity of the data; in these techniques, the survey is requested by using “he” or “she” or “they”

and makes the focus of the respondents about someone else rather than their behavior. So, the survey is not using pronounce such as “I” or “me”. For instance, (Jokovic et al., 2004) asked parents about their children's behavior was much more informing even it was incomplete than asking each bout their behaviors. Although understanding the exact reason for that is still a point of discussion between psychologists – why it is more trustful to use proxy techniques- experts agree about its importance to sensitive questions or social desirable behaviors (Yan & Tourangeau, 2008). So, it would have a positive impact on any survey creations.

Thirdly postpone the demographical items to the end. However, it streams in nursing studies to start the surveys with questions about the respondents such as age, experience, and others known as the demographical part. But there is no transparent, logical rationalization for these locations as it might be in the beginning, middle, or end. However, this is not the case for sensitive topics and socially desirable measurements. Experts argue that, in socially desirable questions, the target is to encourage the respondents to report the truth or much close to it. Therefore, the respondents must shift their focus from a sensitive issue and remove the sensitivity filters (Elliott et al., 2008). And this is attainable in the first part by making the brain not focus on the self – not think about the individual behavior. Thus, the experts argue that making the demographical items at the end postpones the unique focus to the minimum (Alam et al., 2014; Andrews, 1984; Ball, 2019; Bourke et al., 2016; Couper, 2017; Groves & Lyberg, 2010).

By considering repositioning practice measurement a sensitive topic or socially desirable reporting, these aspects include the methodologies of formatting, distributing, and dealing with the collected data. The following chapter further

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discusses the effects of these assumptions on creating the repositioning practice measurement tool (RPS).

5. Scale development

DeVellis (2016) framed seven steps for scale development; (1) clarify the concept of measurement, (2) Generate item pool, (3) Format responses, (4) Review by experts, (5) Face validation and internal consistency, 6) Explore the psychometric properties 7) Confirm the psychometric properties.

5.1 Clarify the concept

The concept of interest marks the measurement boundaries which require proper clarification for the intended aspects of measurements. Experts adopted several methods for clarifying the concept, such as analyzing the concept from a work of literature, exploring the meaning from experts' views, or generating consensus between specialists. In all cases, identifying the concept and its attributes navigate the measurement process to specify the suitable approach and format for the nature of items.

5.2 Generating the items pool

Generating the items is a process of transferring the defining attributes that originated from the concept clarification to a set of items or points that, in the case of answers, refers to the degree of carrying up the concept characteristics. In many cases, the pool of items starts with many points that get less with the scale development process. DeVellis (2016) argued that the number must be four times more than the final number of items in measures. However, this ratio has no clear point or specific standard as the total remaining items measure the concept elements.

5.3 Determine the measurement formats

The measurement survey asked respondents to rank the degree of owning those characteristics. Therefore, the respondents chose from a rank of expressions that reflect the amount. That appears in the measurement development process as measurement formats. For instance, the measurement might measure binary options such as content or not, such items of yes or no. Others considered the need for measurement formats to be ranked points as low, moderate and high, and so on. DeVellis (2016) separated a section for the measurement formats based on their types and appearance. The nature of the survey, data collection methodology, and the participant's involvement play a role in determining the measurement format. Experts prefer the Likert scale as a broad example in measuring the frequency of behaviors or the perceptions toward a set of actions.

5.4 Experts' revisions

According to the DeVellis (2016) methodology, the pool of items must pass through a panel of critically chosen experts. There are no general agreements about the nature of experts responsible for revisions. However, the experts must be figures in their community as experts will revise the items separately. The author compares the agreements and disagreements between several experts to conclude the content validity. Content validity index (CVI) is a statistical expression that refers to the expert's responses distributions according to their agreements to keep or remove items from the survey based on the suitability from their point of view. The CVIs must appear in terms of each item and total for all items.

The content validity calculations required asking experts to evaluate the items based on their needs and representations of good aspects of the survey. Experts

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argued that, in the case of achieving a content validity index (CVI) for each item, more than 0.8 scores. That keeps the item, and if less exclusion is preferable, ranking each item over four degrees from not relevant to highly relevant. Therefore, the current study elaborate the content validity index for each item by estimating the number of experts agree on the suitability of the item (rate as three or four) over the overall number of experts (in the current care they are nine). Also, the study utilized the scale content validity index S-CVIs, which refers to the number of items with I-CVI = 1 over all the items.

5.5 Face validation and internal consistency

Face validation revises the suitability of items for measures. Face validation adjusts the items in terms of social desirability (discussed above), the suitability of linguistic structure, and the survey's appearance. Face validation is a less powerful contrivance than other validation methods such as content or factor analysis. However, it navigates the researcher to view the needs for improvements comprehensively. On many occasions, experts merge the face validation with the trying out (piloting) by adding sections to validate the items. However, the number of respondents who must participate still doubts issues in the scale development.

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Internal consistency refers to the reliability of the survey over a limited number of participants. Trying out the survey is known as piloting; however, piloting is not only for internal consistency; instead, it refers to revising the overall process of reaching participants, data collection, and understanding the nature of replies. However, the internal consistency is much more focused on the ability of the survey to show the stability of measurements; this demands statistical calculations for reliability tests. DeVellis (2016) argued various statistical tests, such as alpha and

omega tests in survey development. In both cases, the researcher tests the survey over a limited number of participants and performs the survey's statistics.

5.6 Explore the psychometric properties

Exploring the psychometric properties involves collecting the data over a large sample to figure out the changes in items responses for others. These statistical tests involve adopting statistical assumptions of the data and the presence of dimensionality for these data sets (the applications for the current study for the assumptions appear in chapter IV). The statistical expression was called exploratory factor analysis (EFA). It assumed the ability to generate a unified matter of items flow changes and discover appearances based on the changes in responses.

5.7 Confirming the psychometric properties

Confirming the EFA result is an additional step in scale developments. Confirming the hypothesis about changes in responses originated from confirming the changes in their relations. There is a group of assumptions and statistical tests for confirming the ability of the model to guarantee its nature of explaining the disposition of relations between items and the contractures (the applications for the current study papers in Chapter IV).

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Psychometric property is a famous expression to refer to the field of psychology that intends to explore the measurements of latent factors. Several discussions about its essence, but the agreements involving the reliability and validity aspects are parts of the psychometric properties.

5.7.1 Reliability is the ability of measures to reproduce the measurements consistently. In other words, it refers to the consistency in measurement. In statistical expressions, it appears by using the word coefficient. The coefficient is a word with

the prefix (co) that combines with the efficient. In practical meaning, it was calculated using the alpha or omega test and ranged from 0 to 1. Higher is better in the cases of low scores that refer to low abilities in showing internal consistency. The types are; internal consistency and equivalence.

1) Internal consistency (homogeneity) is an expression that refers to the ability of items to measure the construct of interest. Therefore, the measurements combined measure the construct. That appears in the ability of the survey to present the consistency among different participants or within different time frames.

2) Equivalence between observers. In many studies, the researcher or observer must be involved in data collection by observing the behavior or assisting the participants in answers. The survey's ability to show eliminating this effect is the equivalent ability of the survey to measure the exciting construct.

5.7.2 Validity also has an impact on assuring the tool's abilities. Experts classified the validity of items into; content validity, face validity, construct validity, and criterion-related validity.

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1) Content validity. As it appears in the descriptions of the steps above, content validity assumed the need for expert revisions and evaluation of the item's appropriateness in the survey.

2) Face validity. Experts argue that face validity is revising the appearance of the survey as it appears with no deductions on the internal details.

3) Construct validity is an essential type among the other types. Construct validity explore the matching between the concept and actual measurements. Colliver et al., (2012) defined it as nomological network understanding for the concept. Which refers to the interpretation and argument for the

nature of the relations within the measured data. Experts argue the ability of factor analysis in defining the construct validity nature.

Factor analysis: Since its discoveries play a significant role in providing evidence about the presence of unobservable factors, these factors are leading to changes in the responses. Statistically, it assumed that changes in the variances associated with each aspect of the items with other unobserved items. Therefore, similar changes in the variance will be clustered together. It is a logical assumption, but it also faces other challenges related to overlaying observations between items, with considered further explorations of the nature of the item to item correlations, item to latent factor correlations, and the ratio between the items (in the current study, the analysis appears in chapter IV for the methods of clarifying these points).

4) Concurrent validity is a particular type of validity that focuses on the ability of newly developed measures to deduct similar aspects (measuring) to a well-stabilized measurement tool. Concurrent means the same time, which means the new survey and the old one agree on the same time on the measurements (deducting the construct).

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In summary, the current tool shows an established abilities for identifying the repositioning practice. The definition of the repositioning practice absorbs the difference among the literature and formulate definition framework. The definition formwork generates a set of items that get the consensus among experts. In this way, passing for the construct validation process which required a set of actual data that investigate the nature of relations among the measured aspects.

CHAPTER III
METHODOLOGY

Chapter three presents the methodology of developing repositioning practice measurement among nurses in Saudi Arabia in two sections; 1) Research methodology that include time frame, targeted population, and sampling approaches. 2) The scale development process based on DeVellis (2016) methodology. The scale development methodology balance four dimensions: the concept, data collection procedure, replicability, and validity of the data (Avella, 2016).

1. Research design

This study design is descriptive research to develop the instrument of repositioning practice and test psychometric properties. The method of scale development by DeVellis (2016) suggested seven steps for scale development. Each step required different research techniques that formulate the nature of research design. The current study, for satisfying the first step, adopted the summative content analysis for analyzing literatures and experts' interviews, cross sectional descriptive design in the step six that include piloting. Same for step seven that include exploratory (EFA) and confirmatory (CFA) factor analysis.

1.1 Population

Nurses who are working in Saudi Arabia as clinical or frontline– it refers to charge nurses, head nurses and nurse's managers (Gunawan & Aungsuroch, 2017) - in hospital sectors involved in the population frame of the current study. In Saudi Arabia, frontline managers have the clinical duties and responsible to spend part from

their times in doing clinical tasks (80 % for charge nurses, 50% for head nurses and 30 % for nurse managers together with the administrative tasks (MOH, 2017)) that also include nurses assigned in units such as quality of nursing care, infection control and the wound care unit (Amr et al., 2017). The governmental reports show that number of nurses who are working in hospitals around 40000 nurses (MOH, 2017).

1.2 Study samples

The current study included five samples' group – based on instrument development steps (7 steps) – 1) Step one sample (for interview, n=6). 2) Step three sample (experts for tool revisions, n =9). 3) Step six sample (Piloting study, n=32). 4) Step seven sample (for EFA study, n = 306), and 5) Sample for step seven (for CFA study, n = 323). This chapter covers details of the first three samples, while it presents only the sample size calculations of the last two. The comprehensive analysis for the EFA and CFA samples appears in chapter IV.

1.3 Sampling procedure and geographical distribution

The first three samples are recruited to satisfy step-related requirements. The fourth and fifth samples aimed to serve EFA and CFA statistical requirements. Sampling participants for the EFA and CFA studies faced two challenges: first, the construct is a sensitive measurement (discussed earlier in chapter II). Kreuter, Presser, et al. (2008) predicted low response rate among such surveys. Rossiter (2009) and Kleine III et al. (1993) warn for negative consequences if researcher were not aware of it. Second, being an online data collection method. Yan and Tourangeau (2008) predicted low response patterns among the online surveys. Ball (2019) assumed that low human interaction among online surveys would reduce the response rate. Many experts assumed that the distribution had to be more to deal with a low response rate.

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The web-based survives expecting response rate ranges from 15 to 50 % (Lakshminarasimhappa, 2021). The current study is no exception which make getting the probability sampling mission difficult to achieve.

Repositioning practice measurement faced these two challenges. The survey distributed in the first sample for 1426 participants to get only 306 responses in EFA study which equal 21.4%. in CFA study the questioner reached 833 participants and got 323 responses to have response rate equal 38%. Therefore, assuming the ability to have a probability sample for all nurses working aside from expecting the low response rate is utopic idea. That means the non-probability mandate its presence in such method.

Experts agreed on the nonprobability sample usage in achieving the scale development process. DeVellis (2016) mentioned that "*A mean value of the attribute that is not representative does not necessarily disqualify the sample for purposes of scale development…while still providing an accurate picture of the internal consistency the scale possesses"* (P131). Thus, quota nonprobability presented the sampling approach.

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A quota nonprobability sample assumes members had a high chance of representations for each cluster, even if it was not sure of the probability assumptions in each cluster (Lehdonvirta et al., 2021). Also, it is efficient, accessible and satisfies the study requirements (Polit & Beck, 2008). According to the available data about the distribution of the population – according to the Ministry of health reports 2017 there are around 40000 nurses working in Saudi Arabia hospitals. The nurses distributed over the five regions as following around fourteen thousand in the south region or to be around one third of the total nurses in Saudi Arabia– although the

south region is not the main region, but due to the current military conflict, government rotate many nurses to support nursing services in south region. Which lead for higher number of nurses in the south region during the study time – followed by central region with around twelve thousand to formulate around 35 % of the total nurses and the others in the other areas (Figure 1).

The quota probability sampling assumes the need to recruit number of nurses in the sample match the percentages in the reality (Lehdonvirta et al., 2021). According to that, the sampling assumed to match the representation in the sample with the population weight. Therefore, the decision made to stop the data collection after assuring reaching the sample size matching with the population weight which means 75 participants from the south region, 26 or more from the west region, 35 or more from the east region and 25 or more form the north region and 88 or more from the south region. These assumptions according to the initial calculation for the sample size to be at minimize 250 participants (at it comes below the lowest accepted number for the sample size to 244 for each phase which rotated here to be 250 participants, the full details in the sampling section in the EFA section).

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Figure 1 Sampling distribution

1.4 Data collection procedure

Getting the ethical approval was the first step in the data collection process. The author applied for the ethical approval in the king Saud Medical city (KSMC) as a representative for national research health committee (King Saud Medical City [KSMC], 2018). The ethical committee approved the study progress and permission for data collection among all hospitals and health institution in the kingdom. As the participants full the questioner considers as agreements from the participant to participate in the study.

The second step regarding the EFA study, the researcher uploaded the instrument on web data collection platform (Limesurvy.com) and sent to the nursing regional officers in each cluster. Saudi authorities classify country regions to five; central, west, east, north, and south. Each area contains regional nursing offices (RNA), that directly control nurses in governmental hospitals and influence nurses in non-governmental hospitals. Regional nursing officer distributed the survey based on

the study inclusion criteria – Sent for them in advance. Each office assigned a connection personnel to follow up the progress with the researcher. The five regional offices agreed to participate in the study and supported nurses to participate. For CFA study same process followed for different time with one additional question at the first page of the survey to ask if the nurse participated in EFA study or not. If the answer is yes the response excluding. The aim of that is assuring absent of any sample replications in EFA and CFA studies.

As a nonprobability sampling, the data collection stopped when reaching the target (more than 300 participants). Each link opening presented evidence for receiving the survey and was used as a dominator in the response rate calculation. The responses that less than 90% of items were excluded. To encourage participation, each respondent received a gift. The gift consisted of an educational package of educational and two free training courses. The package cost around twelve US dollars for each (1 US dollar = 32.5 Thai Baht)

1.5 Inclusion criteria for EFA and CFA studies

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The inclusion criteria: 1) Nurses working on direct clinical patient care in any inpatient department among Saudi hospitals (that include administrative nurses with clinical duty such as head nurses, charge nurses, infection control, quality nurses and wound care nurses). 2) Understand English (English is the official language of communication within the healthcare system); 3) agreed to participate in the study.

2. Instrument development process

DeVellis (2016) formulates seven steps for scale development; 1) clarify the concept of measurement, 2) Generate item pool, 3) Format responses, 4) Review by experts, 5) Face validation, 6) Examine the internal consistency, and 7) Explore the psychometric properties (explore and confirm).

2.1 Step one: Clarify the concept

The concept of measurement is repositioning practice. The study adopted summative content analysis to clarify the concept from the literature (Chapter II). Similarly, summative content analysis was applied for analyzing experts' interviews.

2.1.1Sample of experts (n=6)

The author selected six experts in the pressure ulcer domain. The experts were seniors in variant specialties (Table 1). The full details them was attached in Table 1.

Table 1 demographical characteristics of experts interviewed (n=6)

Personal information	Details	Number (Percentage)
Age (years)	Mean (SD) =47 (5.7)	
Experience (years)	18 (2.76)	
Occupation	Wound care nurse	3 (50)
	Intensive care nursing	1 (16.6)
	General Surgeon	1 (16.6)
	Nursing education	1 (16.6)
Qualification	Master	5 (83.3)
	Ph.D.	1 (16.6)
Nationality	Yamani	1 (16.6)
	Jordan	1 (16.6)
	Indian	1 (16.6)
	Saudi	1 (16.6)
	Canadian	1 (16.6)
	American	

2.1.2 Interviews analysis

The researcher conducted the interviews by himself - with the supervision of the major advisor - by using two open end questions; "what *do you define the repositioning practice*?" and " *what do you think are the items that should be included in the measurement tool?*". The discussions were kept open to encourage experts to explore their ideation about the repositioning practice and measurement items.

During the period from May to July 2021, the interviews were conducted face to face in Riyadh, Saudi Arabia in different locations. Two in hospitals, two in a university and two in a public place. The author uploaded all transcripts to MAXQDA software. MAXQDA is a computerized software that helps the authors in formulating the themes, codes and connecting the related ideas (Kuckartz & Rädiker, 2019). Experts exhibited 128 codes that formulate sixteen themes. The result shows the highest word distribution as generated by the system.

1) Attitude issue

One expert believes that attitude is a component for repositioning practice who spends majority of experience in wound care educational domain. This expert mentioned the attitude as a component for the repositioning practice. However, the same experts present that

"*even the attitude is not directly part from the actual practice but it is important to measure*"

It appeared from the expert intentions; attitude is not part from repositioning practice attributes rather it is important to measure. Attitude is an important as an introductory component, not as original attribute. So, this theme was

denial by the author based on the current understanding of the repositioning practice phenomenon.

2) Fix the line

Fixing the line, arrange the underlying bed sheet or make the line with no shear or cracks that will harm the patients and cause by itself a new kind of injury and eventually pressure ulcer. The themes appeared for one time among the interviews. The importance of this point not only as it is directly understood from the context of repositioning practice that turn leads to cracks and defragmentation of bedlinen suitability and smoothness under the patient, but also from the experts who stress on it. The expert – the surgeon- assumed that this made observable skin damage.

3) Anchor the patient

Anchoring the patient or fixing the patient refers to assuring that the patient will not lose the current position. This by using devices or pillow or any suitable equipment – such as heel protector. For instance, the nurse must put a pillow on the back so the patient will not fall to his back during lateral positioning. Experts stressed that in 14 different locations.

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4) Assessment for the patients

Considering assessment as part of the repositioning practice appeared in four different locations. The experts used statements that refer to the assessment, before during, and after conducting the procedure. Based on a theoretical assumption for repositioning practice patient assessment was included within the attribute's domain.

5) Many terms

Experts highlighted having more than one term that refers to this behavior “repositioning practice”. Experts stressed the effect of these differentials on the measurement tools. For instance, one expert used the terms “turning or positioning or whatever” this is also combined by “*they do moving or turning*”. The experts believed this conceptual disagreement confuse nurses. And research – based on experts’ perceptions – must clarify these terms for nurses before conducting the measurements. Also, experts assumed that these terms refer to so closed actions but not the same. On the other hand, the experts agreed on the suitability of repositioning practice as a reflection for the practice only similarly for the repositioning knowledge that refers to the knowledge part only.

6) Documentation

Experts essentialized the documentation among repositioning practice attributes. Experts agreed nurses forget in many occasions. As the general statement in nursing “*not written not done*”- as one of experts mentioned - the repositioning practice had not occurred even if it was. They defined the documentation as records having who did it, when that happens, and the current posture of the patient and the coming plan. Also, experts verbalized the importance of documentation in monitoring the pressure ulcer prevention.

7) Follow protocols for the steps

Experts defined the repositioning practice as a consequence of steps. Eighteen times, experts described the repositioning practice according to the steps mentioned in the literature. Therefore, the author merged interview findings with literature review in generating the items. Experts assumed the components of the

repositioning practice as a physical action. Physical action is step-based action. These steps are mentioned in protocols, guidelines, and other nursing references.

8) Body techniques

Experts highlighted the performance techniques. Accordingly, nurses must efficiently utilize their body mechanisms to save their health during the procedure. Experts believed that the proper use of the body actualize the meaning of the repositioning practice. Lacking the proper use of the body refers to low repositioning practice.

9) Knowledge issue

Knowledge related expressions were mentioned nine times. However, the current study assumed that repositioning knowledge antecede the repositioning practice, but some experts argued that knowledge is already included within the practice either in determining the posture or in making decision. There is no doubt about the importance of knowledge, but the consensus of experts split either to consider it part of the attributes or antecedents. As conclusion, the current study assumed that knowledge such as attitude and skills are all antecedents. Nurses might have the required knowledge and skills but for other factor did not apply it (Iblasi et al., 2021).

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10) It is a nursing responsibility

The repositioning practice is nursing responsibility. Experts highlighted these points in five different locations. Even if the actual turn performed by non-nurses, the responsibility and accountability is nursing. Also, the procedural description only appears within the state of nursing science domain.

11) Sensitive measures

The sensitivity nature of the repositioning measurements mentioned in four different locations within the interviews. Experts assumed that nurses feel difficulties to report the truth in case of they did not perform the procedure as it required. As nurses might be blamed for low performance. Even, leaders agreed – based on experts' assumptions – that many factors stronger than nurses' abilities – shortage, workload, and lack of equipment's – they will blame nurses. That feeling inhabits the truth reporting. So, the items must be designed to deal with this possibility.

12) It is a practice

Practice is the doing. Interviews showed that the clinical skills grow, senior nurse perform repositioning better than junior nurse. Also within the same group of nurses not all perform at the same level, even for the individualized person, each time might be differ. Experts assumed that this must be taken in consideration in formulating the items. The items nature has to encourage nurses to report the average number of times and build their answers on one time only.

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13) Teamwork

For elven times, experts mentioned teamwork or its synonyms (cooperation or coordination). For instance, experts said:

"*more than one nurse should do this action"*,

"*this action is done in a harmony, assure their congruent body movements (between the nurses participated)"*

Mutual understanding appeared as a mandatory requirement for safe, effective, and suitable posturing. As it appears from the interviews, the

teamwork generates the meaning of repositioning practice. Four experts announced that, absent of teamwork means the repositioning practice not satisfying the meaning, as the repositioning had to protect the nursing health too. The current study utilized the expression “harmonization” to refer to the effective cooperation between two nurses at the same for doing the procedure for the same patient. Harmonization covers the experts’ intentions by teamwork.

14) Time is important

Time is the most repeated issue. Each expert mentioned the time as an essential part for the repositioning practice around five to six times during the interview. Which make the time as the most clarified features for the repositioning practice. Therefore, experts perceived repositioning practice as a time-based action. In this case, the time is important attributes for the repositioning practice and experts stressed on the importance of considering the repositioning practice repeated based on time duration. Finally, experts stressed that nurses should know when the repositioning practice is going to happen, and this is a part form their performance for the repositioning practice. The experts assumed that repeating the procedure within a specific time frame is the success key.

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15) Training

The training was mentioned three times. As the training is consistent with the knowledge development and attuited enhancements. So, it is logical to deal with these aspects as one set. As it appears from the exerts expressions that training is important, but even with the training may be nurses unable to do the repositioning practice for factors such as workload or forgetting (Iblasi et al., 2021) –

as explained before in the knowledge and attitude parts. So, the current study dealt with training as an antecedents' concept for repositioning not as an attribute.

16) It not only turns

The research observed the expression means turn is part of repositioning practice in fifteen different locations. Interviews showed that repositioning practice not only turn. Experts agree that repositioning practice include the turning with some else. For instance, fourth expert said:

"*Repositioning practice not only the turn*"

Therefore, the turning is basic aspects among repositioning practice attributes, but it is not standing alone.

2.1.3 Repositioning practice definition

Researcher analyzed the expert interviews based on the content analysis and match "combine" the results with the literature analysis content analysis. The interview results shows fewer themes but much generalized that the literature. Based on the combined analysis results from interviews literature, repositioning practice is a "*harmonized turn for bedridden patient end by anchoring (fixing) the patient in a new posture and documenting who participate in the doing, when that happen and the next posture time*". Also, it appeared from this analysis that the repositioning practice includes five attributes which are; turning, harmonizing (team work), anchoring, and informing (documentation). (Note: this definition was changed two times; one after step four and one after step seven to be only contains components as it comes with more details in chapter IV).

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2.2 Step 2: Generate item pool

Step two is generating the item pool. Based on the understanding from the literature review there was 575 codes that present 103 themes. The experts interview also leads for 16 themes. While many these overlaps - to that appeared in the literature –the research formatted the first draft of the repositioning practice survey by considering each item presents one theme.

As the descriptive language is the most influential aspect of the psychometry measurement tool, and the fact that this is English language tool (the langue of communication in Saudi hospitals). Therefore, the current tool was formatted in the English language with consistency with the semantic English language. The survey contained 103 items, each item presents singular action. Saris and Gallhofer (2014) presented a guideline for such tools that follows the acronym (rDy) while (r) is the subject, (D) is the action (doing) and (y) is the object. Based on that formulate the researcher write the first version items as presented in table three. Each item assured the clarify , directedly and based on the author understanding at that stage (it was observed later that many items were not clarified and edited in the following steps as it comes later).

2.3 Step 3 Determine the format of measurement

Different kinds available for measurements formats such as Likert scale, Thurstone scaling, Guttman scaling, semantic scale, visual analog, numerical response format, binary option, and others (DeVellis, 2016). The current tool aimed to give wide space for the respondents to choose an answer based on their assessment for the frequency of the behavior. The author believed – at that level- that seven Likert scale is an appropriate decision. The numeric value ranged from zero of the lowest and six

for the highest and the semantic label as following from the lowest: Never, really, occasionally happen, sometimes, frequently, usually, every time. Also, the range of questions would be the last month of the clinical practice (as discussed in chapter two the support the accuracy of reports by determining the memory range). So, for each question the following label has as an answer option – This responding option was rejected by experts later as it will comes in step 4.

2.4 Step 4: revised the tool be experts

According to the scale development guideline, the author distributed the scale to nine experts. The demographical characteristics for the experts are presented down and their full information attached to the Appendix C – all experts agreed to shar their information in the dissertation. All experts have to be with more than fifteen years working with bedridden patients in clinical sittings with academic master's degree and agree to participate in the study.

The author uploaded the first draft over an online data collection platform (Typeform.com) and generate the link and send for the nine experts by email with a request to evaluate each item based on suitability based on numeric scale of four levels as follow; 1) Refers that the item is not relent; 2) Refers that the item required major revisions; 3) Items required minor reversions and 4) Item suitable. The link sent to experts in 21st of July and closed in 1st of August 2021.

2.4.1 Sample of experts in step four (n=9)

The fourth step requests evaluating the items by experts. Nine experts revised the initial draft. Majority of experts were specialized in the wound care field with full details of each expert appears.

The author calculated the mean of content validity index per each items (I- CVIs) and calculated the average of scale content validity for all items (SCV). Literature assumed the I-CVI for each item have to be 0.7 or to add in the survey (I-CVIs > 0.7). And for scale content validity equal 0.8 or more (SCV >0.8) (Polit et al., 2007). Experts reject the first version. The mean of I-CVI = 0.79 and S-CVIs = 0.19.

Experts requested major revisions for the items as the scaling options. They proposed five Likert scaling points instead of seven. Also, the experts refuse starting point to be zero. They rationalized that the seven options confuse nurses. As, most nurses work for eight hours. So, by assuming the repositioning had to happen every two hours mean the nurses will see the intervention four times. So, the seven options might contradict their actual observation while five time much better options. Also, experts assumed that zero as a label for frequency will get rejected from nurses as at least they have practiced even at lower percentages. As part of encouraging reporting the lower performance, experts assumed that the lowest point must be one. The experts I-CVIs in Appendix H. The result shows that the scale content validity (SCV) = 0.19 (number of items that accepted by all experts divided by the number of all items). Also, the result shows the mean of content validity item = 0.79. Based on that, the first draft of the scale rejected.

By considering the content validity index (CVIs) for each item higher than 0.7 , it appeared that experts agree on 75 items only with need for major for each item. However, the analysis shows there is one additional item need to be included. Based on that the author revised the second version of the tool uploaded on the same data collection platform. The second version consist of 76 items as it appears in table

seven and sent them for the second time. Items rearranged and the author sent the revised tool (second version) for experts for experts in 15th of August 2021 with a request to submit within one week. The second tool consisted of 76 items. Experts validate the second version within the time frame with accepted I-CVIs and SCV (Appendix F).

Experts rejected 15 items and accepted on 61 items with modifications. That lead to formulate the third version of the tool. The suggestions to split the turn to two sub scales (pre-turn which means refers to facilitate the turning, and the turn) . Also, add new dimensions for the patient assessments as separate subscale. Also, the need to remove the time from being subscale as it is included in the answering options. Also, experts suggested change the information dimension to be documentation as this much consistence with the nursing applied terms. According to that, the repositioning practice formulate these 61 items over the six dimensions which are; pre-turn (14 items), assessment (4 items), turn (11 items), harmonization (5 items), anchor (12itmes) and documentation (15 items). The researcher rearranged items accordingly.

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2.5 Step 5: face validity and internal consistency

The author tested the face validity and internal consistency by piloting the third version of the repositioning practice. The survey was uploaded over a data collection platform (Limsurvey.com) and sent the link to 31 nurses. Majorities work in large public hospitals in allied health which include wound care, nursing quality and nursing education (Table 2).

Table 2 Demographical characteristics of piloting sample (n=31)

Characteristics	Min	Max	Mean	SD
Age (Y)	28	36	33.50	2.50
Experience (Y)	0	15	9.24	4.12
Duty hrs.	**No.**	**%**		
12 hrs.	16	51.6		
8 hrs.	14	45.2		
Missing	1	3.2		
Scope of service	**No.**	**%**		
ICU	7	22.6		
Medical Surgical	9	29		
CCU	3	9.7		
Allied Health	11	35		
Missing	1	3.2		
Hospital type	**No.**	**%**		
More than 1000 beds	12	38.7		
>500 beds, less than 1000	11	35.5		
Less than 500 beds	6	19.4		
Missing	2	6.4		
Nationality	**No.**	**%**		
Saudi	22	71		
Jordan	3	9.7		
Indian	2	6.5		
Philippines	2	6.5		
Missing	2	6.4		
Current position	**No.**	**%**		
Staff Nurse	5	16.1		
Charge Nurse	6	19.4		
Head Nurse	5	16.1		
Wound Care	13	41.9		
Missing	2	6.4		
Gender	**No.**	**%**		
Male	7	22.6		
Female	22	71		
Missing	2	6.4		

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Expert nurses in the sample expressed their feedback about the face validity through empty space for each question. The comments focused on modifying the linguistic structure of the items. For instance, remove the introductory statements such as "*before the turn*" "*after the turn*" reaped more than 43 times. Other comments to simplify the item context. Based on that, the author remodified the survey to be the fourth version. The fourth version of the survey kept the same number of items (61) after edit the items (Appendix F).

2.6 Step 6 Internal consistency result

2.6.1 Sample for piloting step six (n=31)

The third sample group participant in the piloting to satisfy the step six requirements. The sample consisted of 31 participants. The sample size for piloting was taken according to the conclusion of Hertzog (2008) in accepting a range of 10 to 40 participants. The sample size were 31 participants (Table 8). Those Participants lost their chance to participate in the other samples – to minimize the biases. The pilot result noticed negative skewness in many items.

2.6.2 Reliability test based on the pilot sample (n=31)

However, the reliability scores were higher than 0.9. The study conducted Cronbach's alpha test, and Gutman split half for confirming the reliability result. DeVellis (2016) recommended adopting more than one statistical test to confirm piloting reliability (DeVellis, 2016). The current study assumed that Cronbach's alpha and Gutman split-half satisfy the purpose of confirming the reliability purpose. Both tests present different schools of thought and explore the results of both, serving the ideation of assuring the reliability of the piloting result (Groppe, Makeig, & Kutas, 2009).

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Repositioning practice measurement tools showed a Cronbach's alpha = 0.98 and Guttman reliability = 0.94 (Table 3). The reliability score exceeds the accepted level (>0.9), and it is considered accepted for assuring the internal consistency (Polit & Beck, 2008).

Table 3 Reliability from piloting study (n=31)

	Cronbach's Alpha	Guttman split half
Reliability	0.98	0.94

The reliability score if an item deleted was ranged from 0.96 to 0.98.

2.7 Step Seven: Psychometric properties

Examining the psychometric properties includes analyzing factors over two different set of samples; exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The comprehensive details of the test and the result are presented in chapter IV. However, the current section presents the methodological aspects and the theoretical assumptions for EFA and CFA.

2.7.1 The sample size for exploratory and confirmatory factor analysis

The current part explains only the methods of sample size calculations. Two required samples; first to explore the components known as the EFA study. And the second sample is known as the CFA study. The description explains the calculations for the required number of participants in both studies.

Literature produced contradicted recommendations for the required size. A group assumed that five to ten participants for each item is enough (DeVellis, 2016). Accordingly, a total of 244 to 610 nurses is enough – there were 61 items at this stage. Others assumed 300 or more is satisfying the requirements (Bates & Watts, 1988; Davis, 1992; DeVellis, 1991; Ferketich & Muller, 1990; National Research Council, 1984; Nunnally & Bernstein, 1978; Raghunathan & Grizzle, 1995; Rummel, 1988; Sudman & Bradburn, 1982; Tourangeau & Smith, 1996).

That wide range - the differences between the upper limit to the lower limit and divided by two equal 182- made a precious decision a questionable point. From a skeptical view, the author adopted the available information about the population characteristics for the sample size calculation (Wang & Ji, 2020). The assumption is that repositioning practice is a global nursing phenomenon and the nursing environment in Saudi Arabia is a multicultural community (Aldossary et al., 2008). So, estimating the sample size based on population characteristics is preferable (Tam et al., 2020). As, the most famous formula for calculating the number of required participants to achieve an efficient number of participants is symbolized as follows (Eng, 2003; Johanson & Brooks, 2010)

$$n = \frac{Z^2 \, X \, p(1-p)}{e2}$$

As (n) is the sample size, Z is a fixed value from Z-table, p is the proportion of constructs distributions in the population. Furthermore, e is the margin of errors which is in this case, will be estimated to be 0.05 or 5 %.

Therefore, to adopt this equation, there is a need to calculate the proportion value, one minus the proportion value as shown above. By that, the proportion of construct in the international health care organizations will be like the proportion of construct in the health care system in Saudi Arabia. Then there are logical explanations to utilize the international proportion for calculating the sample size in Saudi Arabia.

For proportion calculation, no agreements about the methods to calculate the repositioning practice – different tools and definitions as presented in Chapter II. Studies measured the construct without a unified operational agreement.

So, the current study for sample size calculation assumed they were similar in terms of variance, either study measured the repositioning practice as a unique constructor or subdimensions among other scales.

The review showed that 23 studies present a measurement for repositioning practice (method of selection appears in chapter II). These studies present repositioning practice.

The repositioning practice measurement for 16756 participants, 8323 of them shows positive. So the proportion equal to 0.49 (based on the previous assumptions). The value to estimate the (1 – p) can be done in two ways; either by depending on the proportion value alone or 1 – 0.49 equal 0.51. Furthermore, by assuming the margin of error is 0.05 as presented above. And Z value for 95% equal 1.96, then the equation presented above will be

$$\frac{3.841\ X\ o.49\ X\ 0.51}{0.0025} \cong 384$$

However, if we assume that these studies did not have similar qualities among the participants and there are participant variations, the value of 1-p should be calculated for each study alone. After that, the mean of all (1-p) values will be applied. In this way, as shown in table one, the value of 1-p is 0.61. So the equation of sample size calculation is

$$\frac{3.841\ X\ o.49\ X\ 0.61}{0.0025} \cong 460.$$

The new sample size ranged from 383 to 460, which is much less than the variations of the first methodology. So by taking the highest estimated (460) multiplied by 10% estimation for the attrition rate (Polit & Beck, 2008), the total number of estimated sample size is around 500 participants. However, the current

study takes 629 for both parts (for EFA study n = 306, for CFA study n = 323). So, even the sample size calculation supported by literature and experts' estimations. Additionally, the study tested the sample by Kaiser-Meyer-Olkin (KMO) sampling adequacy test and the result support these conclusion as it will come in more details in chapter IV.

2.7.2 Exploratory factor analysis (EFA)

The study assumed correlations between these 61 items and concealed factors from the other side. Therefore, the current study applied exploratory factor analysis (EFA). Exploratory factor analysis (EFA) is a well-known terminology in the scale development (Williams et al., 2010). It is widely used in education, psychology, and health care fields to explore factors that are not measured directly (Boateng et al., 2018; DeVellis, 2016; Johanson & Brooks, 2010; Kyriazos & Stalikas, 2018). It assumes presenting of uncovered factors underlying the data set (DeVellis, 2016).

The nature of the statistical conclusion shows factor load is higher than the predetermined cut-off point, which based on many social, psychological, and health references ranging from 0.30 to 0.5 (Phakiti et al., 2018; Williams et al., 2010). The items that present proper correlations with such factors are considered representative measures. The current study took 0.5 as the minimum factor loading.

Exploratory factor analysis is an indicative approach driven by the nature of the data distribution. Therefore, it identifies correlations between data without a predefined hypothesis about the data relations. However, a set of assumptions had to be considered before applying for EFA.

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Exploratory factor analysis builds these associations between factors based on the presence of; 1) Normality distribution for the data 2) Linearity in the relation, 3) Factorability among these set of items and 4) Adequate sample size.

1) Normal distribution for the data.

The accepted statistics taken in the study would range from -2 to 2 according to George and Mallery (2019) recommendations.

The normality investigation in this study was conducted for the 61 items. The data entered the Statistical Package for Social Science (SPSS) IBM v.28 that licensed from Chulalongkorn University and ran for the normality by skewness test. As presented in table 3, the skewness results ranged from -1.32 for the fourth item until -0.3 for the 27th item. George and Mallery (2019) supported accepting the limit for the normalization that ranged between -2 to 2, matching the first required assumptions for EFA conducting (Appendix G).

2) Linearity

Linearity means the expected value of items is located straightway from each other. Exploratory factor analysis assumes an undependability between items. The linearity argument supported several methods (Alam et al., 2014). either by scatter plots or linearity from the ANOVA comparisons test (George & Mallery, 2019). The scatter plots to evaluate the linearity is not a practical method in the current situations because it will require drawing scatter plots for each item with all other items, which mean there is a need to draw scatters by the number of this equation $\binom{61}{60}$ among these items means there are more than 3000 diagrams. So, the second option was taken into consideration he results show that all items show prober linearity results.

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According to this study, it supports the study's assumption about the presence of many interrelated independent actions that their variances are not influenced by each other (instead influenced by other factors as it comes below). However, there is a piece of solid evidence about rejecting the linearity requirement if the number of items exceeds that of 60 (Williams et al., 2010). For statistical purposes, linearity was applied, which showed suitability for EFA.

3) Factorability

The third assumption for EFA is factorability which is initial questions about presenting correlations (correlation is the ratio between covariance over the squared root result of the variance). The correlation between the items is something predicted as this is a process, and each item facilitates the following item. The correlation between items is considered high if the item-to-item correlation equals 0.7 or more. As presented (Appendix J) , there are high correlations between items.

The items that show high correlations with more than thirty other variables are; Items 23 "*Nurses move the knees in alignment with the body (bend the opposite knee of the turning direction in slid position and flex in supine position)"* , items 35 "*Nurses evaluate the patient's comfort verbally (by words) and/or non-verbally (such facial expressions*)", item 43 "*Nurses ensure that the patient is not falling (go back) to his previous posture*", and item 44 " *Nurses make the angle between the patient and bed is around 30 degrees unless clinically contraindicated*". These items are not measuring the same behavior even it statistically shows a high connection with other items as this is due to the consequence of events. Therefore, after revising the items, the study did not remove any of these items for the purpose of

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EFA and entered all items in the EFA analysis and explore the relations accordingly first. There are eleven items removed due to factor loads as coming below.

The study conducted Bartlett's test investigates the level of variance homogeneity between the items. The result shows (x^2=28674, df = 1830, p< 0.05) as seen in (Appendix I). Factorability condition from the statistical point of view, which shows significant statistical evidence. The result satisfies the third statistical requirement.

4) Sample size

The sample size is a significant issue for conducting the EFA. As it presented above in the sampling approach and sample size calculation the current study adopted 306 participants for EFA.

5) Communalities

Communality investigates the amount of variance in each item with the total of others (variance is the squared differences between subtracting (x = response) and the expected value squared). Statistically, it refers to the common factor analysis, which results from the summation of the squared of all factor loads for each item.

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In statistical interpretations, high communities are better than lower (means the variances are related). After revising the evidence, the predefined cut point for the current sample was 0.5 (in other words, the accepted relation in the variances is higher or equal to the total variance from other non-related reasons). That means if any commonalities score less than 0.5 was excluded - p (Var (x) $\geq$ 0.5.

6) Rotation approach

The current study assumed that measurement errors happen by random, not in a systematic format - based on the precautions were taken to control the

sensitivity (Chapter II). That means the assumptions of all measurement errors were equal to zero, and each item is perfectly related to itself (Hair et al., 2019), (Correlation matrix chapter IV). That assumption supports processing the EFA based on beings classical format (Ferketich & Muller, 1990).

The option of analysis was "principal component analysis" - in summary, if there is no evidence of the presence of systematic errors, assumed all errors randomly happen and the difference between covariance ratio and variances multiplications happens by chance. Also, the study assumes each item presents an individual measure of the "reality"(Gaskin & Happell, 2014).

Oblimin is a popular rotation technique in social science (Phakiti et al., 2018) and nursing studies (Gaskin & Happell, 2014) in cases of random expectations for the measurement errors (Ferketich & Muller, 1990). Indirect Oblimin rotation assumes changes in the X and Y line equal zero. IBM defines it as "*When delta equals 0 (the default), solutions are most oblique". As delta becomes more negative, the factors become less oblique. To override the default delta of 0, enter a number less than or equal to 0.8*" (George & Mallery, 2019)

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Mathematically, the limit of covariance in both (x,y) explained by $\lim_{Dx \to 0} = 0$, $\lim_{Dy \to 0}$ and $\sum_{0}^{1} (x \,.\, px) \,.\, (y \,.\, py) = \varnothing$) (Gaskin & Happell, 2014; Phakiti et al., 2018). The study calculated the variances without any predefined point for the items' variance or predefined location in the data matrix structure (Brown, 2014). The variance maximization allows the researcher to determine the most potent factor load and the direction of the influence of each variable (item) with the underlying factor. The system (SPSS) requested to remove any factors that failed to show a load of 0.30 or less (Phakiti et al., 2018; Williams et al., 2010) (Chapter IV).

2.7.3 Confirmatory factor analysis

There are two scenarios for confirmatory factor (CFA) analysis; first, assume that any change in the data originated from the proposed relation. So, the score of the latent variable change according to the proposed association. That means the model fits and shows the actual changes based on that model. At the same time, the second scenario contradicts the first and records the differences between what should happen and what happens. That is known as a model failure.

Testing these two scenarios depends on the variance between the observed and hidden factors. As it is well known, variance is a measurement value for the spread of data around the mean (George & Mallery, 2019; Mendenhall et al., 2012). The following equation determines it.

$$S^2 = \frac{\sum(x_i - \bar{x})^2}{n-1}$$

S^2 is the sample variance (that we are dealing with from the observed items), (x) is the observed value, (x^-) is the mean, and (n) is the sample size (Plichta & Garzon, 2009). So, any change in the variance assumed changes in the observed value (x) and the mean (Trivedi, 2017) as the sample size would be the same among all variables.

The analysis follows changes in the variance between items and the contracts. As the assumptions lead the observer to predict the changes in the latent variances based on the observed variances (as known in statistics, the variance of (x,y) is the total of variance of (x) and variance of (y) as following;

Var (x+y) = Var(x) + Var(y).

However, this formula is valid only in the case of perfect independence (P(x/y) = p(x)* p(y) (Salsburg, 2001). And this is not perfectly matched in measurements as the items already overlap as it all originated from the same constructs. So, the fully supported theory (based on statistical probability assumptions) (Mendenhall et al., 2012) is that.

$$Var(x+y) = Var(x) + Var(y) + 2\ Cov\ (x,y)$$

As it appears from the equation, there are other value-adding up, which is the covariance. Therefore, observing the changes in the variance of any summations is controlled by the changes in the variance of each factor and the changes in the covariance of both. However, this works theoretically in the case of eliminating the measurement errors. This is difficult to be eliminated in such studies; therefore, the actual measurement of variance is equal to the above forum adding to that the errors, which means the intended equation will be the regression formula as follows;

$$y = b\circ + b1\chi + \ell$$

In this case, the analysis is going backward from the observed variable (y) to non-observed variable x (as presented above, the assumption that the latent factor leads to the changes in the observed so that the relationship will be the underlying factor is the independent variable and the observed variable is the dependent variable).

All possibilities for any observed variable will be an integral number ranging from 1 to 5 as this is a five-point Likert scale. Therefore, the result of (y) is known by its limitations over these five possibilities only, and it should be integral (integral means fixed number with no decimal).

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Also, (b_0) is the point of intersection which is the value of crossing the regression line the (y) over the value of x = zero. So, in case of no effort or any matter is going to achieve from the participant to respond for any items, there are still possibilities (probability density function) to be equal to 1/5, and this similar =0.2 (That means if the respondents give a random answer). This value is an intersecting point (based on the regression assumptions (Salsburg, 2001)). Therefore, the only expected changes that are going to happen for the variance of (y) originated from the variance of (x) or the changes in the errors (e) (assumptions that intersect is a fixed value).

The errors are assumed to be perfectly independent between the items (approved before in the EFA report). That means the error of measurements in item one, for example, and item two are unrelated (assume that the errors are independent between items). So, the outcome variance is only changed according to the variance in the observed variable. So, as in the previous equation, the changes will be influenced regularly by the changes in the observed variances. It is not expected that the changes in the variances originated from the errors. Therefore, from a logical perspective, any difference in the variances of two variables (Var (x+y)) is either derived from the variance of (x), the variance of (y), the covariance of both, or the errors. Thus, CFA is going to follow this relation. So, follow the changes in the variances and compare them with what the model assumes. The variances that will be followed are;

$$\text{Var(RP)} = \sum_{1}^{13} items = preparing + \sum_{14}^{31} Items = posturing + \sum_{32}^{44} items = documenting \sum_{45}^{50} Items = evaluating$$

So, if this is the case, the model is fit, and the model is explaining the variances; if this is not the case, the model failed to show the required fitness parameters.

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Confirmatory factor analysis is a deductive approach driven by the understanding of relations (hypothesized) between latent variable (underlying) and observed variable (items). Similarly, for the EFA, CFA also assumed presenting a group of assumptions; 1. Theoretical understanding, 2. Different sample groups. 3. Normality distribution for the data 3. Linearity in the relation (Brown & Moore, 2012).

1) Theoretical understanding (hypothesis)

The study took the results of EFA as a predefined hypothesis for the CFA analysis.

2) Test the data over a new group set

The study uploaded the repositioning practice version four (IV) survey over the same data collection platform (*Limsurvey.com*) and redistributed over the population (nurses in Saudi Arabia). However, the survey added a filtering question (*did you answer or participate in the study that measured repositioning practice in the last month*) with binominal options (Yes/ No). If the answer is yes, the participant is excluded automatically from the survey and transferred to the thanks page with explanations that this part required a new participant.

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(1) Normality distribution of the new data set

Normality investigation was conducted using testing skewness score. All items showed the accepted range of skewness for normality (-2 to 2) (George & Mallery, 2019) as shown appendix H with no recorded out layers among the responses.

(2) Multicollinearity

The result of multicollinearity analysis shows that the mean variance inflation ratio mean = 7.4. which is less than 10 which give a positive indication. However, there are six items had more than 10 eigenvalues as shown in appendix H. After carful revisions for these items, no changes required. Each item asked about one idea and high VIF value can be considered related to the correlations between items as part of being a process.

Note: the analysis for VIF done by using "car" library among R studio software, and all transcript is attached at the appendix H.

(3) Bartlett's test of sphericity and the Kaiser – Meyer – Oklin of adequacy

The result shows that, Bartlett's test (appendix J) also shows appropriate normal variant distribution ($x^2 = 21542.5$, df = 1176, p< 0.05). Also, for the KMO of sampling adequacy the result showed the overall result = 0.96 (Appendix I).

(4) CFA fit parameters

Evaluating the model's performance depends on two parameters: exact and approximate fit indexes. The same fit index is Chi-square (x^2). When the chi-square result is not significant, accept the null hypothesis as the model is fit. However, the Chi-square result is sensitive to the sample size. When the sample size increase, the degree of freedom increases, and both influence Chi-square toward a significant impact (p<0.05). Therefore, experts assumed taking the ratio between the chi-square result and the degree of freedom to assess the model fitness (Hooper et al., 2007). Even there is no agreed cut point for this ratio but making it less than two is much satisfying the model fitness result (Hooper et al., 2007).

Secondly, the approximate fit indexes are widely applied for testing the model. These parameters are; confirmatory value index (CFI), Root mean squared errs approximation (RMSEA), and standardized root mean square residual (SRMR) (Hooper et al., 2007).

The confirmatory value index is the ratio between what is explained by the proposed model over the overall changes in the variance, so it equals the following.

$$CFI = \frac{total\ explained\ by\ the\ model}{total\ changes}$$

So, by understanding the formula, it appears that how much the total explained by the model is high, the value is closed to one (in a perfect situation, it will be 1) (Hooper et al., 2007). Also, how much the value goes lower than one means there are differences between nominator and dominator. Based on that, the cut point is supposed to be as high as possible, which is more than 0.95 or more (Brown & Moore, 2012).

Root mean squared errors approximation (RMSEA) refers to the total errors' residuals. The squaring techniques in statistics to make all value in positive directions (the errors can delete each other if kept in positive and negative signs) (Brown & Moore, 2012). Therefore, the low score of RMSEA is something better, and high is not welcomed (Brown & Moore, 2012), which is also the same for SRMR. The accepted cut point should be less than 0.08 for both to denote a proper model (Brown & Moore, 2012).

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The author applied further statistical control over these covariances by command of modification indices (Using Lavaan library on R studio). The modification incidences suggest further control over the covariances only with no suggestions over the relations between the factors. Summary of the fit parameters for CFA is presented in table 4.

Table 4 The CFA fit parameters applied in the current study

Parameter index	Criteria
Chi-Sequard ratio	X2/ df >2
Comparative fit index	>0.95
Tucker–Lewis index (TLI)	>0.95
Root mean square error of Approximation (RMSEA)	<0.08
Standardized root mean Root residual (SRMR)	<0.08

3. Ethical concerns

The Institutional Review Board committee reviewed study's ethical principles at the Ministry of Health in Saudi Arabia (King Saud Medical City [KSMC], 2018). The review accepted all study processed. The review allows the study conducting in all hospitals in Saudi Arabia. The IRB approval descries attached at the (Appendix B).

4. Data Collection Procedure

After getting the IRB approval, The study adopted online web based data collection approach (Kimball, 2019). The study compared the online data collection platforms. Based on the criteria that facilitate the maxima data privacy requirements, users friendly approach, cost efficient methods and suitability for desktops, laptops and mobiles respondents (Lakshminarasimhappa, 2021; McClain et al., 2019). The

study accommodated *typeform.com* platform for the experts reviews (Dhanavandan, 2016). However, after realizing some technical issues – the page screen different between mobile and computers – the study continued with the *limesurvey.com* for the rest part of the study (Afonso et al., 2021) .

The *Limesurvey.com* data collection platform (Afonso et al., 2021) is a German based web. The platform offers a wide variety of applications and tools for formatting the survey. Also, it provides a secured platform for doing and adopting the data collection procedures. The platform offers the possibilities to respond from mobiles, tablets, and computes by the same screen appearance. The system allows transferring the results to ready SPSS or excel sheet. Also, it encourages students by making a 50% discount based on the university emails – Include Chulalongkorn University emails. Author created an electronic sheet that includes items based on the versions (in EFA and CFA).

5. Scale result interpretations

Experts suggest different interpretation to scale results either based on the expected normality (McDowell, 2006) or based on predefined cut point (Saris & Gallhofer, 2014). The normality expectations, classify the respondents based on their locations among others. All answers will be grouped based on the range of answers by take the ratio between the answers and the induvial response. For instance, in five-point Likert scale, the gaps will be one in each five, in this way the respondent will be categorized based on five levels from low to high. In term of frequency (such the repositioning practice case) the category will be ranged to; very poor for the lowest frequency, followed by poor, fair, good and very good frequency.

The second theoretical approach assumed presenting a predefined cut point that help the users to determine the statistics of the respondents. This applied in many examples such as the Braden assessment tool (Braden & Maklebust, 2005). The current tool is much more consistence with the need to determine a specific cut point based on the clinical need for high level of frequency. However, as this is the initial scale for repositioning practice, and there is no previous such measurement tool by using this format or serving the current tool purpose. The cut point must be also compatible with the required level of performance to be very good as an acceptable level of practice.

Repositioning practice protect bedridden patients from pressure ulcer (EPUAP/NPIAP/PPPIA., 2019). Therefore, even low chances harm patients. So, the highest performance is much accepting practice. According to that, the total accumulation of the repositioning practice has to be high or much close to be high. As perfect compliance is a hard to assumptions. So, the interpretation for the compliance level for the repositioning practice would be on five levels based on the mean of each item; very poor (1.0-1.5), poor (1.51-2.5), fair (2.51- 3.5), good (3.51 – 4.5), and very good (4.51 – 5.0). Based on that, the safe nursing practice required compliance in 4.51 means score or above.

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6. Statistical analysis

6.1 Part One: descriptive analysis

The study analyzed the data in two sections: the descriptive part and inferential psychometric properties tests (as presented in more details in chapter IV). The descriptive part includes clarifying the results of nurses who participated in the study according to their demographical responses according to mean, standard deviations, percentage, median and range of responses. Also, the analysis includes interpretations for the repositioning practice level according to the measurements. That will include the means, standardizations for items in the survey. That also included for interpretations for each sub scales.

6.2 Part two: Psychometric properties

6.2.1 Exploratory factor analysis

The study used EFA analysis through Statistical Packages for Social science (SPSS) as licensed from Chulalongkorn University version 22. By utilizing the factor dimensions. The analysis details appear in chapter IV.

6.2.2 Confirmatory factor analysis

Since its discoveries in 1969, confirmatory factor analysis revisualized the scientific understanding of factor analysis as a concept (Jöreskog, 1969). For fifty years after that discovery, "*confirmatory factor analysis*" became the holy test for the measurement instrument (Brown & Moore, 2012). Instead of waiting for the data to group together and forming underlying (latent) factors, define the relation in advance and test the performance.

The confirmatory factor analysis initially assumes the relations is originated from the latent variable to the observed items. Theoretically, the latent variables control the empirical items. The respondents answered based on their

perceptions of latent variable (Mulaik, 1988). Therefore, the changes in the observed items originally came from the actual changes in unobserved variables (latent variables). However, the researcher was only able to evaluate the observed variable, not the underlying factors. So, it all depends on comparing two scenarios. The study adopted the above-mentioned assumptions by R Studio – Lavaan Library accompanied with fit parameters test (Chapter IV).

6.2.3 Reliability

As it appears among the step six, the study investigates the reliability of the tool through the piloting study. The result shows a reliability = 0.96. The measurement tool (RPS) fourth version which was consisting from 61 items distributed as; pre-turn (18 items), turn (11 items), harmonization (5 items), Anchor (12 items), documentation (15 items). However, the study postponed the subscale reliability investigation to later stages as it will come in chapter IV in more details.

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CHAPTER IV
RESULTS

The current study aims to create a measurement instrument for repositioning practice for immobilized (bedridden) patients among nurses in Saudi Arabia. The instrument maturation strategy passed through the first six steps from the 3rd of December 2020 until the 21st of January 2022. From the 22nd of January until the 10th of February 2022, the Exploratory factor analysis (EFA) is the first part of the seventh step, followed by confirmatory factor analysis (CFA), from the 7th of February until the 11th of March 2022. The current chapter presents the results of the seventh step of tool development. The content of this chapter is split into four sections: Exploratory factor analysis result (EFA), Confirmatory factor analysis (CFA), result inferences and report finalization.

1. Psychometry properties: Exploratory Factor Analysis (EFA)

The current chapter explores the items' performance as required at the 7th step in developing RPS. The author disseminated the RPS over a large sample. The distribution reached 1426 nurses working in one of the five regions of the kingdom of Saudi Arabia (Central, West, East, North, and South) by using the quota sampling technique. Only 306 respondents interacted and satisfied the inclusion criteria. Those respondents display a response rate of 21.4%.

1.1*General Information about the sample*

The sample consisted of 306 participants. The demographical variable was presented in table 5. Most of the participants were female (70.6%), with bachelor's degrees (61.8%). Most participants had an Indian nationality (10%). The most frequent units were intensive care units (21.6%) and medical-surgical units (20.9%). Also, most responses came from the south region (35.6%), with 31% of nurses working in a public hospital with bed capacity from 500 to 1000. The mean and SD of participants' age was 36.11 $\pm$6 and the mean and SD of working experience was 11.26 $\pm$7.

Table 5 Demographical characteristics in EFA study (n=306)

Characteristics	**n**	**Percentage**
Gender		
Male	69	22.50
Female	216	70.60
Missing	21	6.90
Nationality		
Saudi	74	24.20
Indian	86	28.10
Philippine	49	16.00
Jordan	39	12.70
Portugal	10	3.30
Indonesian	9	2.90
Egyptian	6	2.00
Lebanese	1	0.30
Western (Include Australia and New Zealand)	1	0.30
Malaysian	9	2.90
South African	15	4.90
Pakistan	5	1.60
Oman	1	0.30
Missing	1	0.30
Academic level		
Diploma of Nursing	67	21.90
Bachelor's degree	189	61.80
Master's degree	44	14.40
Ph.D.	2	0.70
Missing	4	1.30

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Table 5: to be continuous

Characteristics	n	Percentage
Unit		
Intensive care unit for adult (ICU)	66	21.60
Intensive care unit for pediatric (PICU, NICU)	8	2.60
Cardiac Care Unit (CCU)	6	2.00
Palliative or rehabilitation unit	14	4.60
Medical-Surgical unit – Adult (Include Ob Gyn)	64	20.90
Medical-Surgical unit – Pediatrics	9	2.90
Kidney Dialysis unit	11	3.60
Wound Care Unit	44	14.40
Nursing Education	6	2.00
Nursing Quality (include infection control nurses)	40	13.10
Operation rooms (Include Recovery units)	16	5.20
Emergency Department (Adult and Pediatrics)	16	5.20
Day Surgery Unit	4	1.30
Administrative position	2	0.70
Region		
Central region	70	22.90
West region	40	13.10
East region	40	13.10
North region	47	15.40
South region	109	35.60
Hospital Type		
Public hospital, more than 1000 beds	88	28.80
Public hospital, more than 500 beds, less than 1000	58	19.00
Public hospital, less than 500 beds	97	31.70
Privet hospital, more than 500 beds	15	4.90
Privet hospital, less than 500 beds	44	14.40
	Mean	**SD**	**Range**
Age (Years)	36.11	6.1	28
Experience (years)	11.26	7.0	28

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1.2 The EFA analysis

1.2.1 The numbers of component

According to the EFA analysis, the total variance cumulative explained 80.6%. The result showed there are five latent with eigenvalue 40.928 – 1.022. Component 1 explained 67% of the variance and the other components explained around 13% of the variance. As shown in table 6. However, the extracting components from the analysis based on eigenvalue more than 1. In these results, there are five components get more than 1 in eigenvalue score which also appeared in screen plot too (Figure 2).

Table 6 Eigenvalue in EFA study

Component	Eigenvalue	% of Variance	% Cumulative
1	40.928	67.096	67.096
2	3.393	5.562	72.658
3	2.615	4.288	76.946
4	1.23	2.017	78.962
5	1.022	1.675	80.637

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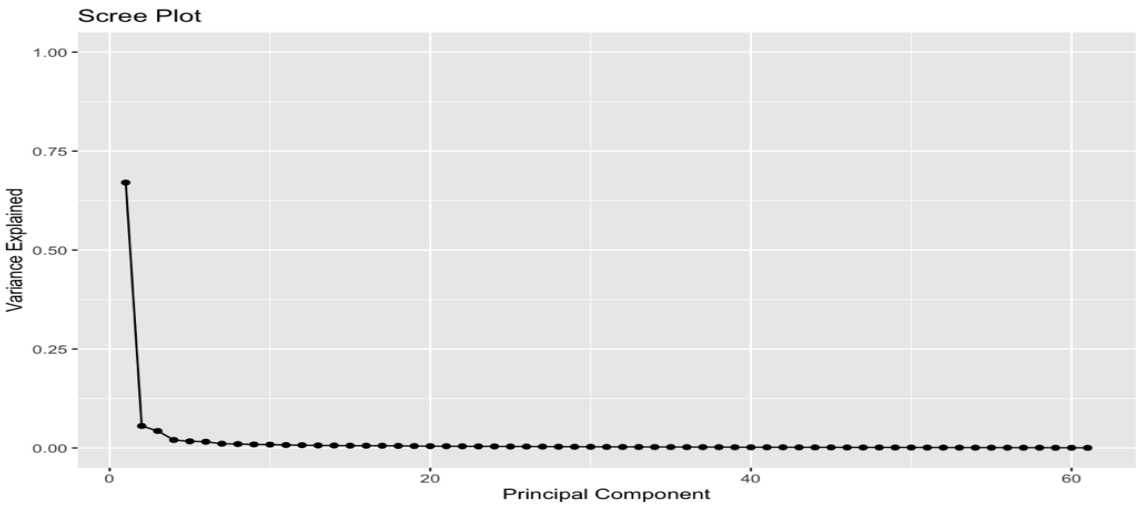

Figure 2 Screen plot for EFA study

1.2.2 Factor loading:

There are three criteria for excluding any items based on the factor load; 1) The factor loading less than 0.5, 2) Each component must contain three questions at least, 3) The intended target of the items consists with other items in the group and 4) If the items had the differences between the highest load and the second load considered in less than 0.2 have further analysis to decide.

The factor loading shows the distribution between factors as presented in the Table 7. The bold numbers show the highest factor loading going with component categorize and get higher score than 0.5 (items 1, item 28, item 41, item 42 and item 43 considered problematic as it will explained below).

Table 7 Factor loading for all items in EFA study

Item no.	Component				
	1	**2**	**3**	**4**	**5**
Item 1	0.38	-0.096	0.51	-0.114	0.097
Item 2	0.017	-0.203	**0.785**	-0.08	0.197
Item 3	0.077	-0.014	**0.851**	-0.014	0.091
Item 4	0.052	0.061	**0.892**	0.045	0.078
Item 5	-0.152	-0.01	**0.944**	0.096	0.069
Item 6	0.025	0.058	**0.928**	0.042	0.051
Item 7	0.008	0.09	**0.871**	0.107	-0.028
Item 8	0.134	-0.091	**0.747**	-0.103	0.046
Item 9	0.004	-0.027	**0.843**	0.048	-0.057
Item 10	-0.026	-0.07	**0.784**	0.059	-0.153
Item 11	-0.026	-0.062	**0.815**	0.066	-0.137
Item 12	0.029	-0.02	**0.823**	0.028	-0.187
Item 13	0.118	-0.065	**0.754**	-0.056	-0.203
Item 14	0.11	-0.134	**0.588**	0.104	-0.165
Item 15	0.139	-0.177	0.351	0.267	-0.304
Item 16	0.312	-0.185	0.217	0.18	-0.375
Item 17	0.312	-0.233	0.203	0.185	-0.355
Item 18	0.41	-0.146	0.147	0.223	-0.381
Item 19	0.231	-0.066	0.318	0.3	-0.341
Item 20	0.078	-0.104	0.222	**0.531**	-0.216
Item 21	0.128	-0.006	0.088	**0.705**	-0.044
Item 22	0.148	-0.091	0.124	**0.633**	-0.094
Item 23	0.161	-0.099	0.203	**0.61**	0.003
Item 24	0.189	-0.144	0.183	**0.53**	-0.027
Item 25	0.119	-0.191	0.069	**0.614**	0.088
Item 26	0.378	-0.039	0.113	0.484	0.053
Item 27	0.245	-0.24	0.073	0.287	0.098
Item 28	0.514	-0.012	0.112	0.356	0.025
Item 29	**0.619**	-0.081	0.069	0.219	0.014

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Table 7: To be continuous

Item no.	Component				
	1	**2**	**3**	**4**	**5**
Item 30	**0.722**	0.141	0.171	0.17	0.098
Item 31	**0.821**	0.006	0	0.058	-0.033
Item 32	**0.82**	0.028	0.032	0.14	-0.03
Item 33	**0.736**	-0.052	0.198	-0.065	0.077
Item 34	**0.886**	-0.055	-0.095	0.022	-0.213
Item 35	**0.826**	-0.067	0.06	0.025	-0.096
Item 36	**0.933**	0.028	-0.025	0.034	-0.109
Item 37	**0.898**	0.038	0.045	0.018	-0.079
Item 38	**0.848**	0.031	0.096	0.061	0.059
Item 39	**0.776**	-0.096	0.135	-0.006	0.096
Item 40	**0.666**	-0.217	0.127	0	0.119
Item 41	0.556	-0.35	0.075	0.013	0.123
Item 42	0.552	-0.339	0.069	0.054	0.127
Item 43	0.529	-0.331	0.074	0.076	0.073
Item 44	**0.513**	-0.297	0.053	0.168	0.07
Item 45	**0.607**	-0.173	-0.005	0.105	0.03
Item 46	0.335	-0.404	0.079	0.225	0.102
Item 47	0.031	**-0.634**	0.08	0.297	0.135
Item 48	0.18	**-0.615**	0.108	0.101	0.158
Item 49	0.458	-0.3	0.067	0.219	0.074
Item 50	0.282	**-0.558**	0.005	0.172	0.153
Item 51	0.102	**-0.621**	-0.01	0.309	0.145
Item 52	-0.056	**-0.828**	-0.039	0.225	0.114
Item 53	-0.005	-0.491	0.049	0.169	0.149
Item 54	-0.037	**-0.937**	-0.014	0.018	0.042
Item 55	0.148	**-0.804**	0.078	-0.061	0.001
Item 56	0.137	**-0.847**	0.027	-0.128	-0.072
Item 57	0.128	**-0.868**	0.036	-0.084	-0.028
Item 58	0.044	**-0.864**	0.057	-0.064	-0.116
Item 59	-0.049	**-0.832**	0.11	0.037	-0.152
Item 60	-0.11	**-0.939**	0.048	0.012	-0.125
Item 61	0.066	**-0.645**	0.238	0.035	-0.156

As presented above, there are ten items failed to show a factor load with any of these items higher than 0.5 (as assumed before). As there is no theoretical objection and by considering these questions covered in the other items, all these items excluded.

1.2.3 Problematic factor loads

The result shows, there are five items show a cross-loading higher than 0.5 with more than one factor. Hair et al. (2019) suggested classifying these items based on the ratio between the squared factor loads among the two (or the highest two) to classify the items to three-level; if the ratio is higher than 2.0, then no problem in including the factors to the highest value. If the ratio is less, these items are either ignorable or problematic and better to exclude. Therefore, the current study considered Hair et al. (2019) assumption as the most suitable decision-making tool. Based on that, one item was removed, and other items were categorized over the other factors as presented in table 8.

Table 8 Items considered problematic based on EFA result

No.	Item	Ratio*	Decision
1	Before the turn, nurses identify the patient.	1.80	Exclude
28	During the turn, nurses move the patient smoothly from the shoulder and pelvic “if clinically appropriate”.	2.08	Factor 1
41	After the turn, nurses support the knees with a pillow	2.52	Factor 1
42	After the turn, nurses support the hand and forearm with a pillow or suitable device	2.65	Factor 1
43	After the turn, nurses ensure that the patient is not falling (go back) to his previous posture	2.55	Factor 1

* Ratio between the highest two loads

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1.2.4 Factor loadings with components

Five factors get more than 1 in Eigenvalue as shown in the table and figure above. However, four factors were able to capsulate all available items. The fifth factor did not get any variable. In other words, the fifth factor failed to explain any of the item's variance alone.

1) Componant1: preparing

The results show there are 13 items formulate the first components which are; items 2,3,4,5,6,7,8,9,10,11,12, and 13). The component get eigenvalue 2.62 and explained 4.28% of the variance, the factor loading as presented in table 9.

Table 9 Number of items and factor loading of preparing

#	Item	Factor loading
2	Before the turn, nurses introduce themselves to the patient.	0.660
3	Nurses explain the procedure to patients and their families (if they are present).	0.738
4	Nurses protect patient's privacy and dignity all the time	0.768
5	Before turning, nurses raise the bed to a suitable height and ensure the wheels are off.	0.776
6	Before turning, nurses straighten the bed (Make the bed flat) if there is no contraindication.	0.806
7	Before turning, nurses remove the pillows from the patient's bed to best assist in positioning.	0.770
8	Before turning, nurses cross the patient's arms on his chest if he/she can.	0.664
9	Before turning, nurses ensure a clean and proper side sheet" "drawsheet" above the bed linen and under the patient's body that crosses the bed from left to right.	0.771
10	Before turning, nurses assure no urinary or stool contamination on the incontinency are" "buttocks and genital".	0.748
11	Before turning, nurses extend patient's legs if possible and clinically appropriate	0.776
12	Before turning, nurses lower the side rail on the working side and raise it after finishing the procedure.	0.798
13	Before turning, nurses centralize the patient body in the middle of the bed (make the patient in the middle of the bed away from the sides if appropriate and clinically applicable)	0.756
14	Before turning, the nurse acknowledged additional preparations for prone posture.	0.658
Total		9.691
	Eigenvalue = 2.625 % of explained variance = 4.288 Cronbach Alpha = 0.97	

2) Component 2: Posturing

The result shows a group of 18 items consists of the second components which are; (items 28 until 45). The component 2 shows eigenvalue = 40.93, and explained 67.09% of the variance as shown in table 10.

Table 10 Number of items and factor loading of posturing

#	Item	Factor loading
28	During the turn, nurses move the patient smoothly from the shoulder and " “pelvic" if clinically appropriate	0.514
29	During the turn, nurses change the posture of heels in alignment with the body truck	0.619
30	During the turn, at least two nurses participate in doing the procedure	0.722
31	Before and during the turn, nurses agree on what each one would do.	0.821
32	During the turn, nurses synchronize the movement	0.820
33	During the turn, nurses use good body mechanics	0.736
34	During the turn, nurses distributed a minimum of two nurses, one nurse on each side of the bed at least.	0.886
35	After the turn, nurses evaluate the patient’s comfort verbally (by words) and/or non-verbally (such facial expressions)	0.826
36	After the turn, nurses put a pillow under the patient's head and shoulder if clinically applicable	0.933
37	After the turn, nurses put a pillow between the legs (if side position) or underneath the legs (if supine position) based on the clinical appropriateness.	0.898
38	After the turn, nurses put a pillow behind the patients	0.848
39	After nurses offloaded both heels by heel lifter or pillow	0.776
40	After the turn, nurses support the feet with a pillow or suitable device.	0.666
41	After the turn, nurses support the knees with a pillow.	0.556
42	After the turn, nurses support the hand and forearm with a pillow or suitable device.	0.552
43	After the turn, nurses ensure that the patient is not falling (go back) to his previous posture.	0.529
44	After the turn, nurses make the angle between the patient and bed is around 30 degrees unless clinically contraindicated.	0.513
45	After the turn, nurses secure all medical devices such as IV line, foley catheter, endocranial tube …...	0.607
	Total of factor load	12.82
	Eigenvalue = 40.92 % of variance explained = 67.09 Cronbach Alpha = 0.98	

3) Component 3: Documenting

The result shows a group of 13 items that consist of the third components which are; items 47, 48, 50, 51, 52, 54, 55, 56, 57, 58, 59,60, and items 61. And get the eigenvalue = 3.39 and explained 5.59% of the variance as presented in table 11.

Table 11 Number of items and factor loading of documenting

#	Item	Factor loading
47	Nurses document how the procedure progressed	0.704
48	Nurses document the current position	0.697
50	Nurses document the current positioning they put the patient in	0.558
51	Nurses document the date and exact time that the procedure was undertaken	0.693
52	Nurses document the plan of the next repositioning, date, time, and type.	0.787
54	Nurses document who participated in doing the procedure	0.833
55	Nurses document the presence of any pain or discomfort during or after the procedure	0.785
56	Nurses document if the procedure was based on hospital policy.	0.763
57	Nurses document the ability of the patient to assist in doing the turn.	0.814
58	Nurses document any equipment they used during the turn.	0.768
59	Nurses document if the physician was notified.	0.743
60	Nurses document reminders for the next turn.	0.799
61	Nurses document the factors that influence the to do the procedure such as risk skin assessment "Braden scale or other"…”	0.654
total		9.835
	Eigenvalue = 3.39 % of Variance explained = 5.59 Cronbach Alpha = 0.98	

4) Component 4: Evaluating

The result show six items’ groups as a component for which are; item 20, 21 22, 23,24, and 25. The component 4 get the eigenvalue = 1.23 and explained 2.01 of the variances as presented in table 12.

Table 12 Number of items and factor loading of evaluating

#	Item	Factor loading
20	During the turn, nurses ensure that the head and neck positions are in alignment with the body/trunk.	0.531
21	During the turn, nurses ensure moving the arm in a way not affected on any IV lines or devices connect it, and assure it will not fall under the patient's body.	0.705
22	During the turn, nurses roll the legs in alignment with the patient's body.	0.633
23	During the turn, nurses move the knees in alignment with the body (bend the opposite knee of the turning direction in slid position and flex in supine position)	0.610
24	During the turn, nurses monitor the patient's general condition, including pain or discomfort	0.530
25	During the turn, nurses move the patient by using a repositioning aid or slid sheet "drawsheet".	0.614
Total		3.623
	Eigenvalue = 1.23 % of Variance explained = 2.01 Cronbach Alpha = 0.95	

1.3 Operational definition

Repositioning practice is what nurses do to change the patient posture. Repositioning practice allow the tissue revisualization and minimize the chance of developing a pressure ulcer. It includes four components; 1. preparing (13 items), 2. posturing (18 items), 3. evaluating (6 items) and 4. Documenting (13 items). The RPS suppose operationally define the repositioning practice.

Operationally, repositioning practice for immobilized (bedridden) patients among nurses in Saudi Arabia refers to group of consequence steps that nurses do it in a regular way that end by assuring the posture change and documentation. According to that, the repositioning practice performance of the nurses measured by the score of RPS among the last thirty days of the nursing duties. The operational definitions for the repositioning practice components are presented in the table 13.

Table 13 Operational definition of the repositioning practice components

Component	Definition
Preparing	Preparing refers to the physical and mental activities conducted by nurses for making patients ready for the posturing procedure. It involves introducing the self for the patients, explain the procedure, protect the privacy of the patients and formatting the patient's bed by removing any obstacles for the posturing procedure. As it appears from the results it will present the score of 13 items.
Posturing	Posturing refers to the physical and mental activities conducted by nurse in the last 30 days of their clinical duties for make the position of the patient change and anchoring the patient in the new position. It involves the activities of holding the patients safely and turn the patient to the new position. Posturing presents the core aspects of the repositioning practice and it reflects the score of the 18 items.
Evaluating	Evaluating refers to the physical and mental activities of the nurse for assuring the safety of the patients after conducting the posturing procedure. It indicates the assurance of the nurse for body alignments postures and the comfort of patient.
Documenting	Documenting it refers to the physical and mental activities conducted by nurses in recording the required information about the overall procedure. It involves the awareness of the nurse for what should be recorded and the location of this information in the patient file.

1.4 Reliability after EFA

The study conclude presence of four sub scales: preparing, posturing, evaluation, and documentation. The total items after the EFA were 50 items and it shows Cronbach alpha reliability score = 0.99 and omega score = 0.89. For each sub scale, the reliability ranges from 0.96 to 0.98 as shown in Table 14.

Table 14 Internal consistency reliability of the RPS in EFA study (n = 306)

No.	Scale dimension	Number of items	Cronbach Alpha
1	Preparing	13	0.98
2	Posturing	18	0.97
3	Evaluating	6	0.96
4	Documenting	13	0.96

2. Item-Total Correlations of the RPS

Item- total correlation investigates the connections between items. Theoretically, these items moved by the same latent variable, so they would somehow be connected. Statistically, the correlation powers must be higher than 0.3 and less than 0.7. As it appears from the data set, there are no items with less than 0.3 correlations. On the other hand, 49 items over the 50 remaining items show correlations higher than 0.7 (range of correlation 0.67 to 0.885). After critically revied the item-to-item relations, the items are more connected with the previous and following items. Also, each item specifies unified actions that different from the others. Repositioning is a process. The overlapping (correlation in statistical meaning) is a strong point and supports the flow of events. Therefore, the absence of redundancy is confirmed by perceiving the process aspect of repositioning. Therefore, the current scale had no evidence of redundancy in the items.

The item-to-item correlation changes in calculating the subscales relations. As in Appendix (J), the items in the preparing sub-scale correlate from 0.6 to 0.86. The trends shifted in the evaluation subscales to reach up to 0.92. These trends also keep appearing among posturing, ranging from 0.66 to 0.87 and documenting 0.6 to 0.89.

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Table 15 Item - total correlation EFA study (n=306)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Preparing				
Item1	188.61	3231.58	0.76	0.99
Item2	188.7	3234.18	0.76	0.99
Item3	188.49	3233.80	0.8	0.99
Item4	188.27	3238.44	0.79	0.99
Item5	188.41	3240.43	0.75	0.99
Item6	188.42	3234.28	0.81	0.99
Item7	188.39	3239.37	0.77	0.99
Item8	188.76	3235.71	0.75	0.99
Item9	188.53	3231.34	0.80	0.99
Item10	188.4	3236.51	0.78	0.99
Item11	188.48	3233.13	0.80	0.99
Item12	188.32	3232.65	0.80	0.99
Item13	188.56	3229.14	0.80	0.99
Posturing				
Item14	188.54	3225.2	0.82	0.99
Item15	188.43	3234.00	0.82	0.99
Item16	188.35	3238.91	0.81	0.99
Item17	188.36	3230.43	0.84	0.99
Item18	188.47	3223.19	0.84	0.99
Item19	188.52	3233.86	0.82	0.99
Item20	188.56	3232.05	0.78	0.99
Item21	188.54	3232.53	0.74	0.99
Item22	188.51	3232.06	0.81	0.99
Item23	188.57	3219.09	0.87	0.99
Item24	188.51	3216.34	0.86	0.99
Item25	188.61	3227.01	0.77	0.99
Item26	188.65	3216.06	0.84	0.99
Item27	189.02	3234.42	0.67	0.99
Item28	188.66	3213.76	0.85	0.99
Item29	188.67	3212.15	0.85	0.99
Item30	188.59	3223.70	0.82	0.99
Item31	188.61	3221.34	0.79	0.99

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Table 15: **To be continuous**

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Evaluating				
Item32	188.55	3212.60	0.86	0.99
Item33	188.77	3217.05	0.82	0.99
Item34	188.55	3219.84	0.82	0.99
Item35	188.52	3212.8	0.89	0.99
Item36	188.5	3219.38	0.85	0.99
Item37	188.53	3216.82	0.86	0.99
Documenting				
Item38	188.61	3212.17	0.87	0.99
Item39	188.69	3215	0.88	0.99
Item40	188.6	3219.96	0.87	0.99
Item41	188.58	3225.51	0.83	0.99
Item42	188.55	3221.98	0.85	0.99
Item43	188.47	3219.36	0.84	0.99
Item44	188.57	3220.04	0.86	0.99
Item45	188.56	3223.01	0.77	0.99
Item46	188.49	3227	0.84	0.99
Item47	188.47	3228.75	0.78	0.99
Item48	188.49	3233.5	0.77	0.99
Item49	188.43	3217.1	0.86	0.99
Item50	188.56	3223.01	0.77	0.99

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3. Psychometry properties: Confirmatory Factor Analysis (CFA)

The EFA results suggested four components for RPS which are preparing (13 items), posturing (18 items), evaluating (6 items) and documenting (13 items). Confirmatory factor analysis (CFA) aims to prove the ability of this suggestions in explaining the variance in the result of RPS. The current study redistributed the RPS fifth version (after excluding 11 items based on EFA result) over the population (nurses in Saudi Arabia). However, the survey added a filtering question (*did you answer or participate in the study that measured repositioning practice in the last*

month) with binominal options (Yes/ No). If the answer is yes, the participant is excluded automatically from the survey and transferred to the thanks page with explanations that this part required a new participant. That question aims to assure a different sample.

3.1 Demographical characteristics

One hundred twenty-nine participants answered the filter question as yes, so excluded; therefore, the number of nurses received the invitation was 833. However, only 323 participants respond, and the response rate = 38% (323 ÷ 833). The demographical characteristics for the participants in the second survey in table 16.

Table 16 Demographical characteristics in CFA study (n=323)

Demographics	n	%
Gender		
Male	54	16.7
Female	269	83.3
Nationality		
Saudi	140	43.3
Indian	72	22.3
Philippine	42	13
Jordan	27	8.4
Portugal	2	0.6
Indonesian	12	3.7
Egyptian	4	1.2
Lebanese	1	0.30
Western	8	2.5
Malaysian	11	2.5
South African	7	2.2
Academic level		
Diploma of Nursing	70	21.7
Bachelor’s degree	214	66.3
Master’s degree	34	10.5
Ph.D.	5	1.5
Unit		
Intensive Care Unit	98	30.3
Intensive care unit for pediatric	18	5.6
Cardiac Care Unit	7	2.2

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Table 16: To be continuous

Demographics	n	%
Palliative	2	0.6
Medical-Surgical unit +Ob Gyn	68	21.1
Medical-Surgical unit – Pediatrics	10	3.1
Kidney Dialysis unit	17	5.3
Wound Care Unit	50	15.5
Nursing Education	7	2.2
Nursing Quality + infection control nurses)	7	2.2
Operation rooms (Include Recovery units)	13	4
Emergency Department (Adult and Pediatrics)	18	5.6
Day Surgery Unit	8	2.5
Administrative position	0	0
Region		
Central region	114	35.5
West region	26	8
East region	43	13.3
North region	25	7.7
South region	115	35.6
Hospital Type		
Public hospital, more than 1000 beds	113	35
Public hospital, more than 500 -1000 beds	77	23.8
Public hospital, less than 500 beds	106	32.8
Privet hospital, more than 500 beds	12	3.7
Privet hospital, less than 500 beds	15	4.6
	Mean	**Std**	**Range**
Age (Years)	36.62	6.88	37
Experience (Years)	13.23	6.76	11

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The results showed most participants were females (83.3%). The majority were Saudi (43.3%). Also, the most reported academic education as bachelor's degree (66.3%), and the working unit intensive care unit 30.3%. For geographical distribution, the majorities are from the south region (35.6%) followed by the central region (35.5%).

3.2 Confirmatory factor fit parameters for hypothesized model

The data set was uploaded to R studio software under the library (lavaan). After running the initial model, the result shows that the model failed to achieve the accepted ratio. The result shows that the chi-square still shows a significant difference (test statistic = 4663, $p<0.05$, with df = 1074) and Chi-square/ df ratio = 4.34. The other fit parameters failed satisfy the requirements too (CFI = 0.842, TLI = 0.834, RMSEA = 0.102 and SRMR = 0.46) as presented in the table 17 below and the figure 3. Therefore, the study remodified the model and re-test the fit parameters.

Table 17 Fit parameters result with hypothesized model

Parameter index	Criteria *	Hypothesized mode
Chi-Sequard ratio	X^2/ df < 2	4663 / 1074 = 4.34
Comparative fit index	>0.95	0.842
Tucker–Lewis index (TLI)	>0.95	0.834
Root mean square error of Approximation (RMSEA)	<0.08	0.102
Standardized root mean Root residual (SRMR)	<0.08	0.046

Criteria of accepting the model fit depends on the Hooper et al (2008) assumptions to accept the model based on the proportion differences between chi-square and degree of freedom to be less than two. This accompanied with Comparative fit index less than 0.95, TLC > 0.95, RMSEA < 0.08, and SRMR < 0.08 as appears in Table (17).

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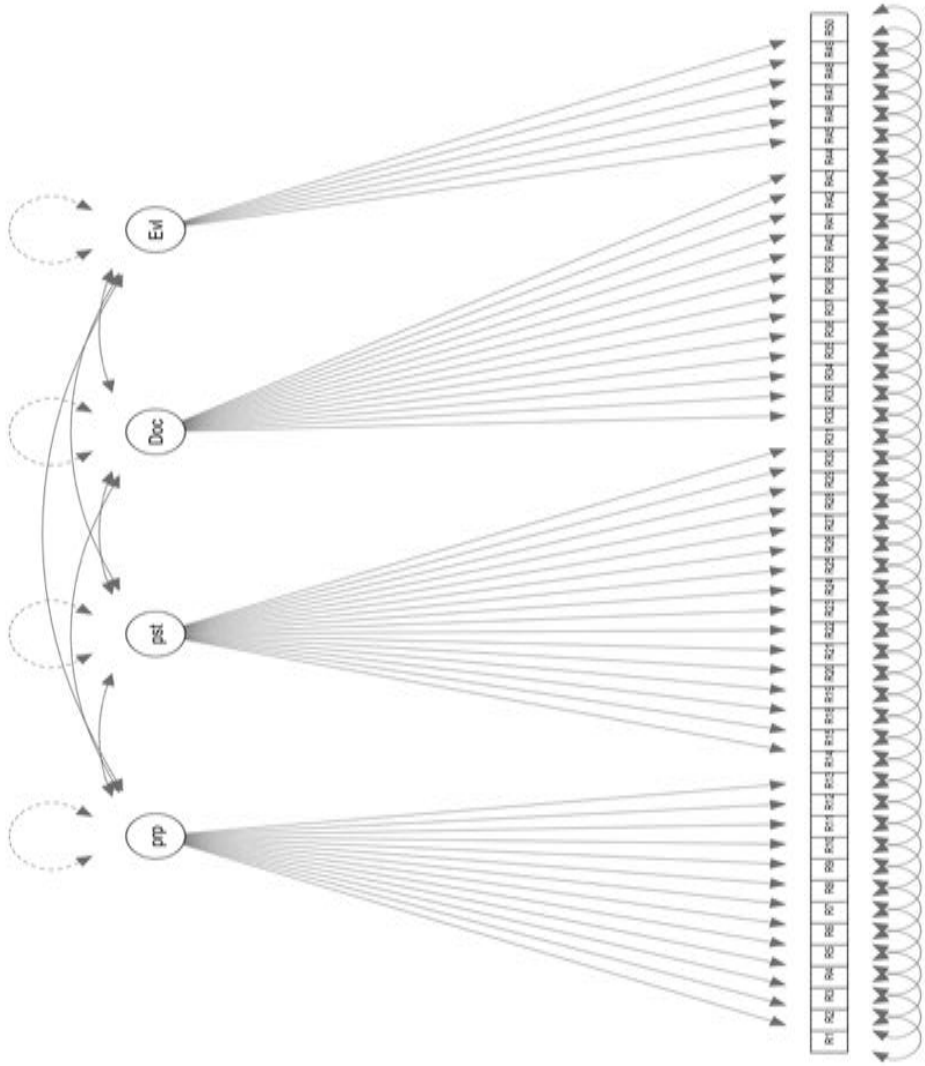

Figure 3 Path analysis for the hypothesized model

3.2.1 Model modifications

The author applied further statistical control over these covariances by command of modification indices (Using Lavaan library on R studio). The modification incidences suggest further control over the parries of 200 covariance relation. The modifications include covariances control only with no suggestions over the relations between the factors. Therefore, the new model statement was written with adding these modifications and call it the modified model as attached on the R script Appendix J.

The analysis for the modified model shows that the chi-square still shows a significant difference (test statistic = 1615, $p<0.05$, with df = 884), but the ratio changes to be less than 2 (Chi-square/ df ratio = 1.82). The other fit parameters satisfy the fit test requirements as (CFI = 0.968, TLI = 0.959, RMSEA = 0.51 and SRMR = 0.23) as appears in table 18.

Table 18 Fit parameters result with hypothesized and modified model

Parameter index	Criteria	Hypothesized mode	Modified model
Chi-Sequard ratio	X^2/ df < 2	4663 / 1074 = 4.34	1615 / 884 = 1.82
Comparative fit index	>0.95	0.842	0.968
Tucker–Lewis index (TLI)	>0.95	0.834	0.959
Root mean square error of Approximation (RMSEA)	<0.08	0.102	0.051
Standardized root mean Root residual (SRMR)	<0.08	0.046	0.023

The result of CFA shows accepted fit parameters. Therefore, the changes in the sample and differences in the characteristics had not significantly eliminated the ability of the model to present a valid measure. That presented as the survey is showing a satisfactory convergent validity. The path diagram for hypothesized model (figure 3) and the modified model (figure 4) shows that the changes after the modifications. Also figure 5 shows the model plot by using structural equation modeling plots

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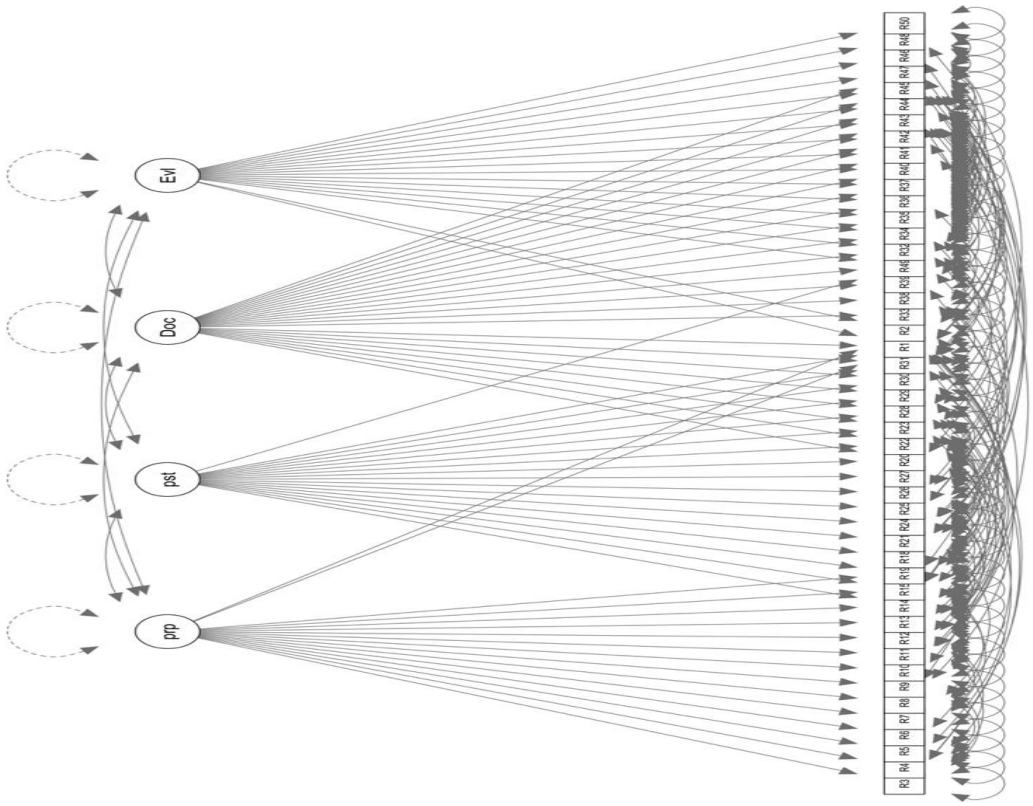

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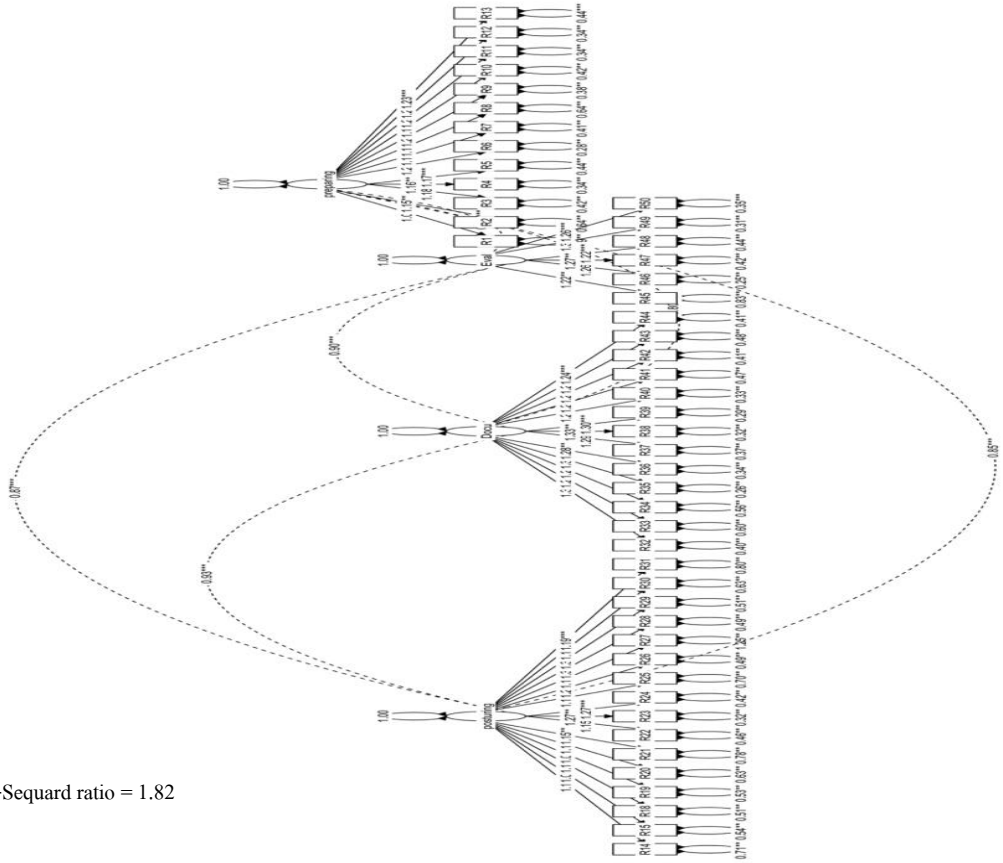
Figure 4 Path plot for the modified model



Chi-Sequard ratio = 1.82

RMSEA = 0.051

Figure 5 The modified model by using Sem plot function

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3.2.2 Fit parameters for each sub scale

Repositioning practice scale (RPC) consist of four components, each component presents a sub scale; Preparing, Posturing (18 items), evaluating (6 items) and documenting (13 items). With considering the subscales fittest, the result shows the model fit on the subscale that the three models fit the requirements, table 19.

Table 19 Fitness parameters for each sub scare of RPC

Subscale	χ^2/df <2	FI >0.95	TLC >0.95	RMSE <0.08	SRMR <0.08
$Preparing = \sum_{1}^{13} Items$	75/38 = 1.97 *	0.993	0.985	0.056	0.014
$Posturing = \sum_{14}^{31} Items$	104/65= 1.6 *	0.993	0.987	0.044	0.017
$Document = \sum_{32}^{44} Items$	29/16 = 1.8 *	0.998	0.990	0.051	0.009
$Evaluation = \sum_{45}^{50} Items$	3/1.28 = 2.3	1.0	1.0	<0.001	0.003

***the score of p-value <0.05**

And the path diagram for each subscale is and the correlation figures for all items in each subscale are in figure 6 in Appendix J. The figures show the distribution of items' overall factors by using the Simplot library in R studio (Appendix J) .

3.2.3 CFA related reliability

The repositioning practice measurement consists from 50 items distributed over four components; preparing (13 items), posturing (18 items), evaluating (6 items), and documenting (13 items). The overall reliability shows that Cronbach alpha = 0.98, MacDonald Omega Hierarchical = 0.89, Omega H asymptomatic = 0.9. (Appendix J).

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3.3 Internal consistency reliability of the RPS

Table 20 Internal consistency reliability of the RPS

No.	Scale dimension	Number of items	Cronbach Alpha	Omega
1	Preparing	13	0.98	0.92
2	Posturing	18	0.97	0.93
3	Evaluating	6	0.96	0.86
4	Documenting	13	0.96	0.92

4. Scoring and interpretation of the RPS score

The study results show that, the mean score of items ranges from 3.54 – 4.24. Inferencing the result based on categorizing the results as explained on Chapter III and as result of the importance of this intervention in patients' safety and high risk for developing pressure ulcer in case of compliance lacking to five levels; level of repositioning practice as follows Table 21.

Table 21 Interpretation score of RPS

Mean Scores	Level of repositioning practice
4.51-5.00	**Very good (Expected)**
3.51-4.50	**Good**
2.51-3.50	**Fair**
1.51-2.50	**Poor**
1.00-1.50	**Very poor (Bad)**

At this stage, the level of frequency for the repositioning practice performance is the indication for the compliance. The result shows the compliance level ranged within the good level. However, the compliance level that assure the patient safety have to be in very good level based on the study assumptions. This means further efforts must be applied for improving this practice. The means score for all answers with the performance level estimations presented in Table 22.

Table 22 Mean score with the interpretations in CFA study (n = 323)

Item		Mean	Performance level
1	Nurses introduce themselves to the patient.	3.59	Good
2	Nurses explain the procedure to patients and their families (if they present).	3.83	Good
3	Nurses protect patients' privacy and dignity all the time	4.05	Good
4	Nurses raise the bed to a suitable height and ensure the wheels are off.	3.86	Good
5	Nurses straighten the bed (Make the bed flat) if there is no contraindication.	3.91	Good
6	Nurses remove the pillows from the patient's bed to best assist in positioning.	3.91	Good
7	Nurses cross the patient's arms on his chest if he/she can.	3.54	Good
8	Nurses ensure a clean and proper side sheet “drawsheet” above the bed linen and under the patient's body that crosses the bed from left to right.	3.81	Good
9	Nurses assure no urinary or stool contamination on the incontinency area “buttocks and genitals”.	3.93	Good
10	Nurses extend the patient's legs if possible and clinically appropriate	3.88	Good
11	Nurses lower the side rail in the working side and raise it after finishing the procedure	4.13	Good
12	Nurses centralize the patient body in the middle of the bed.	3.93	Good
13	The nurse acknowledged additional preparations for prone posture.	3.91	Good
14	Nurses move the patient smoothly from the shoulder and hip “pelvic” if clinically appropriate	4.04	Good
15	Nurses change the posture of heels in alignment with the body truck	4.08	Good
16	At least two nurses participate in doing the procedure (could be 5 for bariatric patients or for prone position)	3.93	Good
17	Nurses agree on what each one would do.	3.93	Good
18	Nurses synchronize the movement.	4.02	Good
19	Nurses use good body mechanics.	3.97	Good

Table 22: To be continuous

Item		Mean	Performance level
20	Nurses distributed a minimum of two nurses, one nurse on each side of the bed at least.	3.93	Good
			Good
21	Nurses evaluate the patient's comfort verbally and/or non-verbally.	3.96	Good
22	nurses put a pillow under the patient's head and shoulder if clinically applicable	3.98	Good
23	Nurses put a pillow between the legs (if side position) or underneath the legs (if supine position) based on the clinical appropriateness.	4.03	Good
24	Nurses put a pillow behind the patients (if on side position) or on edge (if supine position) depending on clinical appropriateness.	4.10	Good
25	Nurses offload both heels by heel lifter or pillow	4.09	Good
26	Nurses support the feet with a pillow or suitable device.	3.87	Good
27	Nurses support the knees with a pillow.	4.07	Good
28	Nurses support the hand and forearm with a pillow or suitable device.	4.06	Good
29	Nurses ensure that the patient is not falling (go back) to his previous posture.	4.07	Good
30	Nurses make the angle between the patient and bed is around 30 degrees unless clinically contraindicated.	4.03	Good
31	Nurses secure all medical devices such as IV line, foley catheter, endocranial tube …..	3.93	Good
32	Nurses ensure that the position of the head and neck are in alignment with the body / trunk.	3.78	Good
33	Nurses ensure moving the arm in a way not affected on any IV lines or devices connect it, and assure it will not fall under the patient's body.	3.80	Good
34	Nurses roll the legs in alignment with the patient's body.	3.73	Good
35	Nurses move the knees in alignment with the body (bend the opposite knee of the turning direction in slid position and flex in supine position)	3.85	Good
36	Nurses monitor the patient's general condition, including pain or discomfort	3.75	Good
37	Nurses move the patient by using a repositioning aid or slid sheet "drawsheet".	4.12	Good
38	Nurses document how the procedure progressed	4.00	Good

Table 22: To be continuous

Item		Mean	Performance level
39	Nurses document skin color, pigmentation, and texture "skin assessment result" every time when repositioning practices happen	4.07	Good
40	Nurses document the date and exact time that the procedure was undertaken	4.08	Good
41	Nurses document the plan of the next repositioning, date, time, and type	4.24	Good
42	Nurses document the current position	4.13	Good
43	Nurses document who participated in doing the procedure	4.28	Good
44	Nurses document the presence of any pain or discomfort during or after the procedure	3.90	Good
45	Nurses document if the procedure was based on hospital policy.	3.98	Good
46	Nurses document the ability of the patient to assist in doing the turn.	4.10	Good
47	Nurses document any equipment they used during the turn.	3.74	Good
48	Nurses document if the physician was notified.	3.80	Good
49	Nurses document reminders for the next turn.	3.61	Good
50	Nurses document the factors that influence the to do the procedure such as risk skin assessment "Braden scale or others…"	3.83	Good

5. Finalized repositioning practice scale

The final version of repositioning practice scale consists from 50 items that divided over four factors; preparing (13 items), posturing (18 items), evaluating (6 items) , and documenting (13 items). The questioner designed and presented for respondents in English language with the instructions and required information's accompanied. The questioner presented over three parts; the introductory part consisted of from one question, repositioning practice and demographical as it attached in the appendix H over the electronic and paper formats.

5.1 Introductory part

Introductory part consists of one question "*Many nurses complain of low back pain, neck stiffness, or muscular discomfort from repositioning practice. Others said; No, there are no relations with these issues and repositioning practice. Which one is closer to your viewpoint?*" with six answering options;

1. Repositioning practice is harmful. It causes back pain, muscular spasms.
2. The shortage makes nurses do it without considering all steps or safety precautions, which leads to harmful consequences.
3. Insufficient training makes nurses unable to do repositioning practice correctly.
4. Repositioning practice is not dangerous, but some patients are heavy, and this causes muscular pain.
5. There is no problem in repositioning practice.
6. Other (Write what do you think).

The aim of this question is reducing the sensitivity perception of nurses from reporting the repositioning practice (as conspiring the repositioning practice social desirable behavior).

5.2 Part two repositioning practice related items

Part two consist of the fifty items that for measuring the repositioning practice. Each item had five options (Never, Rarely, Sometimes, often, and always). In the information section it presents that the meaning of these items as following:

1. Never, which means over the last 30 days, I did not notice nurses doing this action on any occasion per shift.
2. Rarely, which means over the last 30 days, I noticed nurses doing this rarely as one time per shift.

3. Sometimes, which means over the last 30 days, I noticed nurses doing this sometimes as two times per shift.

4. Often, which means over the last 30 days, I noticed nurses doing this often as three times per shift.

5. Always, which means over the last 30 days, I noticed nurses doing this consistently and all the time as four times per shift.

The ranking of this items for statistical purpose considers never = 1, Rarely = 2, Sometimes = 3, Often = 4, Always = 5).

5.3 Part three: demographical information

Part three consists of eight questions. It asks about the demographical information of participants that's include their geographical location, hospital type, working unit, academic degree, nationality, age, years of experience, and gender. One filtrating question about the country of work and if not in Saudi Arabia exclude the participation.

6. Data inference

The result related to repositioning practice level of compliance estimated on percentage based on the theoretical understanding for the importance of repositioning practice for patients and categorized as shown above to five levels (very poor, poor, fair, good and very good). As the expected result must locate to very good result or near to 100 % or near to assure patient safety (Gefen, 2009, 2018; Schwartz & Gefen, 2019). The accepted range of practice must be higher than 80% to allow the required revascularization for the tissues. The mean score of each element transfer to be percentage presentations. However, as the item that get one in statistical meaning it means never happen. So, the percentage include subtracting the minimum score from

the mean of each component and divided by the range. The cut point for the accepted level of practice must be higher than 90% which equal (4.51) for all points.

Based on Schwartz & Gefen (2019) model about the expectation for repositioning practice to prevent pressure ulcer, the level of nursing compliance for the repositioning practice recategorized over three levels; accepted level of practice; more than 90% (100% - 90%), need improvement; from 90% until 60% (80.2% - 70.2 %) which include the means for items ranged from (4.5 to 3.51) and not accepted level of practice; less than 70% (the mean of item less than 3.5). The performance interpretation for the level of compliance by using RPS appears in table 23.

Table 23 RPS interpretations based on subscales in CFA study (n =323)

Subscale	**Omega**	**Range of possible scores**	**Mean (Sd)**	**Range of scores**	**Compliance level**	**Interpretations**
Preparing (13 items)	0.92	13-65	50.7 (15.5)	52	73%	Need improvement
Posturing (18 items)	0.93	18-90	68.8 (21.4)	72	71%	Need improvement
Documenting (13 items)	0.86	13-65	49.6 (16.6)	52	70%	Need improvement
Evaluation (6 items)	0.92	6-30	23.8 (7.7)	24	73%	Need improvement
Total (50 items)	0.89	50-250	192 (57.8)	200	71%	Need improvement

The result shows that the overall repositioning practice compliance was in the need improvement (71%). Regarding the compliance based on the components; the result shows that the lowest level from all subscales for the documenting (13 items) with score (70%) followed by posturing (18 items) (71%), preparing and evaluating as 73% for both.

CHAPTER V
SUMMARY AND DISCUSSION

The current study aimed to develop a valid and reliable measurement tool for practice repositioning among nurses in Saudi Arabia. The current part presents the discussions according to the study objective: creating a repositioning practice scale and examining its psychometric properties. The contents of the current chapter are conclusion, discussion, limitation, recommendation study result interpretation, and future exploration.

Summary

Repositioning Practice Scale (RPS) is an instrument to evaluate the nursing repositioning practice performance for bedridden patients in Saudi Arabia. The tool consists of 50 Likert scale items present measurements for four components: preparing (13 items), posturing (18 items), evaluating (6 items) and documenting (13 items). Each question offers five possible responses; 1. Never happen in the last 30 days of my clinical practice, 2. Rarely happen in the last 30 days of my clinical practice, 3. Sometimes happen in the last 30 days of my clinical practice, 4. Often happen in the last 30 days of my clinical practice, 5. Always happen in the last 30 days of my clinical practice.

The RPS development passed through seven steps; step one clarifies the concept of repositioning practice, step two formulates the pool of items, step three determines the format of measurements, step four revise the expert opinion, step five validate the items, step six test the performance of the items, and step seven evaluate

the psychometric properties. For satisfying step one objective, summative content analysis for the literatures accompanied with and interviewing six experts leads to suggest the concept wording as repositioning practice by adding the expression "practice" to the repositioning in aiming to satisfy the meaning of performing the repositioning and differentiate it from other related terms such as turning or positioning. And end by defining the repositioning practice as a harmonized turn end by anchoring the patient in a new position and documentation.

Step two includes formulating the pool of items based on the literature content analysis and experts' interview. The initial pool contains 103 items designed based on Likert scale from seven levels that distributed over five components which are; turning, harmonizing, anchoring, informing and timing. For satisfying the requirements from step three to step six, the author relay on experts and statistical validation.

The first version of the tool distributed over nine experts' nurses specialized in the field of pressure ulcer management. However, the experts reject the initial draft with a mean of content validity index (I-CVI = 0.184) and scale validity index (SCV = 0.63). The experts' reject many items as well as the response options and suggest a different formation for the components to be pre turn, turn, harmonization, anchor and documentation and make the time aspects included in the answer options.

The second version of the repositioning practice arranged and formulated based on the expert suggestions. The second version contains 73 Likert scale items. The newly formatted tool was distributed over a group of twelve experts (the first six experts with additional three experts). Experts accepted the second version with a content validity index mean equal (I-CVIs = 0.87) and scale content validity (SCV =

0.84). However, the content validity end by the recommendation to exclude 12 items and make minor linguistic changes in some other items with keeping the same components and answering options as it.

The author formulated the third version of the instrument based on those findings. The third version was distributed for 31 expert nurses for piloting purposes. All nurses in the pilot group were either wound care nurses or nursing educators from different hospitals in Saudi Arabia. Piloting the tool shows a reliability = 0.96 with the recommendations for minor linguistic changes in some items. The author revised the findings based on the piloting study recommendations and formulate the repositioning practice measurement tool (RPS) fourth version which was consisting from 61 items distributed as; pre-turn (18 items), turn (11 items), harmonization (5 items), Anchor (12 items), documentation (15 items).

For satisfying step seven from the tool development, the author uploaded the fourth version to an online data collection platform and distributed it to 306 nurses in Saudi Arabia. The exploratory factor analysis (EFA) showed four underlying components included in the repositioning practice which are preparing (13 items), posturing (18 items), evaluating (6 items) and documenting (13 items) with recommendations to exclude 11 items. The total are 50 items. The EFA results support formatting the fifth version of the RPS. The fifth version was re-tested over 323 nurses for confirmatory factor analysis (CFA). The result confirms the congruence of the variances in the models which support the ability of the fifth version to explain the variance among the sample after making a statistical control for the covariance (Chi-square/df = 1.8, $p < 0.05$, CFI = 0.968, TLC = 0.959, REMSEA = 0.51, SMER = 0.23). And the sixth version shows reliability = 0.89 by applying the

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omega calculations for all tool reliability. The sub scale reliability revisions show that Cronbach alpha equals to 0.98 for all subscales (preparing, posturing, evaluating, and documenting).

Discussion

According to the study objective, the author discusses the findings, presenting a valid and reliable measurement for the repositioning practice among nurses in Saudi Arabia. Therefore, the coming part is discussing the instrument contractions based on the instrument development process followed.

Objective 1. To develop a repositioning practice scale (RPS) for bedridden patients among nurses in Saudi Arabia.

Assuring the proper quality of any measurement depends on believing that tool measure what intended to measure. Therefore, the current study clarify the concept over four scopes; 1. Rodger's evolutionary concept analysis approach (Tofthagen & Fagerstrøm, 2010), 2. The archology of science (Foucault, 2002) techniques, 3. Summative techniques, 4. Experts opinion explorations. Rodger concept analysis and archology of science conclude presenting ambiguity in the perception of nurses in the conceptual meaning of the repositioning practice. Also, the summative content literature analysis and experts' interviews shows variations in the way of dealing with the expressions either based on purpose in prevention of treating pressure ulcer, or according to the frequencies of behavior based on time or based on applying behaviors that refers to the concept. For instance, while nursing management present the concept correlated with workload, nursing teamwork with more focuses on mental activities to determine the time, proper position, arranging the resources and

team coordination (Jocelyn Chew et al., 2018; Lam et al., 2018; Webster et al., 2017). The clinical nursing studies perceived it as related to the physical activities that related to actual techniques for reducing the effect of pressure on tissue and the steps of doing the behaviors (Courvoisier et al., 2018; EPUAP/NPIAP/PPPIA., 2019; Jin et al., 2019; Lee et al., 2019; Mervis & Phillips, 2019; Woodhouse et al., 2019). The current study presents a consistent point view for the intervention based on two sides of conceptual presentations (physical and mental) activities. Thus, the conceptual meaning must include both.

The researcher interviewed six experts to clarify the repositioning practice concept. The experts were variant in terms of their origins, ages, and academic degrees. Two of them have Western-based origin and education, while the other two have Saudi origin and western education; all are working in Saudi Arabia. The current variety supports analyzing the repositioning phenomenon and exploring its components. All experts specialize in pressure ulcer care, as the main consequence of repositioning practice is reducing pressure ulcers. Pressure ulcer prevention is the intention for performing repositioning practice which is the motivation for assuring the compliance level by measurement.

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Interviews take an open discussion approach to explore how experts describe the repositioning practice. The interview analysis relay on summative content analysis accompanied by experts' thoughts. The interview results present consensuses between experts' perceptions and literature review findings. Experts assumed that their thoughts about the repositioning practice originated from the literature on the proper assessment of the patient's condition (DeWit & Williams, 2013; Nugent & Vitale, 2014; Wilkinson & Van Leuven, 2016; Yoost & Crawford, 2019) and proper

coordination is between the team members (Kozier, 2009; Taylor et al., 2001) must follow the flow of events appears in the literature.

Therefore, clarifying the concept based on different approaches enable the study in formulating a comprehensive description for the concept based on five facts: process, team based, time based, depend on specific patients' conditions and need clinical decision making skills (Kozier, 2009; Taylor et al., 2001.

The experts' interviews show the repositioning practice as a process that contains a set of related steps. Each step leads to the following. Also, all steps must be repeated within the expected time (every two hours). These steps are grouped based on the nature of efforts required from the performing nurse; physical, mental, or communication. These groups are; preparing, turning (posturing), harmonization (teamwork), anchoring (fixing), and documentation (informing). Experts argue on these steps based on the nature of nursing behaviors. For preparation, the nurse engaged in mental activities with little effort for the physical actions. The nurse has to revise, introduce, and prepare the patient and equipment for the action. That required proper understanding and consequence of deciding what has to be done and why. In the preparing stage, experts agree that physical activities such as removing the pillow or centralizing the patient serve the purpose of patient preparation, but these activities come in the preparing stage as following the mental activities. In the posturing stage, the role of physical-related steps increased the steps that required further physical actions. Nurses have to spend further effort moving the patient and changing the posture. While in teamwork, need both physical and communication skills between nurses. Those steps were categorized as requiring physical action inconsistent with another nurse, which already required communication and mutual understanding. For

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instance, moving the patient with counting requires both nurses to understand the language, have mutual understanding, and agree on the action. Although this step takes seconds to perform, it reflects a long list of agreements between nurses. Documentations also rely on mental activity. The nurse must remember specific findings to document it, such as who does it and when and what the skin condition was.

Experts perceived the complex nature of repositioning practice. These steps flow from the first components to the second to satisfy repositioning practice. The repeating is also influenced by the last performance time. For instance, the nurse will not repeat the same posture in the following performance. So, if the last repositioning practice end in a supine position, the future performance must be anything rather than the supine position. Also, the interactions and dependability between the steps stay with the nurses during and after the procedure. The analysis summarized these findings over the component and explored its nature in the analysis.

Objective 2. To test the psychometric properties of RPS

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The RPS development includes testing the psychometric properties by investigating the validity and reliability. Validity was investigated by content validity and construct validity. Reliability in the current study refers to internal consistency.

Content validity is an expression that refers to the level of trust in the ability to provide the truth about the collected concept. The content validity personates the content validity index (CVI) in the current case. As it appears in the methodology, the current study reached the mean if I-CVIs = 0.87. That result was considered satisfactory for the content validity assurance (Polit & Beck, 2008)

Then the author explores the nature of psychometric properties (construct validity) by exploratory factor analysis tests. Construct validity is an expression of the ability of the tool to investigate and verify the presence of relations among the concept of interest. The EFA test showed that 50 items were categorized over four components. These components are (preparing 13 items), posturing (18 items), evaluating (6 items), and documenting (18 items), consisting of its nature of measuring the repositioning practice and satisfying the relations between each item.

As it appears from the current study that, The RPS conceptualization for repositioning practice confronts several levels of challenges to accommodate with different level of understanding. The result shows that the RPS for the repositioning practice explain the repositioning practice and provide a valid measurement according based on the four components.

1. Preparing

Operationally, preparing is the score for the first 13 items in RPS. These items include the performance of nurses in preparing the patient, equipment's, plans, agreements, supporting team and the patient environment for the procedure (Berman et al., 2016). It all depends on the actual situation of the patients at specified moment (Kozier et al., 2018). For instance, if the patient was in supine position, the technique of preparing might differ than other position such as prone position (Diepenbrock, 2011). However, in both cases the general umbrella that covers what nurses must perform stay similar form introducing themselves to the patients, assuring the patients privacy and removing the barriers such as pillows or any equipment used in the procedure before (Urden et al., 2016).

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Preparing assures safety measures that aim to protect the patient from fall such as fixing the bed during the turn and flatting the bed before the turn. All the activities during the preparing aims to accommodate the sittings for the physical turn. Although this phase had not any direct effect on revascularizing the patient's tissue or in minimizing the pressure ulcer, but it was essential in accommodating the environment for the turn (Gefen, 2009, 2018; Schwartz & Gefen, 2019).

2. Posturing

Posturing is the core part in the repositioning practice. It refers to the actual practice that redistribute the pressure to revascularize the tissue which minimize the chance of pressure ulcer formations (Gefen, 2009, 2018; Schwartz & Gefen, 2019). Operationally, RPS presents is as is the frequency score of 18 items in the survey (items 14 until 31). These items present the process that nurse followed for performing the posture change. These steps designed to assure the safety for patients and nurse at the same time. Also, these steps retried initially from the literatures and confirmed from experts and shows connectivity among the statistical calculations as shown in EFA and confirmed in CFA.

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Posturing is high demands for muscular efforts from the nurse's side. As it involves the moving, holding, and lifting the patients. Also, it supposes a harmonization between two or more nurses on the same time for doing the consistent activities. The RPS shows among the current data set that nurse in Saudi Arabia failed to achieve the score of required level of repositioning practice in 29% of times. There are several factors might lead for that, either reasons due to patients' condition, nursing context or organizational policies. However, low score of posturing is a critical sign for higher chance for developing low blood flow to tissue of bedridden

patient which significantly increases the chance of tissue burden from pressure and lead for pressure ulcer development (EPUAP/NPIAP/PPPIA., 2019).

3. Evaluating

Evaluating the patient posture refers assure the level of patient's safety, and comfort over the new posture. For instance, the nurse must return the intravenous lines, medication lines and any other devices to its regular conditions. In this step, all kind of care that interrupting during the care coming back to its origin. Operationally, it refers to the frequency score of six items among RPS (items 32 – 36). The current data set report evaluating score as the highest (73%). However, taking with this result alone is not showing the reliability as it discussed before without taking the meaning. In this case, it shows 73% of evaluating but not from the total score rather it refers to the fact that evaluating assuming already having posturing happens in place at the beginning. So, for RPS, this will be the score that under condition of posturing happens. In this way, the evaluating score equals actual evaluating of nurses under condition posturing happens (Evaluating score = Actual evaluating | Posturing). Although this is theoretical subtractions from the repositioning practice understanding, but this shows its influence in understanding the score. That appears in the way that experts present the steps of repositioning practice as based on the flow of events (Cooper & Gosnell, 2014; King, 2019; White, 2011). Also, in logical understanding for the evaluation that based on presence of posturing actions. As this is conditional nature refers to estimate the Bayesian logical relation. As having the posturing is supporting performing the evaluations actions. Also, the evaluation is basically for posturing actions. That also appears in the correlations between these two components.

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4. Documenting

Documentation is reporting the progress, condition, and related information about the procedure. Documentation happens in hospitals either on electronic or paper patient records. What specify the repositioning practice documentation part, that, it was written in purpose for specifying the procedure, in term of time, date, nurse name and the patient condition during the turn and the current posture. Operationally it refers to items from (37-50). Revising the documenting score in RPS assume that all other phases happens first, and documentation follows up. By logical understanding, its documentation for what already happen (Cooper & Gosnell, 2014; King, 2019; White, 2011) and how that happen (Burton & Ludwig, 2014; Collier, 2016; DeWit & Williams, 2013; Nugent & Vitale, 2014).

Confirmatory factor analysis shares similar principles with EFA in focusing on factor analysis. However, CFA assumes the relations with the latent variables' variances, calculates the items' variance, and matches the results (Brown, 2014; Brown & Moore, 2012). Experts assumed the need for investigating the fit of the model calculations. According to the results in Chapter IV, the model failed to show the required fit parameters. However, the model modifications by additional statistical control show that the model fit after making additional control of the covariance between some of the items (Yaşlioğlu & Yaşlioğlu, 2020).

The repositioning practice scale differs from the existing tools in equipping the users with a comprehensive measure for all attributes. In existing tools, the measurement realizes a signaler attribute - such as documenting or posturing (Wu & Ashton, 1997) and generalizes the measurement as a total repositioning practice (Blair

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& Smith, 2012). The current tool vends the repositioning practice as a set of steps related to each other's and not conditional. Therefore, RPS ensures evaluating the concept from all parts by considering measuring all its components. Furthermore, there was no agreement on the nature of the measures before the RPS. Mehta et al., (2015) assumed the nursing plan was enough for the measurements. Others disputed that the documentation before and after must be compatible (Webster et al., 2017). Nevertheless, only relying on the documentation as the only data source challenges the collected data's validity.

Other tools rely on observing the nursing behaviors (Rich et al., 2011; Tayyib & Coyer, 2017) or tracking their performance (Behrendt et al., 2014; Källman et al., 2016; Renganathan et al., 2018; Schutt et al., 2018). Rather than the technical difficulties in those methods, the validity of measurements is still negated. The assumption that nurses always record repositioning practice-tracking the documents - is not a strong argument (Källman et al., 2016; Renganathan et al., 2018; Schutt et al., 2018). Add to that lack of standardized expressions or unified sheets that show or refer to the repositioning practice performance (Blair & Smith, 2012). Also, the current tool - as self-administrative questioners - leaves free space for the respondents to estimate their behaviors which supports the validity of the collected data instead of other applied methods such as observing the nursing performance (Rich et al., 2011; Tayyib & Coyer, 2017).

From the current point of view, repositioning practice is an exhaustive continuous process that satisfies bedridden patients' needs during their hospitalizations. It differs from the others' perspective of perceiving the repositioning as just turning. Also, repositioning practice satisfies additional nonphysical patient

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needs, such as respecting the patient's dignity (privacy and introduction) and securing providers' safety (by proper body techniques and harmonization). Therefore, the repositioning practice covers all the components in the other tools (which are documentation as it comes from revising the charts, preparing the patient, teamwork (harmonization), and evaluating (anchoring the posture) at the same time. It comes from observing the nursing performance and time the digital observations tools (Rich et al., 2011; Tayyib & Coyer, 2017). Thus, the data from the repositioning practice includes all components of the repositioning practice distributed over the tools and grouped as one data set. These are additional benefits in the RPS that are not presented among the existing tools. The RPS presents-in the initial draft-six components based on the literature review and expert interviews (pre-turn, turn, harmonization, anchor, and information), which are recategorized after psychometric prosperities explorations and confirmations to be four (preparing, posturing, evaluating and documenting). In addition, Reliability investigation for the current tool assumes the suitability of internal consistency statistical calculations. DeVellis (2016) summarized two types of statistical tests that are suitable in such situations, which are "Alpha – Cronbach" or "Omega MacDonald's omega estimate". Regardless of the differences in the calculation method and underlying philosophical approaches, alpha is widely applied in literature, not because of suitability but for its availability in several statistical packages (such as SPSS).

On the other hand, omega requires further mathematical efforts to calculate and estimate. The omega reliability test considers further accurate and provides further deductions for the measurement errors. Omega explores the dimensionality data as a way of calculating the reliability score. Which serves further reliability

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estimates accuracy. Among the current data set, the reliability test by using alpha shows it equals 0.98. Although a value of more than 0.9 is accepted in applied sciences (DeVellis, 2016), such as physics or chemistry, it is not popular in nursing studies and might require additional items to remove (DeVellis, 2016). However, this is not the case. Based on that, DeVellis (2016) recommended omega processing shows a clear overview of the nature of stability among the scale. The analysis proceeds to omega and the result in hierarchical level, estimate the reliability level to 0.89.

That is not an epistemological discussion about the differences between various reliability tests or their rationale. In any statistical reliability test, reliability is to assure the tools' ability to produce a consistent measure. Thus, the purpose of these tests is to provide evidence that already appears in the current tool. However, retesting the reliability is a responsibility for upcoming researchers too.

The purpose of RPS is to measure the repositioning practice. Repositioning practice is one of the highest frequent interventions (one time every two hours) and accompanied nurses during their clinical practice. That make retrieving the actual level of performance a challenge (Cremasco et al., 2013). The human mind formulates their memories in different ways. For instance, for the nurse with long experience, perception for the term “always” differ than newly graduated nurses. Therefore, specify the time duration is mandatory to assure presenting a specific scope for the measurement. The RPS chose the time framework of measurement to be on monthly bases (30 days). The rationalization for this duration depends on the frequencies of reporting the pressure ulcer related indicators. In general, hospitals in Saudi Arabia report the pressure ulcer related indicators (incidence, prevalence) on monthly basis

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(Ministry of Health [MOH], 2019). That make a kind of consistency. Therefore, it assures presenting a consensus between all participants clearly about the intended duration (the last 30 days). So, the RPS not only a research tool rather it presents an administration function too, in measuring the repositioning practice over regular time (each month) in unit or hospital.

Study Implications

The current study impacts the state of nursing science over four levels: nursing administration, nursing research, nursing education, and nursing professionalism.

1. Nursing administration

Nursing leaders are responsible for ensuring nurses' compliance in repositioning practice for immobilized patients. Leaders applied several projects and approaches to enhance nurses' performance, but the lack of proper tools that facilities valid and reliable information about the actual performance restricts their ability to evaluate the overall performance and create suitable improvement interventions. The golden role in nursing administration is "*what cannot measure, cannot manage*" (Yoost & Crawford, 2019). The RPS provides a measurement approach for repositioning practice, so the ability to manage the repositioning practices improved accordingly. That equipped the nursing leaders with other tools toward enhancing the actual performance of repositioning practice for pressure ulcer prevention. Therefore, RPS is not only a research tool rather it is an administrative tool too. The RPS suitable for use in monthly bases in hospitals and nursing agencies that provide the care for bedridden patients and aims to eliminate pressure ulcer development.

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2. Nursing Education

Repositioning practice scale (RPS) clarifies the critical boundaries between repositioning practice and related concepts, such as turn. From the concept clarification to process standardization, the RPS serves nursing education by formulating a suitable framework for teaching nurses the practical performance. In addition, RPS presents a procedural competency that clarifies the process of repositioning practice that nurses must follow to assure procedural actualization. The RPS pride evidence for the required steps for repositioning practice and standardized the procedural descriptions.

3. Nursing Research

Nursing research is a comprehensive process that aims to answer specific questions or bridge a gap in the nursing science (Leavy, 2017; Mihas, 2019; Polit & Beck, 2008). As it appears in the literature, nurses face a challenge in complaining about the repositioning practice. The RPS suggests a measurement tool that can be used as a base for communicating the findings. With this tool, the experts will generate comparative studies and evaluate the consequence of the interventions, which supports the repositioning practice-related research to go up in the hierarchy of evidence.

4. Nursing professionalism

The challenges that face the nursing professionalism in repositioning practice massively increased. Due to the nursing shortage, technological advances, and high immobilization rate, the demand for repositioning practice increased. In addition to the fact, nurses were unable to measure the actual repositioning practice

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measurement, other healthcare specialties start to interfere and offer different solutions, such preforming a similar intervention for the repositioning practice.

Several reports present a suggestion to withdraw the repositioning practice from nursing scop and assign new teams to that (Cyriacks & Spencer, 2019; Hobbs, 2004; Yap et al., 2018). In case of advances, this will reduce the clinical space of nursing professionalism. If the nursing scholar agrees with these changes, that will open the gate for further interventions to be taken. The RPS stress on hidden fact that the repositioning practice is a part of the professional nursing practice. By expanding applications of utilizing RPS in understanding repositioning practice phenomena, it will protect nursing professionalism from any expansions in the scope of practice against.

Exploring the future

The current study suggests future implications for these findings over four levels of nursing science: education, administration, research, and professionalism.

1. Nursing education

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Repositioning practice is not a negotiable intervention, and even a little missing will lead to the pressure ulcer development (Gefen, 2009, 2018; Schwartz & Gefen, 2019). And the repositioning practice is associated with nursing education initially (Kozier et al., 2018; Rienecker et al., 2013; Suresh, 2017; Taylor et al., 2001; Yoost & Crawford, 2019). Y educations, nurses will have the required knowledge skills and build their positive attitudes toward the performance. The RPS provides clinical and theoretical guideline for educators to be applied in academic and clinical nursing educations. The current study recommends further investigations for the

impacts of standardizing the repositioning practice descriptions by RPS on the practice of nurses.

2. Nursing administration

Repositioning practice scale (RPS) is a research and administrative tool. The future studies that utilize the current tool will satisfy the executive role in following up the actual performance. Evaluating the actual implementation is crucial for repositioning practice clinical projects.

3. Nursing research

The current study expects several future projects in the field of repositioning practice measurements to measure the nursing performance and explore the actual behavior. Validate this tool and assure the actual performance of nurses. This is the first version of the instrument applied only to Saudi Arabian nurses. The extent to which the current device can provide proper measurement in a different context or among the variant population is questionable. There is a need to reapply for this tool in the future to answer these questions.

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Tool development is a continuous process that aims to present proper measurements that serve the nursing science (Leavy, 2017; Mihas, 2019; Polit & Beck, 2008). As it appears in the literature, nurses face a challenge in measuring the repositioning practice. The RPS suggests a measurement tool that can be used as a base for measurements. With this tool, the experts will generate comparative studies and evaluate the consequence of the interventions, which supports the repositioning practice-related research to go up in the hierarchy of evidence. However, the current part of the tool only the initial version. Based on the DeVellis (2016), the process has

to pass through the eighth step which shortening the number of items. That required further studies by adopting the current tool.

4. Nursing professionalism

The direct impact of the current study in nursing professionalism is assuring the repositioning practice is a genuine nursing intervention. There is a need for improving the practice without taking it out of the nursing scope. The reports and projects that suggest formatting non-nursing teams are inappropriate and might lead to further complexities in the professional nursing practice. Nursing professionality is responsible for satisfying nursing needs, and repositioning practices are essential. Also, it highlights the need to protect the professional nursing scope of service from any further changes that reduce the professional nursing space of practice.

Study limitations

There are several opportunities to improve the current study results and maximize its benefits either related to the study input, study processes and the outcome. For the study input the study focused one the terms detentions and explanations in the English related literatures with no access or referral to other references written in different languages (McDowell, 2006). As the repositioning practice is an international phenomenon (Kozier et al., 2018) so exploring the influence of different terms in other languages on the performance of nurses might inform scientific community more about the repositioning practice phenomena.

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On the other hand, the study relies in single methodology in the tool creations DeVellis (2016). However, adding further methodologies for tool creations had further influence in reducing the measurement errors and improve the validity of measured data (Bates & Watts, 1988; Davis, 1992; DeVellis, 1991; Ferketich & Muller, 1990; National Research Council, 1984; Nunnally & Bernstein, 1978; Raghunathan & Grizzle, 1995; Rummel, 1988; Sudman & Bradburn, 1982; Tourangeau & Smith, 1996). Finally, the result shows the need for fifty items to measure the repositioning practice which considered long survey and further efforts required in future to reach much practical and suitable measurement methods that able to provide valid information in less efforts from participants (Davis, 1992; DeVellis, 1991; Nunnally & Bernstein, 1978; Raghunathan & Grizzle, 1995; Tourangeau & Smith, 1996).

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จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

APPENDICES

จุฬาลงกรณ์มหาวิทยาลัย
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Appendix A

Approval of Dissertation Proposal

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

ประกาศ
(Announcement)
คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
(Faculty of Nursing, Chulalongkorn University)
เรื่อง การอนุมัติหัวข้อดุษฎีนิพนธ์
(Approval of dissertation topic)
ครั้งที่ 8/2563 ประจำปีการศึกษา 2563
(No. 8/2020, Academic year 2020)

นิสิตผู้ทำวิจัยและอาจารย์ที่ปรึกษาดุษฎีนิพนธ์

รหัสนิสิต *(ID)*	6077402036
ชื่อ-นามสกุล	นายอับดุล การีม ซูเฮล ฮามาเดะ อิบลาซี
(Name)	*Mr. Abdulkareem Suhel Iblasi*
สาขาวิชา	พยาบาลศาสตร์ (นานาชาติ)
(Academic Program)	*Doctor of Philosophy Program in Nursing Science*
ประธานกรรมการ	รองศาสตราจารย์ ดร. ศิริเดช สุชีวะ
(Chairperson)	*Assoc. Prof. Dr. Siridej Sujiva*
อาจารย์ที่ปรึกษาหลัก	รองศาสตราจารย์ ร.ต.อ.หญิง ดร. ยุพิน อังสุโรจน์
(Major-advisor)	*Assoc. Prof. Capt. Dr. Yupin Aungsuroch*
อาจารย์ที่ปรึกษาร่วม	รองศาสตราจารย์ ดร. อารีย์วรรณ อ่วมตานี
(Co-advisor)	*Assoc. Prof. Dr. Areewan Oumtanee*
กรรมการ	ผู้ช่วยศาสตราจารย์ ดร. ชนกพร จิตปัญญา
(Examiner)	*Asst. Prof. Dr. Chanokporn Jitpanya*
กรรมการ	รองศาสตราจารย์ ดร. จิราพร เกศพิชญวัฒนา
(Examiner)	*Assoc. Prof. Dr. Jiraporn Kespichayawattana*
กรรมการภายนอก	รองศาสตราจารย์ ดร. วันทนา มณีศรีวงศ์กูล
(External Examiner)	*Assoc. Prof. Dr. Wantana Maneesriwongul*
ชื่อหัวข้อดุษฎีนิพนธ์	การพัฒนามาตรวัดการปฏิบัติการพยาบาลในการจัดท่าผู้ป่วยติดเตียงซาอุดิอาระเบีย
(Title of Thesis)	*THE SCALE DEVELOPMENT OF NURSING REPOSITIONING PRACTICE FOR BEDRIDDEN PATIENTS, SAUDI ARABIA*
ครั้งที่อนุมัติ	8/2563
(Announcement No.)	
ระดับ	ปริญญาเอก
(Level)	*Doctoral degree*

จากมติเวียนคณะกรรมการบริหารคณะพยาบาลศาสตร์ เมื่อวันที่ 18 ธันวาคม 2563
(Approved by the Board of the Faculty of Nursing dated December 18, 2020)

ประกาศ ณ วันที่ 18 ธันวาคม พ.ศ. 2563
(*Announced on December 18, 2020*)

(รองศาสตราจารย์ ดร. วราภรณ์ ชัยวัฒน์)
(Waraporn Chaiyawat, D.N.S., Dip. APPN.)
คณบดีคณะพยาบาลศาสตร์
Associate Professor and Dean

ประกาศ

(Announcement)

คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

(Faculty of Nursing, Chulalongkorn University)

เรื่อง การอนุมัติหัวข้อดุษฎีนิพนธ์

(Approval of dissertation topic)

ครั้งที่ 5/2564 ประจำปีการศึกษา 2564

(No. 5/2021, Academic year 2021)

ตามที่คณะพยาบาลศาสตร์ ได้มีประกาศ เรื่อง การอนุมัติหัวข้อดุษฎีนิพนธ์ ครั้งที่ 8/2563 ประจำปีการศึกษา 2563 ประกาศ ณ วันที่ 18 ธันวาคม 2563 แล้วนั้น เนื่องจากมีการปรับแก้บางส่วน จึงขอยกเลิกประกาศหัวข้อวิทยานิพนธ์ฉบับดังกล่าว และใช้ประกาศฉบับนี้แทนดังนี้

นิสิตผู้ทำวิจัยและอาจารย์ที่ปรึกษาดุษฎีนิพนธ์

รหัสนิสิต *(ID)*	6077402036
ชื่อ-นามสกุล	นายอับดุล การีม ซูเฮล ฮามาเดะ อิบลาซี
(Name)	*Mr. Abdulkareem Suhel Iblasi*
สาขาวิชา	พยาบาลศาสตร์ (นานาชาติ)
(Academic Program)	*Doctor of Philosophy Program in Nursing Science*
ประธานกรรมการ	รองศาสตราจารย์ ดร. ศิริเดช สุชีวะ
(Chairperson)	*Assoc. Prof. Dr. Siridej Sujiva*
อาจารย์ที่ปรึกษาหลัก	รองศาสตราจารย์ ร.ต.อ.หญิง ดร. ยุพิน อังสุโรจน์
(Major-advisor)	*Assoc. Prof. Capt. Dr. Yupin Aungsuroch*
อาจารย์ที่ปรึกษาร่วม	รองศาสตราจารย์ ดร. อารีย์วรรณ อ่วมตานี
(Co-advisor)	*Assoc. Prof. Dr. Areewan Oumtanee*
กรรมการ	รองศาสตราจารย์ ดร. ชนกพร จิตปัญญา
(Examiner)	*Assoc. Prof. Dr. Chanokporn Jitpanya*
กรรมการ	รองศาสตราจารย์ ดร. จิราพร เกศพิชญวัฒนา
(Examiner)	*Assoc. Prof. Dr. Jiraporn Kespichayawattana*
กรรมการภายนอก	**รองศาสตราจารย์ ดร. พิศสมัย อรทัย**
(External Examiner)	***Assoc. Prof. Dr. Pisamai Orathai***
ชื่อหัวข้อดุษฎีนิพนธ์	การพัฒนามาตรวัดการปฏิบัติการพยาบาลในการจัดท่าผู้ป่วยติดเตียง ซาอุดิอาระเบีย
(Title of Thesis)	*THE SCALE DEVELOPMENT OF NURSING REPOSITIONING PRACTICE FOR BEDRIDDEN PATIENTS, SAUDI ARABIA*
ครั้งที่อนุมัติ	5/2564
(Announcement No.)	
ระดับ	ปริญญาเอก
(Level)	*Doctoral degree*

จากมติคณะกรรมการบริหารคณะพยาบาลศาสตร์ ครั้งที่ 9/2565 วันที่ 24 พฤษภาคม 2565

(Approved by the Board of the Faculty of Nursing. No. 9/2022 Date May 24, 2022)

ประกาศ ณ วันที่ 25 พฤษภาคม พ.ศ. 2565

(Announced on May 25, 2022)

(ศาสตราจารย์ ดร. รัตน์ศิริ ทาโต)

(Ratsiri Thato)

คณบดีคณะพยาบาลศาสตร์

Professor and Dean

Appendix B

Approval of IRB

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

Ministry of Health – King Saud Medical center research center

Kingdom of Saudi Arabia
Ministry of Health
King Saud Medical City

مدينة الملك سعود الطبية
KING SAUD MEDICAL CITY

المـملكة العــربية الســعوديــة
وزارة الـصحة
مدينة الملك سعود الطبية

IRB Registration Number with KACST, KSA: **H-01-R-053**
IRB Registration Number U.S. Department of HHS IORG #: **IORG0010374**

- Memorandum -

Date: April 27, 2021

Proposal Reference No.	: **H1RI-31-Mar21-02**
Proposal Title	: "The Scale Development of Nursing Repositioning Practice for Bedridden Patients, Saudi Arabia"
PI	: Mr. Abdulkareem S Iblasi
Co-Investigators	: None
Type of Review	: Initial
Category of Approval	: Expedited
Date of IRB Approval-Expiration (Validity)	: 27/04/2021 26/10/2022 (06 months)

Dear Mr. Abdulkareem S Iblasi:

We are pleased to inform you that the above-referenced research proposal has been reviewed and was approved. The Institutional Review Board (IRB) committee found that the research met the applicability criteria and was eligible for expedited review. However, to commence the collection of data a permission letter must be issued from the Director of the Research Center first.

This approval is valid for **06 months** from the date of IRB review when approval is granted. The approval will no longer be in effect on the date listed above as the IRB expiration date. Please note that you are obligated to submit the following to IRB committee:

1. progress/final report on the **06 months (26-Oct-2021)** (or earlier in the case the study has completed)
2. any manuscript resulting from this research for approval by IRB before submission to journals for publication.

The approval of the conduct of this proposal will be automatically suspended after 06 months, in the case the Progress Report (or Final Report, if relevant) is pending acceptance. You also need to notify the Research Centre as soon as possible in case of:

1. any amendments to the proposal;
2. termination of the study;
3. any serious or unexpected adverse events;
4. any event or new information that may affect the benefit/risk ratio of the proposal.

All records relating to the research including consent form must be retained and available for audit for at least 3 years after the research has ended.

We wish you every success in your research endeavors.

Dr. Faisal Almazroua
Chairman, Institutional Review Board (IRB)
King Saud Medical City Riyadh, KSA

وزارة الصحة المملكة العربية السعودية
مدينة الملك سعود الطبية
King Saud Medical City
لجنة أخلاقيات البحوث (IRB)

☎435-5555 Ext. 2345 irb@ksmc.med.sa

Appendix C

Name-list of content Experts

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

Name-list of content Experts

Name	Qualification	Domains	Experience (Y)	Nationality	Institution
Sarah Bagazi	Master's degree	Nursing Wound care	17	Yamani	National Guard
Hayat Saleh	Master's degree	Nursing Wound care	18	Saudi	National Guard
Dwood Assad	Master Degree	Nursing Intensive care	16	Jordanian	King Saud Medical City
Dr. Jovial	Master Degree	General Surgery	14	Indian	King Saud Medical City
Dr. Hussam Itani	Master Degree	Nursing Wound care	21	Canadian	MiMedx-Wound care company
Dr. Sandra Holms	Ph.D. Nursing	Nursing Education	22	American	King Saud Medical

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

Appendix D

Participations Information Sheet and Consent form

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

Repositioning practice for a hospitalized bedridden patient (Data Collection)

Paper version

Dear Respected Nurses,

I am Abdulkareem Iblasi, and this is part of my Ph.D. dissertation in repositioning practice measurement to prevent pressure ulcer/injury development in hospitals.

Repositioning practice is a cornerstone in preventing pressure ulcers/injuries. And we have difficulty in establishing a valid and reliable measurement. Your participation is crucial in assuring the tool can provide a consistent, accurate, reliable, and valid measure for the repositioning practice.

Seventy-two items were divided into foundational issues, repositioning practice measurement, and demographical data. You are requested to read and respond accordingly.

The study had ethical approval from King Saud Medical City number H1R1-31-MAR 21-02 and Chulalongkorn University - Faculty of nursing/number 8/2563.

There will not be any signs, mentions, or referral for any personal information or anything that will lead to your identity; not the researcher nor anyone can identify who is responding.

You will get a gift after finishing the survey. The gift is free to access two courses in wound care; Pressure Ulcer from A to Z & Pressure ulcer prevention (in Arabic language), plus seven electronic books in wound care. The gift will be sent to your email after 3 to 5 working days from submission. It is expected to take 12 to 15 minutes to respond to all items.

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

Participant Consent Form

Vital for you to know that:

A. Withdrawal without Prejudice

Participation is voluntary; rejection to participate will not involve any consequences. You are free to withdraw the survey at any time without discrimination or penalty. You are also free to refuse to answer any questions/items in the survey.

B. Procedure

If you are ready to participate, you are requested to press the "Next" button down, read the questions, and click on the options that reflect what you think is the right option.

C. Risk and Discomfort

No risks or discomfort are anticipated from your participation in the study.

D. Benefit

The benefit of participating in this research is the opportunity to develop a valid and reliable measurement tool for repositioning practice. There are no personal benefits. However, the results of your answer will be helpful for the future of pressure ulcer/ injury prevention in Saudi Arabia.

E. Confidentiality

The information gathered during this study will remain confidential in the secure and protected web domain. Only the researcher will have access to the study data and information. There will not be any identifying personal information. The study results will be published in a research paper and may be published in an International journal or presented at a professional meeting. The knowledge obtained from this study will be of great value in guiding professionals to be more effective.

F. Cost

Researchers will bear all research-related costs.

For any concerns, questions, or comments feel free to contact the researcher (

Abdulkareem Suhel Iblasi), E-mail:rn.iblasi@gmail.com, Mobile: 0066928530093

Informed Consent Form (For Nurses)

Title: THE SCALE DEVELOPMENT OF NURSING REPOSITIONING PRACTICE FOR BEDRIDDEN PATIENTS, SAUDI ARABIA

Code number: Participant …….

I had been notified by the researcher **Mr. Abdulkareem Suhel Ibasi**, and his address, Al-Imam Abdul Aziz Ibn Muhammad Ibn Saud, Riyadh 12746, Saudi Arabia, King Saud Medical City, Medical Tower, 2nd floor, Wound Management Department about the participation in the above names study as part from his PhD dissertation in the Chulalongkorn University, Faculty of Nursing, Bangkok, Thailand.

Moreover, I am willing to take part in the current research study, which serves nurses to understand repositioning. This study is investigating the repositioning influencing factors. The current study is promoting the quality of nursing care, preserve the hospital resources, and encourage nursing administrators in establishing useful strategies to magnify repositioning among nurses.

I had been informed that there would be around 600 nurses will be asked similar questions about the repositioning compliance. During my participation in the study, I will be submitting the current questioners about the repositioning. The questioner will take around 30 minutes to be fulfilled, and the overall duration of the study will be five weeks from the day I received the questioner. The study will be followed by observing the repositioning in the unit.

I declare that the researcher informed me about my right to withdraw from the study at any time point, before, during, or after the study. The researcher also familiarized me that there will no any signs, reflections, or mentions for any of my personal information that will presents or identify my identities. The current data will be confidential, and it will not be shear with any administrative position to refer to my characters. Have been told that some potential risk such as tiredness and fatigue, could occur.

I fully understand that during the current study, I can contact the researcher Mr. Abdulkareem Suhel iblasi @ +966599509517, Email: rn.iblasi@gmail.com or ALBLASI@KSMC.MED.SA or at King Saud Medical City, Medical Tower third floor.

I have read the information above and understood it, and I am willing to be in this study and participate voluntarily without any fees or rewards from the researcher or the hospital. After I sign the form, I understand I will receive a copy of this consent form.

…… Date/Month/Year	Signature…… (……) Name of subject/participant
…… Date/Month/Year	Signature…… (……) Main researcher

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

Appendix E
Content Analysis

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

Figure 1. Flow Diagram Literature Selection

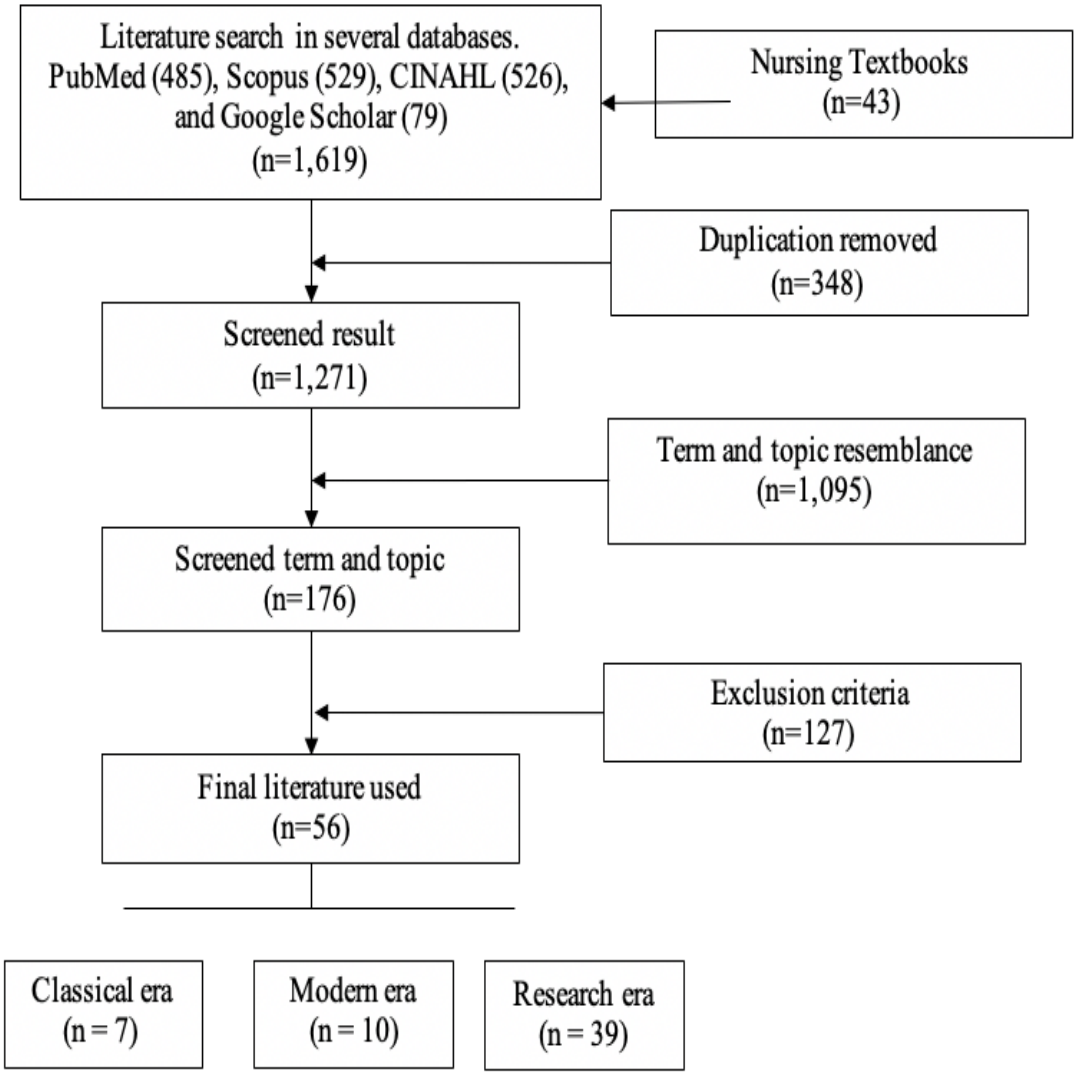

Table 1: the selected literature for analysis

Type of reference	Classical era	Modern era	Research era
Textbook	(Domville, 1881) (Nightingale, 1860) (Sanders, 1916)	(Burston et al., 1950)	(Berman et al., 2010) (Carpenito, 2013) (DeWit & Williams, 2013) (Lewis et al., 2016) (Kozier et al., 2018) (Morton et al., 2017) (White, 2011) (Wilkinson & Van Leuven, 2016) (Potter et al., 2013) (Springhouse, 2006) (Diepenbrock, 2011) (Eckman & Megan L. Aldinger, 2013) (Lynn, 2018) (Lynn, 2010) (Rhoads & Meeker, 2008) (SM Mogotlan, 2015) (Treas & Wilkinson, 2013) (Treas & Wilkinson, 2012)
Published studies		(Newell Jr et al., 1970) (Silver, 1967) (Bliss et al., 1967) (Bardsley et al., 1964) (Souther et al., 1973) (Carpendale, 1974)	(Beeckman et al., 2013) (Bours et al., 2002) (Hall & Clark, 2016) (Langemo et al., 2015) (Manderlier et al., 2017) (Miles et al., 2013) (Moore et al., 2011) (Saliba et al., 2003) (Tayyib & Coyer, 2017a) (Tayyib et al., 2016)
Published review	(Scanlan, 1886) (Basil, 1888) (Rogers, 1849) (Elliot, 1896)	(Cope, 1939) (Exton-Smith, 1961) (Matheson & Lipschitz, 1956)	(Jocelyn Chew et al., 2018) (Moore & Cowman, 2015) (NETWORK, 2016) (O'Neil, 2004) (Samuriwo & Dowdin2014) (Soban et al., 2011) (Yarkony, 1994)
International guideline			(EPUAP, 2009) (EPUAP/NPIAP/PPPIA., 2019) (Haesler et al., 2012) (NPUAP/EPUAP/PPPI, 2014)

จุฬาลงกรณ์มหาวิทยาลัย
Chulalongkorn University

Table 2: Formation of concept among eras

Era	**Forms of successions**	**Forms of enunciative**	**Procedure**	**Preconceptual**
Classical era Until 1929	Series of events: Bedsore associated with patient unable to move. So, nurses have to do the intervention "turning". If the nurse fails in doing the "turning" the patients will complain. Type of dependences: bedsore happens as patient unable to move with no clarification for the definitions of the ability. Also, nurses blame for developing bedsore. Combination: bed sore, nursing fail, role of nursing in charge, move and turn comes interchangeable	Filed of presence: Bedsore, hospital, nursing, medical hospitalized care, cost of care for paralysis patients. Accompanied: Nursing role, hospital role, treatment of bed sore Filed of memory: hard to exactly determine what people's memory for repositioning practice	Techniques of rewriting: Move, change their positions, turn Transcribing: No forms of documentations appear Translating: no clarification for the methods of performance appears in the texts Systemizing of practice: No systemization for any forms of repositioning practice appears	Bedsore, nursing failure, type mattress, etiology of bedsore development depends related to pressure and failure of nerves
Modern era 1930 -1974	**Series of events:** Changes in term from bedsore to pressure sore shift the thinking that pressure is the responsible for the cellular death, so the care have to reduce the pressure and	**Filed of presence**: Prevention and treatment of bedsore. Presence of teamwork for turn Mattress that reduce the pressure. Critical care and respirator use.	**Techniques of rewriting:** Turning, moving, posturing, positioning**.** **Transcribing**: Forms of documentations but not clear what they should document. **Translating**: Recommendations	Pressure sore, Bedsore nurse do the prevention Mattress applications Nurses responsible with no blame nurse staff time, nursing as group work scientific measurements

จุฬาลงกรณ์มหาวิทยาลัย
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Era	Forms of successions	Forms of enunciative	Procedure	Preconceptual
	repositioning "turning" is proper intervention. Also, bedridden patients unable to that for themselves so nurse have to do it for them. The bedsore is the result of pressure, abrasion with shear deformations. Moisture and lack of cleanness. Turning is a standard nursing care Pressure sore development due to several factors and pressure appears as factor Pressure is associated with tissues ischemia **Type of dependences:** Repositioning practice depends on number of nurses on duty, and the need of patients also the type of mattress. **Combination:** Pressure sore term give better explanations than bedsore which	**Accompanied**: bed sore developed from pressure gangrene. Standardized care for repositioning practice Time of repositioning practice every 2 hours Nurses need training "competencies for nurses" **Filed of memory**: nursing role to take attention, time of being patient on bed. Repositioning for ultraviolet light.	on how the nurses will perform the procedure as nurse should not roll out rather by lifting the patient gently Bedfast **Systemizing of practice:** it should happen by more than one nurse if required, and end by documentations. Present the points that nurses should not have pressure over it. Describing the frequent time table (either for reminding or documentation) Hospital need a system	nursing understaff (shortage of nurses) Trophic pressure sore Position change Pressure sore Operation pads Ischemia

Era	Forms of successions	Forms of enunciative	Procedure	Preconceptual
	developed due to pressure. Respirators is critical aspects and applied for patients in need for special care such as being not moved during the time. Two hourly turning is efficient in preventing pressure sore			
Research era 1974 - 2020	**Series of events**: Pressure and shear reduce the blood supply which lead for permeant cellular death. Repositioning practice is redistribute the pressure to eliminate the tissues death. The scientific evidences about the important role of repositioning practice in reducing the possibility of pressure ulcer development. Repositioning practice is a significant part of pressure ulcer care. Pressure ulcer prevention depends on repositioning	**Filed of presence**: pressure ulcer care, quality of care, cost, patients right, accreditation, insurance, nursing workload. **Accompanied**: Bio mechanical applications for the role of repositioning, pressure ulcer etiology, teamwork for nurses, mattresses technology, sensor development **Filed of memory**: bedsore (even it appears in textbook and some publications), Balm of nurses, preventable pressure ulcer.	**Techniques of rewriting:** Turning and repositioning, repositioning and turning, positioning, change their positions "***Combination of two terms together appears more obvious***" **Transcribing**: Paper based and electronic based documentations. Nurses have to document when that happen, how that happen and who participate in doing System of documentation follow up **Translating**: details steps written and accompanied with pictures in textbook with details recommendations in the international guideline	Evidence based practice Scientific evince Maps of pressure Sensors for pressure Pressure ulcer or pressure injury Avoidable pressure ulcer versus unavoidable pressure ulcer

Era	Forms of successions	Forms of enunciative	Procedure	Preconceptual
	practice. Risk assessment tools such as Braden give evidence for the need for repositioning practice **Type of dependences:** Repositioning practice depends on the patient needs. Repositioning practice depends on the ability of nurses, number of nurses, knowledge, skills and attitude of nurses. Organizational role for the repositioning practice. **Combination:** **P**ressure ulcer prevention measures, quality of care, safety of patient, safety pf nurses, cost, time, workload		**Systemizing of practice:** Standardization Research based for the methods of measurements not have pressure over it. Associated with the professionalism of nurses	

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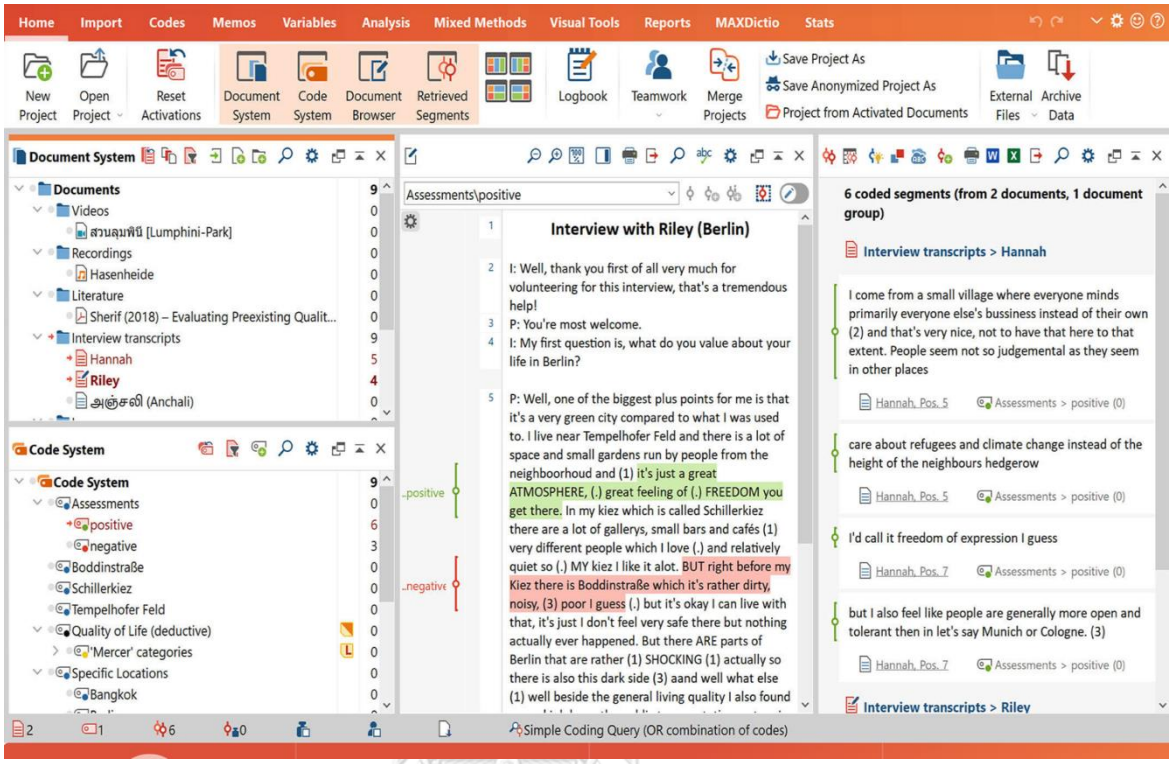
Figure2: MAXQDA software



Note: Screen shot from the website (https://www.maxqda.com/) for clarification only

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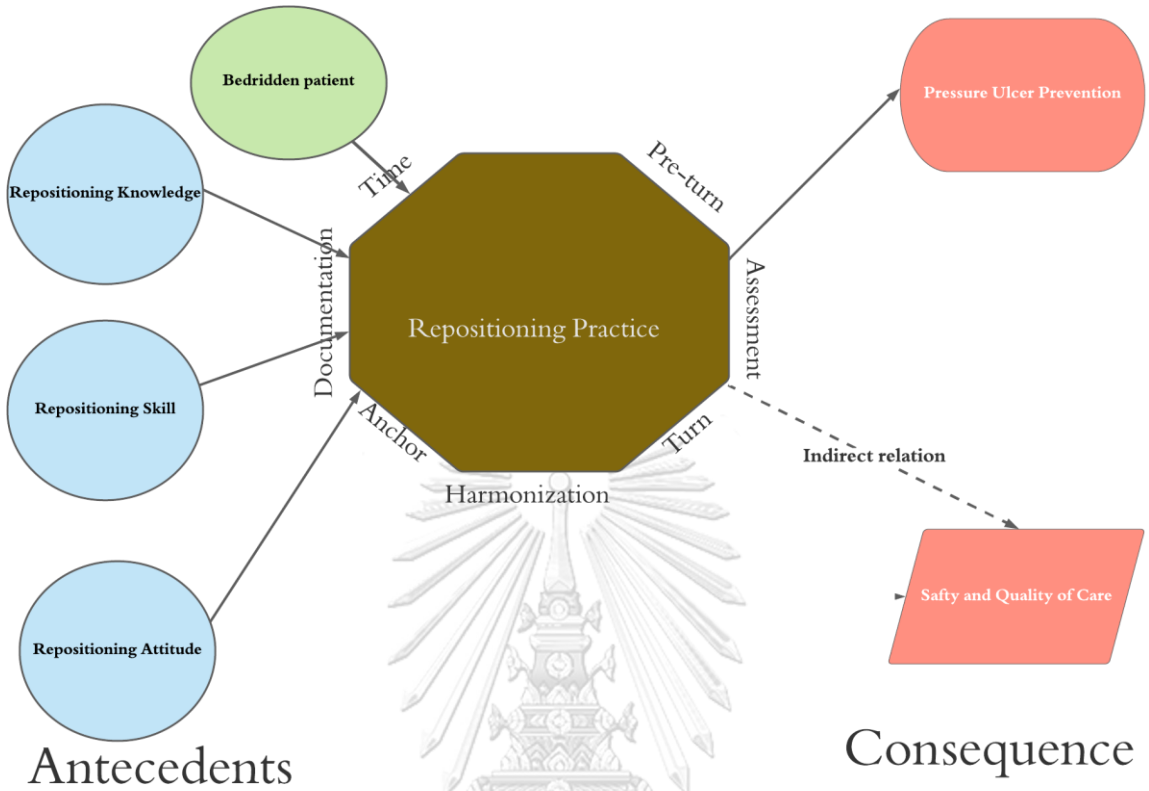
Figure 2: Concept analysis graph – repositioning practice



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Contents

content analysis per themes

Summative content analysis – summary

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Table 3: Preparation codes (an example)

Code	Reference	Page	Text
Prepare the bed	(Berman et al., 2010)	230	Put the head of the bed flat if the resident can tolerate it.
Prepare the bed	(Berman et al., 2010)	282	Adjust the head of the bed as flat as possible if the resident can tolerate it
Prepare the bed	(Berman et al., 2010)	282	Elevate the head of the bed.
Prepare the bed	(Rhoads & Meeker, 2008)	447	Raise bed to your thigh level
Prepare the bed	(White, 2011)	759	Adjust bed to comfortable working height
Prepare the bed	(Potter et al., 2013)	1195	Raise level of bed to comfortable working height.
Prepare the bed	(Potter et al., 2013)	1196	Elevate head of bed 45 to 60 degrees “Supine position”
Prepare the bed	(Potter et al., 2013)	1198	Make the bed flat
Prepare the bed	(Potter et al., 2013)	1199	Patient lies supine with head of bed as low as he or she tolerates

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Table 4: Patient assessment codes (An example)

Code	Reference	Page	Text
Assess patient ability	(White, 2011)	759	Assess the client's ability to move independently. Determine if the client can assist with turning and repositioning.
Assess patient ability	(White, 2011)	763	Assess the client's ability to assist with repositioning.
Assess patient ability	(Potter et al., 2013)	1195	Assess patient's physical ability to help with moving and positioning
Assess patient ability	(Potter et al., 2013)	1195	Assess ability and motivation of patient, family members, and primary caregiver to participate in moving and positioning patient in bed in anticipation of discharge to home.
Assess patient ability	(White, 2011)	759	Assess the client's ability to move independently. Determine if the client can assist with turning and repositioning
Assess patient ability	(Treas & Wilkinson, 2012)	205	Level of consciousness, ability to follow directions, and ability to assist with the move.
Assess patient ability	(Diepenbrock, 2011)	387	Instruct a paraplegic to shift his weight by doing push-ups.

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Table 5: Turn "posturing" Codes (An example)

Code	Reference	Page	Text
Hand on shoulder hand on hip	(Berman et al., 2010)	272	Place one hand on the resident's shoulder farther away from you and the other hand on the hip farther from you
Hand on shoulder hand on hip	(Berman et al., 2010)	286	Place one hand on the resident's shoulder farther from you and the other on the hip farther from you
Hand on shoulder hand on hip	(Berman et al., 2010)	286	Place one hand on the resident's shoulder farther from you and the other on the hip farther from you
Hand on shoulder hand on hip	(Rhoads & Meeker, 2008)	447	Place one hand and arm under patient's shoulder, and the other under patient's thigh.
Hand on shoulder hand on hip	(Potter et al., 2013)	1196	Each nurse places one arm under patient's head and shoulders and one arm under patient's thighs.
Hand on shoulder hand on hip	(Rhoads & Meeker, 2008)	450	Place your hands-on patient's far shoulder and hip and roll patient toward you
Hand on shoulder hand on hip	(Potter et al., 2013)	1199	Place one hand on patient's hip and one hand on patient's shoulder
Hand on shoulder hand on hip	(Potter et al., 2013)	1199	Place hands under patient's dependent shoulder and bring shoulder blade forward
Hand on shoulder hand on hip	(White, 2011)	761	using the shoulder and hip as key points of control

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Table 6: Harmonization codes (An example)

Code	Reference	Page	Text
Two to three staff	(Berman et al., 2010)	270	Call another staff person to assist you.
Two to three staff	(Berman et al., 2010)	272	Call another staff person to help you.
Two to three staff	(Berman et al., 2010)	289	Get at as many staff to help as needed.
Two to three staff	(White, 2011)	762	Use three nurses
Two to three staff	(White, 2011)	763	Repositioning a client is sometimes done by a single staff member, but often it requires two or more people to do this procedure safely
Two to three staff	(Potter et al., 2013)	1194	The skill of moving and positioning patients in bed can be delegated to nursing assistive personnel (NAP).
Two to three staff	(Potter et al., 2013)	1196	Use safe nursing judgment by increasing number of nurses or NAP when moving a larger patient up in bed. If in doubt, acquire more help
Two to three staff	(Potter et al., 2013)	1195	Get extra help as needed
Two to three staff	(Potter et al., 2013)	1315	Have two nurses reposition patient routinely
Two to three staff	(White, 2011)	759	Secure adequate assistance to safely complete task
Two to three staff	(White, 2011)	760	If you cannot move the client easily, always ask for and obtain assistance for both your and the client's safety
Two to three staff	(White, 2011)	762	Use three nurses
Two to three staff	(Potter et al., 2013)	1200	Position two nurses or other staff members on side of bed to which patient will be turned. Position third nurse or staff member on other side of bed (see illustration).

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Table 7: Anchor codes (An example)

Code	Reference	Page	Text
Assure Comfort	(Rhoads & Meeker, 2008)	449	After each positioning, realign patient, replace pillows and other positioning aids.
Assure Comfort	(Rhoads & Meeker, 2008)	450	Patient's body alignment and position, and comfort level
Assure Comfort	(Miles et al., 2013)	2	comfort
Assure Comfort	(Emily Haesler et al., 2012)	3	patient comfort
Assure Comfort	(NPUAP/EPUAP/PPPI, 2014)	104	Reposition the individual in such a way that pressure is relieved or redistributed
Assure Comfort	(Langemo, Haesler, Naylor, Tippett, & Young, 2015)	2	comfort
Assure Comfort	(Manderlier et al., 2017)	2	Posture comfort
Assure Comfort	(Stinson, Ferguson, & Porter-Armstrong, 2018)		proper distribution for the weight
Assure Comfort	(EPUAP/NPIAP/PPPIA., 2019)	124	Preference for medical condition
Assure Comfort	(Carpenito, 2013)	515	Use foam blocks or pillows to provide a bridging effect to support the body above and below the high-risk or ulcerated area so the affected area does not touch the bed surface
Assure Comfort	(Potter et al., 2013)	1198	Be sure that patient is comfortable on back with head

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Table 8: Documentation codes (An example)

Code	Reference	Page	Text
How that happen	(Berman et al., 2010)	270	The common completion steps
How that happen	(Kozier et al., 2018)	1114	After moving the client, document the client's transfer and ambulation status (e.g., method or type of transferring and ambulation), the level of assistance required by caregiver(s), assistive equipment and supportive devices used, and client's tolerance.
How that happen	(E Haesler, R Rayner, & K Carville, 2012)		Repositioning interventions (e.g. when and how) and the response to repositioning (e.g. skin assessment) should be documented.
Skin condition	(Springhouse, 2006)	387	Document condition and temperature of surrounding skin.
Skin condition	(Rhoads & Meeker, 2008)	450	Any change in skin condition
Skin condition	(White, 2011)	762	Integumentary assessment, including color and integrity of skin and length of time redness persists over bony prominences
Skin condition	(Potter et al., 2013)	1201	Observe for areas of erythema or breakdown involving skin

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Table 9: Time codes (An Example)

Reference	Code	Page	Text
(White, 2011)	Time	331	Reposition the client at least every 2 hours
(White, 2011)	Time	759	Clients who cannot reposition themselves must be repositioned at least every two hours and more frequently if they are uncomfortable, incontinent, or have poor circulation, fragile skin, decreased cognition, decreased sensation, or poor nutritional status
(Kozier et al., 2018)	Time	1170:	. The older adult is especially at risk. For example, an older adult who is immobilized on a backboard following a trauma can develop skin breakdown within 3 hours
(Kozier et al., 2018)	Time \With pressure ulcer	1230: 1348	When patient is lying down, position her in the 30-degree lateral position

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Table 10: Summative content analysis for repositioning practice attributes

Attribute	Code	Frequency	% in the attributes	% in the over all
Pre-Turn = 15 code	Identify patient	4	4.49%	0.69%
	Introduce nurse	3	3.37%	0.52%
	Explain the procedure	5	5.62%	0.87%
	Prepare the bed	17	19.10%	2.95%
	Adjust the arm	7	7.87%	1.21%
	Place draw Sheet	8	8.99%	1.39%
	securing patients buttocks	1	1.12%	0.17%
	adjusting patients' knees	6	6.74%	1.04%
	Adjusting patient's legs	1	1.12%	0.17%
	Remove the pillows	10	11.24%	1.73%
	Side raise	7	7.87%	1.21%
	guaranteeing patients privacy	7	7.87%	1.21%
	appropriate starting posture	5	5.62%	0.87%
	Prone position consideration	6	6.74%	1.04%
	Hand wash	2	2.25%	0.35%
	total of pre-turn locations	89	100.00%	15.42%
Assessment = 4 codes	Ability to assist	7	17.07%	1.21%
	Pressure ulcer risk	8	19.51%	1.39%
	Turn restriction	11	26.83%	1.91%
	Skin	15	36.59%	2.60%
	total of assessment locations	41	100.00%	7.11%
Turn = 12 codes	Hand on Shoulder hand on hip	14	15.73%	2.43%
	Hold head and neck	7	7.87%	1.21%
	Move the arm	5	5.62%	0.87%
	One hand under the patient	2	2.25%	0.35%
	Move the leg	3	3.37%	0.52%
	Move the knees	4	4.49%	0.69%
	Monitoring patient condition	2	2.25%	0.35%

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Attribute	Code	Frequency	% in the attributes	% in the over all
	Lift by sheet or device	28	31.46%	4.85%
	Rolling	21	23.60%	3.64%
	Pressure mapping	1	1.12%	0.17%
	Range of Motion	1	1.12%	0.17%
	Heels	1	1.12%	0.17%
	total of turns	89	100.00%	15.42%
Harmonization = 4 codes	Two to three staff	23	36.51%	3.99%
	Count to three	10	15.87%	1.73%
	Body mechanism proper use	20	31.75%	3.47%
	One at each side of bed	10	15.87%	1.73%
	total	63	100.00%	10.92%
Anchor = 13 codes	Assure Comfort	16	13.68%	2.77%
	Head and Shoulder	14	11.97%	2.43%
	Support the leg	8	6.84%	1.39%
	Support the back	12	10.26%	2.08%
	Heel	14	11.97%	2.43%
	Feet	4	3.42%	0.69%
	Knees	6	5.13%	1.04%
	Hand and forearm	3	2.56%	0.52%
	Wait to be sure	2	1.71%	0.35%
	Patient bed angel	16	13.68%	2.77%
	Secure the device	14	11.97%	2.43%
	Eliminate sheet effect	2	1.71%	0.35%
	Boney prominence	6	5.13%	1.04%
	total	117	100.00%	20.28%
Documentation = 13 cods	How that happen	3	4.92%	0.52%
	Skin condition	15	24.59%	2.60%
	What is the current position	7	11.48%	1.21%
	When that happen	17	27.87%	2.95%
	Describe the body conidiation	2	3.28%	0.35%
	Who participate in doing?	3	4.92%	0.52%
	Presence of pain or discomfort	3	4.92%	0.52%

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Attribute	Code	Frequency	% in the attributes	% in the over all
	Document unusual findings	1	1.64%	0.17%
	Based on policy	1	1.64%	0.17%
	Level of cooperation	2	3.28%	0.35%
	Equipment used	3	4.92%	0.52%
	Record physician notification	1	1.64%	0.17%
	Reminders	2	3.28%	0.35%
	Factors influencing the decision	1	1.64%	0.17%
	total	61	100.00%	10.57%
	Within 30 min	4	3.40%	0.69%
	Within 1 hr.	2	1.70%	0.35%
	Every 1 to 2 hrs.	5	4.30%	0.87%
	Every 2 hrs.	33	28.20%	5.72%
	Within 3	7	6.00%	1.21%
	Within 2 to 4 hrs.	8	6.80%	1.39%
	Every 4 hrs.	3	2.60%	0.52%
	Frequent (no specification)	36	30.80%	6.24%
	Based on individualized plan	17	14.50%	2.95%
	Reminders	2	1.70%	0.35%
	total	117	100.00%	20.28%
Total of Codes =72	All Score	577		100%

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Appendix F

Content Validity Index

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Table 1: Item content validity index (I-CVIs) first version (items = 103)

Item	I-CVIs
1. Nurses in the unit determine the need of the patient for repositioning practice	0.89
2. Nurses revise physicians' orders. Clarify whether any positions are contraindicated because of the patient's condition	0.78
3. Nurses in the unit perform hand hygiene	0.67
4. Nurses explain the procedure for the patient and his family (if present) and what they do.	0.56
5. Nurses protect the patient privacy by assuring closing the curtains	0.89
6. Nurses assess the patient's body alignment and comfort level while lying down before initiating any changes.	1.00
7. Nurses assess risk factors that may contribute to complications of immobility: Hemiparesis Traction or arthritis, or other contributing disease processes	1.00
8. Nurses in the unit assess patient’s physical ability to help with moving and positioning	0.67
9. Nurses in the unit announce for all teams what is the coming posture of the patient will be	0.44
10. Nurses assess the patient for any device, tub or lines that need securing.	0.89
11. Nurses assess the ability and motivation of the patient, family members, and primary caregiver to participate in moving and positioning the patient in bed and ask them to participate if possible.	1.00
12. Nurses in the unit raise the level of the bed to a comfortable working height.	0.89
13. Nurses in the unit position the patient flat in bed if this is tolerated.	0.89
14. Before flattening the bed, nurses in the unit account for all tubing, drains, and equipment to prevent dislodgement or tipping if caught in the mattress or bed frame as the bed is lowered.	0.89
15. Nurses in the unit position patient by at least two nurses	0.89
16. Nurses in the unit avoid a 90° side-lying position.	0.67
17. Nurses in the unit avoid semi-recumbent positions on the lateral side.	0.67
18. Nurses remove the pillow from the head and shoulders and place it at the head of the bed.	0.89
19. Nurses in the unit ask the patient to cross arms across the chest if the patient can	1.00

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Item	I-CVIs
20. Each nurse in the unit has one arm under the patient's shoulders and one arm under the patient's thighs if possible, or one nurse at the patient's upper body. The nurse's arm nearest the head of the bed should be under the patient's head and opposite shoulder; the other arm should be under the patient's closest or under the patient's lower back and torso.	0.89
21. Nurses in the unit place feet apart, with foot nearest head of bed behind the other foot	0.89
22. Nurses in the unit ask the patient to flex knees with feet flat on the bed if possible	0.78
23. Nurses in the unit instruct patients to assist moving by pushing with feet on the bed surface if possible	0.89
24. Nurses in the unit flex knees and hips, bringing forearms closer to the bed level.	0.89
25. Nurses in the unit instruct patients to push with heels and elevate the trunk while breathing out, on a count of 3 if possible.	0.33
26. On the count of 3, rock and shift weight from back to the front leg.	1.00
27. Nurses in the unit move a patient up in bed with a draw sheet or friction-reducing device by two nurses.	0.89
28. Nurses in the unit use sheet that extends from shoulders to thighs.	1.00
29. Nurses in the unit are assured of having one nurse at each side of the patient.	0.89
30. Nurses in the unit realign patients in correct body alignment.	0.89
31. Nurses in the unit supported patient from heel and feet of in *Fowler's position*	0.89
32. Nurses elevate the head of the bed 45 to 60 degrees if the patient.	0.89
33. Nurses in the unit rest patient's head against the mattress or on a small pillow.	0.78
34. Nurses use pillows to support arms and hands if the patient does not have voluntary control or use of hands and arms.	0.56
35. Nurses in the unit position pillow at the lower back.	0.89
36. Nurses in the unit place a small pillow under the thigh.	0.89
37. Nurses in the unit position patient's heel in heel boots or other heel pressure relief devices.	1.00
38. Nurses in the unit position patient with hemiplegia in extra supported pillows.	0.89

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Item	I-CVIs
39. Nurses in the unit support the involved arm and hand on the overbed table in front of the patient.	0.89
40. Nurses place arm away from the patient's side and support the elbow with a pillow if the patient has a paralyzed extremity	0.78
41. Nurses in the unit flex patient’s knees and hips by using a pillow or folded blanket under the knees.	0.56
42. Nurses assure the patient is comfortable on the back with the head of the bed flat.	1.00
43. Nurses in the unit place a small rolled towel under the lumbar area of the back.	1.00
44. Nurses in the unit place a pillow under the upper shoulders, neck, or head.	0.78
45. Nurses in the unit place trochanter rolls or sandbags parallel to the lateral surface of the patient's thighs.	0.44
46. Nurses in the unit place pillows under pronated forearms, keeping upper arms parallel to the patient's body	1.00
47. Nurses in the unit place hand rolls in the patient's hands.	0.78
48. Nurses in the unit during positioning the hemiplegic patient in supine position place a folded towel or small pillow under the shoulder or affected side	0.89
49. While positioning the hemiplegic patient in the supine position, nurses in the unit keep the affected arm away from the body with the elbow extended and palm up.	0.89
50. During positioning, hemiplegic patients in supine position support feet with soft pillows at a right angle to the leg.	0.44
51. During positioning hemiplegic patients in the supine position, nurses move the patient toward one nurse and the second nurse in the second part of the bed.	0.78
52. During positioning hemiplegic patients in the supine position, nurses in the unit ensure that the side rail on the opposite side is up for safety.	0.89
53. Nurses in the unit position the hemiplegic patient in a supine position, turn the patient's head to one side, and support the head with a small pillow.	0.89
54. Nurses in the unit roll patient onto the side.	0.78
55. Nurses in the unit place pillow on the patient's abdomen.	1.00
56. Nurses roll patients onto the abdomen by positioning the involved arm close to the patient's body, with the elbow straight and hand under the hip.	0.67
57. Nurses in the unit roll patient overarm.	0.89

Item	I-CVIs
58. Nurses in the unit turn head toward the bedside.	0.44
59. Nurses' position involved arm out to the side, elbow bent, hand toward the head of the bed, and fingers extended (if possible).	0.33
60. Nurses in the unit flex knees slightly by placing a pillow under the legs from knees to ankles.	0.89
61. Nurses in the unit keep feet at the right angle to legs by using a pillow high enough to keep toes off the mattress.	0.33
62. Nurses in the unit lower head of bed completely or as low as the patient can tolerate.	0.89
63.Nurses in the unit position patient to the side of the bed.	0.89
64. Nurses prepare to turn the patient onto the side by flexing the patient's knee that will not be next to the mattress.	0.67
65. Nurses in the unit place one hand on the patient's hip and one hand on the patient’s shoulder.	0.56
66. Nurses in the unit roll patient onto the side toward one of them.	0.33
67. Nurses in the unit place pillow under the patient's head and neck.	0.33
68. Nurses in the unit bring shoulder blades forward.	0.33
69. Nurses in the unit position both arms in a slightly flexed position. A pillow level supports the upper arm with the shoulder; the other arm, by the mattress.	1.00
70. Nurses place a tuck-back pillow behind the patient's back.	0.89
71. Nurses in the unit keep folding pillow lengthwise, and the smooth area is slightly tucked under the patient’s back.	0.89
72. Nurses in the unit place pillow under semi flexed upper leg level at the hip from groin to foot	0.89
73. Nurses in the unit place sandbags parallel to the plantar surface of the dependent foot.	0.89
74. Nurses in the unit lower head of bed completely.	0.89
75. Nurses in the unit assure the minimum Necessary Personal before initiating the position to be six (Two respiratory Therapist & 4 nurses) for prone position	0.33
76. Nurses in the unit apply lubricant to eyes and tape	0.33
77. Nurses in the unit assure removal of any jewelry from the patients head or neck	0.33

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Item	I-CVIs
78. Nurses in the unit removal of any bite blocks or possibilities of airway blocks	0.89
79. Nurses give patient bolus necessary analgesia/sedation/ neuromuscular blocker if possible	1.00
80.Nurses confirm Spo2 monitors are in place and functional before initiating any change	0.89
81. Nurses measure patient vital signs before, during, and after the turn.	1.00
82. Nurses in the unit position secured with pillows the elbow, head, shoulder of patient and frequently check the patient in the prone position	1.00
83. Nurses in the unit assure they are three nurses to initiate this intervention	1.00
84. Nurses in the unit place pillow between the patient's knees.	1.00
85. Nurses in the unit cross patient's arms on the chest.	1.00
86. Nurses in the unit position two nurses on the side of the bed to which the patient will be turned.	0.89
87. Nurses in the unit the third nurse on the other side of the bed.	0.89
88. Nurses in the unit fanfold or roll the draw sheet or pull sheet.	0.44
89. Nurses in the unit move the patient as one unit in a smooth, continuous motion on the count of 3.	0.56
90. Nurses in the unit, the nurse on the opposite side of the bed, places pillows along the patient's length.	0.89
91. Nurses in the unit gently lean the patient as a unit back toward the pillows for support.	0.89
92. Nurses in the unit evaluate patients' level of comfort and ability to assist in position change.	0.89
93. After each position change, nurses in the unit evaluate the patient's body alignment and any pressure areas.	0.89
94.Nurses in the unit observe for areas of erythema or breakdown involving the skin.	1.00
95. Nurses in the unit keep waiting for 15 to 30 seconds to assure the patient will not return to the previous posture	0.89
96. Nurses in the unit assure the patient privacy and protect dignity before leaving the bed	1.00
97. Nurses in the unit perform hand hygiene	0.78

Item	I-CVIs
98. Nurses in the unit record the observation over the skin condition	0.89
99. Nurses record the procedure of who did the procedure and the time of the procedure.	0.89
100. Nurses repeat these steps every two hours or as hospital policy	0.67
101. Nurses fix the bed line	0.78
102. Nurses fix the patient cover and assure cover the patient	0.67
103. Nurses assure the tidiness of the patient	0.67
Mean of I-CVIs	0.79
S-CVI	0.19
Noted: - I-CVI is the number of experts rate the item as three of four to the relevancy of item, divided by the number of experts. - Scale-Content Validity Item/Universal Agreement (S-CVI/UA) is the number of items considered relevant by all the experts (or number of items with CVI equal to 1) divided by the total number of items Scale-Content Validity Item/Average is the sum of I-CVIs is divided by the total number of items means of item content validity (I-CVI) I-CVI (>.70) and S-CVI (>.80) based on (Davis, 1992; Polit & Beck, 2010).	

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Table 2: The second version of the tool with the CVIs for each item (Items = 76)

Items	I-CVIs
1. Before the turn, nurses identify the patient.	1
2. Nurses introduce themselves to the patient.	1
3. Nurses explain the procedure to patients and their families	1
4. Nurses protect patients' privacy and dignity all the time	1
5. Before the turn, nurses raise the bed to a suitable height for them.	1
6. Before the turn, nurses straighten the bed (Make the bed flat) if no contraindication.	1
7. Before the turn, nurses remove the pillows from the patient's bed.	1
8. Before the turn, nurses cross the patient's arms on his chest if he/she can.	1
9. Before the turn, nurses ensure a clean and proper drawsheet above the bed linen and under the patient's body that crosses the bed from left to right.	0.67
10. Before the turn, nurses assure no urinary or stool contamination on the incontinency area "buttocks and genitals."	1
11. Nurses raise the level of the bed to a comfortable working height for them.	0.67
12. Before the turn, nurses extend the patient's legs	1
13. Before the turn, Nurses raise the side rail and keep it up until the end.	0.78
12. Before the turn, nurses centralize the patient body in the middle of the bed.	1
13. Before the turn, the nurse acknowledged additional preparations for prone posture.	1
14. Before the turn, nurses evaluate patients' physical ability to assist in turning.	1
15. Before the turn, nurses assess patient pressure ulcer risk areas.	1
16. Before the turn, nurses assess the patient for any turn restrictions	1
17. Before the turn, nurses assess the patient for the presence of any pressure ulcer	1
18. Before the turn, nurses assess the patient skin over the upper chest, back and lower back, legs and toes, buttocks, incontinence area for any erythema, breakdown, or color changes other abnormalities	1
19. During the turn, nurses put one hand over the shoulder and use it for the turn.	1
20. During the turn, nurses put the other hand over the hip and use it for the turn.	1
21. During the turn, nurses consistent head and neck posture with the body trunk movement.	1
22. During the turn, nurses ensure moving the arm in a way not affected on any IV lines or devices connect it, and assure it will not fall under the patient body if the patient is unconscious.	1

Items	I-CVIs
23. During the turn, nurses put one hand under the patient's body and use it for lifting.	1
24. During the turn, nurses roll the legs consistently with the body of the patient.	1
25. During the turn, nurses roll the knees consistently with the body of the patient.	1
26. During the turn, nurses monitor the patient's hemodynamic and general condition.	1
27. During the turn, nurses turn the patient by device or drawsheet.	1
28. During the turn, nurses hold a drawsheet for the posture change.	1
29. During the turn, nurses use lifting devices for obese and bariatric patients.	1
30. During the turn, nurses roll the patient smoothly from his shoulder.	1
31. During the turn, nurses roll the patient smoothly from his hip.	0.67
32. During the turn, nurses roll the patient head and shoulder consistently with the other body part.	0.67
33. During the turn, nurses change the posture of heels.	0.67
34. During the turn, at least two nurses participate in doing the procedure.	1
35. During the turn, two or more nurses enrolled each during the procedure.	1
36. During the turn, nurses agree on what each one will do.	0.67
37. During the turn, nurses count one, two, three before making the turn.	1
38. During the turn, nurses flex their knees.	1
39. During the turn, nurses apply the body mechanism principles, manual handling techniques to protect their muscles.	1
40. During the turn, nurses distribute the patient weight on their large muscles such as thigh and arms, not on their backs.	0.67
41. During the turn, nurses distributed as one nurse on each side at least.	0.67
42. After the turn, nurses evaluate the level of patient comfort.	0.67
43. After the turn, nurses evaluate the patient's facial expressions.	0.67
44. After the turn, nurses put a pillow under the patient's head.	1
45. After the turn, nurses put a pillow under the patient shoulder.	0.67
46. After the turn, nurses put a pillow between the legs.	1
47. After the turn, nurses put a pillow to support the back of patients.	1
48. After the turn, nurses offload both heels.	1
49. After the turn, nurses keep their heels flattened.	0.67
50. After the turn, nurses support the feet with a pillow or suitable device.	1
51. After the turn, nurses support the keens with a pillow or suitable	1

Items	I-CVIs
device.	
52. After the turn, nurses support the hand and forearm with a pillow or suitable device.	1
53. After the turn, nurses wait for a few seconds to ensure that the patient is not falling to his previous posture.	1
54. After the turn, nurses make sure that the angle between the patient and bed is around 30 degrees.	1
55. After the turn, nurses check the angle between the patient and the bed.	0.67
56. After the turn, nurses secure any medical devices such as IV line, foley catheter, endocranial tube …..etc.	1
57. After the turn, nurses secure all non-medical equipment such as a ring, watch, or collar.	0.67
58. After the turn, nurses secure tide bedlinen and draw sheet and ensure there are no wrinkles under the patient body.	1
59. After the turn, nurses secure boney prominence.	0.67
60. Nurses document how the procedure happen	1
61. Nurses document skin color, pigmentation, and texture	1
62. Nurses document the presence of any injury, peeling, ulcerations, or wounds.	1
63. Nurses document the current positioning they put the patient on	1
64. Nurses document when the procedure happened	1
65. Nurses document when is the next time the procedure should happen.	1
66. Nurses document the body alignment condition of the patient.	1
67. Nurses document who participate in doing the procedure	1
68. Nurses document the presence of any pain or discomfort when putting the patients on	1
69. Nurses document the procedure based on the policy.	1
70. Nurses document the procedure based on the format approved by policy.	0.78
71. Nurses document by using expressions approved by policy.	1
72. Nurses document the ability of the patient to assist in doing the turn.	0.78
73. Nurses document any equipment they use during the turn.	1
74. Nurses document the notification for the physician.	1
75. Nurses document reminders for the other nurses about the patient.	0.78
76. Nurses document the factors that influence the to do the procedure.	0.78
I-CVIs (mean)	0.91
S-CVI	0.81

Items	I-CVIs
Noted: - I-CVI is the number of experts rate the item as three of four to the relevancy of item, divided by the number of experts. - Scale-Content Validity Item/Universal Agreement (S-CVI/UA) is the number of items considered relevant by all the experts (or number of items with CVI equal to 1) divided by the total number of items. - Scale-Content Validity Item/Average is the sum of I-CVIs is divided by the total number of items means of item content validity (I-CVI) I-CVI (>.70) and S-CVI (>.80) based on (Davis, 1992; Polit & Beck, 2010).	

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Appendix G

EFA assumptions and Research Instrument

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Table (1): Descriptive analysis for EFA study (n=306)

Item	Mean	Std	Skewness
Item 1	3.79	1.44	-0.776
Item 2	3.68	1.411	-0.59
Item 3	3.88	1.353	-0.881
Item 4	4.12	1.3	-1.323
Item 5	3.96	1.356	-1.063
Item 6	3.97	1.332	-1.036
Item 7	4.01	1.328	-1.132
Item 8	3.61	1.408	-0.591
Item 9	3.85	1.372	-0.928
Item 10	4	1.347	-1.073
Item 11	3.89	1.347	-0.985
Item 12	4.08	1.352	-1.204
Item 13	3.81	1.404	-0.804
Item 14	3.84	1.418	-0.881
Item 15	3.93	1.319	-0.938
Item 16	4.03	1.28	-1.166
Item 17	4.03	1.333	-1.131
Item 18	3.92	1.393	-0.998
Item 19	3.87	1.321	-0.89
Item 20	3.83	1.398	-0.851
Item 21	3.85	1.469	-0.945

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Item	Mean	Std	Skewness
Item 22	3.88	1.352	-1.042
Item 23	3.81	1.397	-0.907
Item 24	3.86	1.445	-0.947
Item 25	3.77	1.476	-0.801
Item 26	3.73	1.485	-0.801
Item 27	3.32	1.594	-0.301
Item 28	3.71	1.488	-0.796
Item 29	3.69	1.499	-0.747
Item 30	3.79	1.44	-0.87
Item 31	3.78	1.506	-0.892
Item 32	3.85	1.482	-0.957
Item 33	3.6	1.499	-0.691
Item 34	3.83	1.479	-0.935
Item 35	3.86	1.425	-0.976
Item 36	3.9	1.427	-1.049
Item 37	3.84	1.445	-0.952
Item 38	3.77	1.453	-0.842
Item 39	3.69	1.423	-0.766
Item 40	3.78	1.394	-0.796
Item 41	3.83	1.385	-0.892
Item 42	3.84	1.397	-0.932
Item 43	3.93	1.424	-1.077

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Item	Mean	Std	Skewness
Item 44	3.83	1.404	-0.968
Item 45	3.83	1.529	-0.952
Item 46	3.92	1.354	-1.027
Item 47	3.94	1.43	-1
Item 48	3.91	1.384	-0.96
Item 49	3.97	1.426	-1.184
Item 50	3.97	1.405	-1.064
Item 51	3.91	1.421	-0.969
Item 52	3.74	1.488	-0.764
Item 53	3.81	1.448	-0.788
Item 54	3.67	1.501	-0.671
Item 55	3.78	1.41	-0.807
Item 56	3.74	1.509	-0.747
Item 57	3.75	1.463	-0.744
Item 58	3.62	1.486	-0.584
Item 59	3.77	1.53	-0.787
Item 60	3.71	1.484	-0.703
Item 61	3.98	1.372	-1.062

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Table (4): KMO and Bartlett's test, EFA study n =306

KMO and Bartlett's's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.97
Bartlett's Test of Sphericity	Approx. Chi-Square	28066.02
	df	1830
	Sig.	0

Table (5) Communalities, EFA study n = 306

Communalities		
	Initial	Extraction
Item 1	1	0.659
Item 2	1	0.779
Item 3	1	0.803
Item 4	1	0.822
Item 5	1	0.801
Item 6	1	0.858
Item 7	1	0.797
Item 8	1	0.708
Item 9	1	0.817
Item 10	1	0.785
Item 11	1	0.83
Item 12	1	0.855

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Communalities		
	Initial	Extraction
Item 13	1	0.824
Item 14	1	0.765
Item 15	1	0.785
Item 16	1	0.792
Item 17	1	0.821
Item 18	1	0.854
Item 19	1	0.809
Item 20	1	0.749
Item 21	1	0.745
Item 22	1	0.805
Item 23	1	0.88
Item 24	1	0.823
Item 25	1	0.759
Item 26	1	0.798
Item 27	1	0.522
Item 28	1	0.786
Item 29	1	0.792
Item 30	1	0.767
Item 31	1	0.74
Item 32	1	0.859
Item 33	1	0.766

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Communalities		
	Initial	Extraction
Item 34	1	0.835
Item 35	1	0.897
Item 36	1	0.876
Item 37	1	0.861
Item 38	1	0.874
Item 39	1	0.874
Item 40	1	0.845
Item 41	1	0.803
Item 42	1	0.822
Item 43	1	0.802
Item 44	1	0.817
Item 45	1	0.645
Item 46	1	0.804
Item 47	1	0.838
Item 48	1	0.804
Item 49	1	0.819
Item 50	1	0.814
Item 51	1	0.823
Item 52	1	0.826
Item 53	1	0.867
Item 54	1	0.835

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Communalities		
	Initial	Extraction
Item 55	1	0.863
Item 56	1	0.803
Item 57	1	0.878
Item 58	1	0.82
Item 59	1	0.825
Item 60	1	0.836
Item 61	1	0.828
Extraction Method: Principal Component Analysis.		

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Research Instrument for EFA

Part One: Foundational Part

Please read the following item and choose the most appropriate

Many nurses complain of low back pain, neck stiffness, or muscular discomfort from repositioning practice.

Others said; No, there are no relations with these issues and repositioning practice.

Which one is closer to your viewpoint?

1. Repositioning practice is harmful. It causes back pain, muscular spasms.
2. The shortage makes nurses do it without considering all steps or safety precautions, which leads to harmful consequences.
3. Insufficient training makes nurses unable to do repositioning practice correctly.
4. Repositioning practice is not dangerous, but some patients are heavy, and this causes muscular pain.
5. There is no problem in repositioning practice.
6. Other (Write what do you think).

The scaling of questionnaire

Scaling	Meaning
1	Never
2	Rarely
3	sometimes
4	Often
5	Always

จุฬาลงกรณ์มหาวิทยาลัย
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Items	Frequency of Practice				
	1	2	3	4	5
1. Nurses identify the patient.					
2. Nurses introduce themselves to the patient.					
3. Nurses explain the procedure to patients and their families (if they present).					
4. Nurses protect patients' privacy and dignity all the time					
5. Nurses raise the bed to a suitable height and ensure the wheels are off.					
6. Nurses straighten the bed (Make the bed flat) if there is no contraindication.					
7. Nurses remove the pillows from the patient's bed to best assist in positioning					
8. Nurses cross the patient's arms on his chest if he/she can					
9. Nurses ensure a clean and proper side sheet “drawsheet” above the bed linen and under the patient's body that crosses the bed from left to right.					
10. Nurses assure no urinary or stool contamination on the incontinency area “buttocks and genitals”.					
11. Nurses extend the patient's legs if possible and clinically appropriate					
12. Nurses lower the side rail in the working side and raise it after finishing the procedure					
13. Nurses centralize the patient body in the middle of the bed (make the patient in the middle of the bed away from the sides if appropriate and clinically applicable)					
14. Nurse acknowledged additional preparations for prone posture					
15. Nurses evaluate patients' physical ability to assist in turning.					
16. Nurses assess the patient for any turn restrictions					
17. Nurses assess the patient for the presence of any pressure ulcer					
18. Nurses assess the patient skin over the incontinence area for the presence of any moisture associated skin damage					
19. Nurse’s one hand over the shoulder and other hand over the hip “pelvic”					
20. Nurses ensure that the position of the head and neck are in alignment with the body / trunk.					

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Items	Frequency of Practice				
	1	2	3	4	5
21. Nurses ensure moving the arm in a way not affected on any IV lines or devices connect it, and assure it will not fall under the patient's body.					
22. Nurses roll the legs in alignment with the patient's body.					
23. Nurses move the knees in alignment with the body					
24. Nurses monitor the patient's general condition, including pain or discomfort					
25. Nurses move the patient by using a repositioning aid or slid sheet "drawsheet".					
26. Nurses used a slid sheet "drawsheet" to assist in turning without dragging.					
27. Nurses use lifting devices for bariatric patients (Obese)					
28. Nurses move the patient smoothly from the shoulder and hip "pelvic" if clinically appropriate					
29. Nurses change the posture of heels in alignment with the body truck					
30. At least two nurses participate in doing the procedure (could be 5 for bariatric patients or for prone position)					
31. Nurses agree on what each one would do					
32. Nurses synchronize the movement					
33. Nurses use good body mechanics (flex their knees, back, and neck in extension to prevent repetitive stress injury or any muscular-skeletal injuries)					
34. Nurses distributed a minimum of two nurses, one nurse on each side of the bed at least					
35. Nurses evaluate the patient's comfort verbally and/or non-verbally					
36. Nurses put a pillow under the patient's head and shoulder if clinically applicable					
37. Nurses put a pillow between the legs or underneath the legs based on the clinical appropriateness.					
38. Nurses put a pillow behind the patients (if on side position) or on edge (if supine position) depending on clinical appropriateness					
39. Nurses' offload both heels by heel lifter or pillow					

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Items	Frequency of Practice				
	1	2	3	4	5
40. Nurses support the feet with a pillow or suitable device.					
41. Nurses support the knees with a pillow					
42. Nurses support the hand and forearm with a pillow or suitable device.					
43. Nurses ensure that the patient is not falling (go back) to his previous posture					
44. Nurses make the angle between the patient and bed is around 30 degrees unless clinically contraindicated					
45. Nurses secure all medical devices such as IV line, foley catheter, endocranial tube …..					
46. Nurses tide bedlinen and draw slid “drawsheet” (there are no wrinkles under the patient body).					
47. Nurses document how the procedure progressed					
48. Nurses document skin color, pigmentation, and texture “skin assessment result” every time when repositioning practice happen					
49. Nurses document the presence of any injury, peeling, ulcerations, or wounds at any area of skin.					
50. Nurses document the current positioning they put the patient in					
51. Nurses document the date and exact time that the procedure was undertaken					
52. Nurses document the plan of the next repositioning, date, time and type.					
53. Nurses document the general body condition (such as the joint movements, muscle conditions)					
54. Nurses document who participated in doing the procedure					
55. Nurses document the presence of any pain or discomfort during or after the procedure					
56. Nurses document if the procedure was based on hospital policy.					
57. Nurses document the ability of the patient to assist in doing the turn.					
58. Nurses document any equipment they used during the turn.					
59. Nurses document if the physician was notified.					
60. Nurses document reminders for the next turn.					
61. Nurses document the factors that influence the to do the procedure such as risk skin assessment “Braden scale or others…”					

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Appendix H

Research Instrument for CFA

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Repositioning practice for a hospitalized bedridden patient (Data Collection)

Paper version

Dear Respected Nurses,

I am Abdulkareem Iblasi, and this is part of my Ph.D. dissertation in repositioning practice measurement to prevent pressure ulcer/injury development in hospitals.

Repositioning practice is a cornerstone in preventing pressure ulcers/injuries. And we have difficulty in establishing a valid and reliable measurement. Your participation is crucial in assuring the tool can provide a consistent, accurate, reliable, and valid measure for the repositioning practice.

Seventy-two items were divided into foundational issues, repositioning practice measurement, and demographical data. You are requested to read and respond accordingly.

The study had ethical approval from King Saud Medical City number H1R1-31-MAR 21-02 and Chulalongkorn University - Faculty of nursing/number 8/2563.

There will not be any signs, mentions, or referral for any personal information or anything that will lead to your identity; not the researcher nor anyone can identify who is responding.

You will get a gift after finishing the survey. The gift is free to access two courses in wound care; Pressure Ulcer from A to Z & Pressure ulcer prevention (in Arabic language), plus seven electronic books in wound care. The gift will be sent to your email after 3 to 5 working days from submission. It is expected to take 12 to 15 minutes to respond to all items.

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Participant Consent Form

Vital for you to know that:

A. Withdrawal without Prejudice

Participation is voluntary; rejection to participate will not involve any consequences. You are free to withdraw the survey at any time without discrimination or penalty. You are also free to refuse to answer any questions/items in the survey.

B. Procedure

If you are ready to participate, you are requested to press the "Next" button down, read the questions, and click on the options that reflect what you think is the right option.

C. Risk and Discomfort

No risks or discomfort are anticipated from your participation in the study.

D. Benefit

The benefit of participating in this research is the opportunity to develop a valid and reliable measurement tool for repositioning practice. There are no personal benefits. However, the results of your answer will be helpful for the future of pressure ulcer/ injury prevention in Saudi Arabia.

E. Confidentiality

The information gathered during this study will remain confidential in the secure and protected web domain. Only the researcher will have access to the study data and information. There will not be any identifying personal information. The study results will be published in a research paper and may be published in an International journal or presented at a professional meeting. The knowledge obtained from this study will be of great value in guiding professionals to be more effective.

F. Cost

Researchers will bear all research-related costs.

For any concerns, questions, or comments feel free to contact the researcher (Abdulkareem Suhel Iblasi), E-mail:rn.iblasi@gmail.com, Mobile: 0066928530093

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Part One: Foundational Part

Please read the following item and choose the most appropriate

Many nurses complain of low back pain, neck stiffness, or muscular discomfort from repositioning practice.

Others said; No, there are no relations with these issues and repositioning practice.

Which one is closer to your viewpoint?

1. Repositioning practice is harmful. It causes back pain, muscular spasms.
2. The shortage makes nurses do it without considering all steps or safety precautions, which leads to harmful consequences.
3. Insufficient training makes nurses unable to do repositioning practice correctly.
4. Repositioning practice is not dangerous, but some patients are heavy, and this causes muscular pain.
5. There is no problem in repositioning practice.
6. Other (Write what do you think)

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Part Two: Repositioning Practice measurement

Read these items and choose the closest answer for nurses' performance.

For each item, there are five options which as following from the lower to highest:

1. Never, which means over the last 30 days, I did not notice nurses doing this action on any occasion per shift.
2. Rarely, which means over the last 30 days, I noticed nurses doing this rarely as one time per shift.
3. Sometimes, which means over the last 30 days, I noticed nurses doing this sometimes as two times per shift.
4. Often, which means over the last 30 days, I noticed nurses doing this often as three times per shift.
5. Always, which means over the last 30 days, I noticed nurses doing this consistently and all the time as four times per shift.

The scaling of questionnaire

Scaling	Meaning
1	Never
2	Rarely
3	sometimes
4	Often
5	Always

จุฬาลงกรณ์มหาวิทยาลัย
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Items	Frequency of practice				
	1	2	3	4	5
1. Nurses introduce themselves to the patient.					
2. Nurses explain the procedure to patients and their families (if they present).					
3. Nurses protect patients' privacy and dignity all the time					
4. Nurses raise the bed to a suitable height and ensure the wheels are off.					
5. Nurses straighten the bed (Make the bed flat) if there is no contraindication.					
6. Nurses remove the pillows from the patient's bed to best assist in positioning.					
7. Nurses cross the patient's arms on his chest if he/she can.					
8. Nurses ensure a clean and proper side sheet “drawsheet” above the bed linen and under the patient's body that crosses the bed from left to right.					
9. Nurses assure no urinary or stool contamination on the incontinency area “buttocks and genitals”.					
10. Nurses extend the patient's legs if possible and clinically appropriate					
11. Nurses lower the side rail in the working side and raise it after finishing the procedure					
12. Nurses centralize the patient body in the middle of the bed (make the patient in the middle of the bed away from the sides if appropriate and clinically applicable)					
13. The nurse acknowledged additional preparations for prone posture (if prone posture was planned, further preparations happened such as revising the medical needs for prone posture and assuring safety personnel, respiratory therapist if necessary and so on)					
14. Nurses move the patient smoothly from the shoulder and hip “pelvic” if clinically appropriate					
15. Nurses change the posture of heels in alignment with the body truck					
16. At least two nurses participate in doing the procedure (could be 5 for bariatric patients or for prone position)					
17. Nurses agree on what each one would do.					
18. Nurses synchronize the movement (by counting one, two, three before making the turn).					

Items	Frequency of practice				
	1	2	3	4	5
19. Nurses use good body mechanics (flex their knees, back, and neck in extension to prevent repetitive stress injury or any muscular-skeletal injuries)					
20. Nurses distributed a minimum of two nurses, one nurse on each side of the bed at least.					
21. Nurses evaluate the patient's comfort verbally (by words) and/or non-verbally (such facial expressions)					
22. Nurses put a pillow under the patient's head and shoulder if clinically applicable					
23. Nurses put a pillow between the legs (if side position) or underneath the legs (if supine position) based on the clinical appropriateness.					
24. Nurses put a pillow behind the patients (if on side position) or on edge (if supine position) depending on clinical appropriateness.					
25. Nurses offload both heels by heel lifter or pillow					
26. Nurses support the feet with a pillow or suitable device.					
27. Nurses support the knees with a pillow.					
28. Nurses support the hand and forearm with a pillow or suitable device.					
29. Nurses ensure that the patient is not falling (go back) to his previous posture.					
30. Nurses make the angle between the patient and bed is around 30 degrees unless clinically contraindicated.					
31. Nurses secure all medical devices such as IV line, foley catheter, endocranial tube …..					
32. Nurses document how the procedure progressed					
33. Nurses document skin color, pigmentation, and texture "skin assessment result" every time when repositioning practices happen					
34. Nurses document the date and exact time that the procedure was undertaken					
35. Nurses document the plan of the next repositioning, date, time, and type					
36. Nurses document the general body condition (such as the joint movements, muscle conditions)					
37. Nurses document who participated in doing the procedure					
38. Nurses document the presence of any pain or discomfort during or after the procedure					

Items	Frequency of practice				
	1	2	3	4	5
39. Nurses document if the procedure was based on hospital policy.					
40. Nurses document the ability of the patient to assist in doing the turn.					
41. Nurses document any equipment they used during the turn.					
42. Nurses document if the physician was notified.					
43. Nurses document reminders for the next turn.					
44. Nurses document the factors that influence the to do the procedure such as risk skin assessment “Braden scale or others…”					
45. Nurses ensure that the position of the head and neck are in alignment with the body / trunk.					
46. Nurses ensure moving the arm in a way not affected on any IV lines or devices connect it, and assure it will not fall under the patient’s body.					
47. Nurses roll the legs in alignment with the patient's body.					
48. Nurses move the knees in alignment with the body (bend the opposite knee of the turning direction in slid position and flex in supine position)					
49. Nurses monitor the patient's general condition, including pain or discomfort					
50. Nurses move the patient by using a repositioning aid or slid sheet “drawsheet”.					

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Part Three: demographical part

This section for demographical information

It will be used in analyzing and classifying repositioning practice score

1. I am working/was working in Saudi Arabia (Yes / No)
2. If Q1 yes in which region:
    a. Central region
    b. East region
    c. West region
    d. North region
    e. South region
3. Hospital type
    a. Public hospital, more than 1000 beds
    b. Public hospital, more than 500 beds, less than 1000
    c. Public hospital, less than 500 beds
    d. Privet hospital, more than 500 beds
    e. Privet hospital, less than 500 beds
4. I am working in (Unit):
    a. Intensive care unit for adults (ICU).
    b. Intensive care unit for pediatric (PICU, NICU)
    c. Cardiac Care Unit (CCU)
    d. Palliative or rehabilitation unit
    e. Medical-Surgical unit – Adult (Include all Oby Gyna)
    f. Medical-Surgical unit – Pediatrics
    g. Kidney Dialysis unit
    h. Wound Care Unit
    i. Nursing Education
    j. Nursing Quality (include infection control nurses)
    k. Operation rooms (include Recovery units)
    l. Emergency Department (Adult and Pediatrics)
    m. Day Surgery Unit
    n. Chemotherapy Clinics (Outpatient Clinic)

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o. I am working in an administrative position (including nursing leaders in high positions such as MOH)

p. Other: (mention)

5. The highest certificate I have is; (Academic degree)

a. Diploma of Nursing

b. Bachelor degree

c. Master degree

d. Ph.D.

6. I was born in ..... (Years Only)

7. I am working as a nurse since;..... (Years only)

8. My Nationality is

a. Saudi

b. Indian

c. Philippine

d. Jordan

e. Portugal

f. Indonesian

g. Malaysian

h. Egyptian

i. Lebanese

j. Western (Include United Kingdom, Ireland, United State of America, and Canada)

9. Gender

a. Male

b. Female

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Example of Data collection Sheet – Web version

This survey is currently not active. You will not be able to save your responses.

Repositioning practice for hospitalized bedridden patient

Repositioning Practice Measurement (RPM)

Dear Respected Nurses,

I am Abdulkareem Iblasi, and this is part of my Ph.D. dissertation, in repositioning practice measurement to prevent pressure ulcer/injury development in hospitals.

Repositioning practice is a cornerstone in preventing pressure ulcers/injuries. And we have difficulty in establishing a valid and reliable measurement. Your participation is crucial in assuring the tool's ability to provide a consistent, accurate, reliable, and valid measure for the repositioning practice.

Seventy-two items were divided into foundational issues, repositioning practice measurement, and demographical data. You are requested to read and respond accordingly.

The study had ethical approval from King Saud Medical City number H1R1-31-MAR 21-02 and Chulalongkorn University - Faculty of nursing/number 8/2563.

There will not be any signs, mentions, or referral for any personal information or anything that will lead to your identity; not the researcher nor anyone can identify who is responding.

You will get a gift after finishing the survey. The gift is free to access two courses in wound care; *Pressure Ulcer from A to Z & Pressure ulcer prevention (in Arabic language),* plus seven electronic books in wound care. The gift will be sent to your email after 3 to 5 working days from submission. It is expected to take 12 to 15 minutes to respond to all items.

Participant Consent Form

Important for you to know that:

A. Withdrawal without Prejudice
Participation is voluntary; rejection to participate will not involve any consequences. You are free to withdraw the survey at any time without discrimination or penalty. You are also free to refuse to answer any questions/items in the survey.

B. Procedure
If you are ready to participate, you are requested to press the "Next" button down, read the questions, and click on the options that reflect what you think is the right option.

C. Risk and Discomfort
No risks or discomfort are anticipated from your participation in the study.

D. Benefit
The benefit of participating in this research is the opportunity to develop a valid and reliable measurement tool for repositioning practice. There are no personal benefits. However, the results of your answer will be helpful for the future of pressure ulcer/ injury prevention in Saudi Arabia.

E. Confidentiality
The information gathered during this study will remain confidential in the secure and protected web domain. Only the researcher will have access to the study data and information. There will not be any identifying personal information. The study results will be published in the form of a research paper and may be published in an International journal or presented at a professional meeting. The knowledge obtained from this study will be of great value in guiding professionals to be more effective.

F. Cost
Researchers will bear all research-related costs.

For any concerns, questions or comments feel free to contact the researcher (Abdulkareem Suhel Iblasi), E-mail:rn.iblasi@gmail.com, Mobile: 0066928530093

Page (1)

This survey is currently not active. You will not be able to save your responses.

Foundation part

Please read the following item and choose the most appropriate

*Many nurses complain of low back pain, neck stiffness, or muscular discomfort from repositioning practice.
Others said; No, there are no relations with these issues and repositioning practice.
Which one is closer to your viewpoint?

Choose one of the following answers

- Repositioning practice is harmful. It causes back pain, muscular spasms.
- The shortage makes nurses do it without considering all steps or safety precautions, which leads to harmful consequences.
- Insufficient training makes nurses unable to do repositioning practice correctly.
- Repositioning practice is not dangerous, but some patients are heavy, and this causes muscular pain.
- There is no problem in repositioning practice.
- Other:

Previous Next

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Page (2)

LimeSurvey

25%

Repositioning Practice Measurement

Read these items and choose the closest answer for nurses' performance.

For each item, there are five options which as following from the lower to highest:

1. **Never**, which means over the last 30 days, I did not notice nurses doing this action on any occasion per shift.
2. **Rarely**, which means over the last 30 days, I noticed nurses doing this rarely as one time per shift.
3. **Sometimes**, which means over the last 30 days, I noticed nurses doing this sometimes as two times per shift.
4. **Often**, which means over the last 30 days, I noticed nurses doing this often as three times per shift.
5. **Always**, which means over the last 30 days, I noticed nurses doing this consistently and all the time as four times per shift.

Page (3)

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*Nurses introduce themselves to the patient.

Choose one of the following answers

- Never
- Rarely
- Sometimes
- Often
- Always

*Nurses explain the procedure to patients and their families (if they are present).

Choose one of the following answers

- Never
- Rarely
- Sometimes
- Often
- Always

*Nurses protect patients' privacy and dignity all the time

Choose one of the following answers

- Never
- Rarely
- Sometimes
- Often
- Always

*Nurses raise the bed to a suitable height and ensure the wheels are off.

Choose one of the following answers

- Never
- Rarely
- Sometimes
- Often
- Always

*Nurses straighten the bed (Make the bed flat) if there is no contraindication.

Choose one of the following answers

- Never
- Rarely
- Sometimes
- Often
- Always

*Nurses remove the pillows from the patient's bed to best assist in positioning.

Choose one of the following answers

- Never
- Rarely
- Sometimes
- Often
- Always

Appendix I

Testing Assumption for CFA

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Table 1: Items descriptive result in CFA study n = 323

Item	Mean (SD)	Skewness
1	3.59 (1.45)	-0.53
2	3.83 (1.45)	-0.87
3	4.05 (1.41)	-1.22
4	3.86 (1.44)	-0.92
5	3.91 (1.38)	-0.97
6	3.91 (1.44)	-1.00
7	3.54 (1.48)	-0.54
8	3.81 (1.44)	-0.90
9	3.93 (1.41)	-0.99
10	3.88 (1.38)	-0.97
11	4.13 (1.31)	-1.24
12	3.93 (1.26)	-0.91
13	3.91 (1.28)	-0.88
14	4.04 (1.22)	-1.03
15	4.08 (1.25)	-1.19
16	3.93 (1.22)	-0.95
17	3.93 (1.23)	-0.91
18	4.02 (1.24)	-1.02
19	3.97 (1.27)	-0.91
20	3.93 (1.28)	-0.89
21	3.96 (1.21)	-0.95
22	3.98 (1.21)	-0.95
23	4.03 (1.14)	-0.90
24	4.10 (1.14)	-1.01
25	4.09 (1.14)	-0.95
26	3.87 (1.19)	-0.71
27	4.07 (1.15)	-0.99
28	4.06 (1.14)	-0.92
29	4.07 (1.17)	-1.00
30	4.03 (1.16)	-0.89
31	3.93 (1.13)	-0.79
32	4.00 (1.07)	-0.71
33	4.07 (1.06)	-0.82
34	4.08 (1.09)	-0.93
35	4.24 (1.04)	-1.22
36	4.13 (1.04)	-1.02
37	4.28 (1.06)	-1.37

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Item	Mean (SD)	Skewness
38	3.90 (1.41)	-0.90
39	3.98 (1.25)	-0.87
40	4.10 (1.23)	-1.07
41	3.74 (1.41)	-0.65
42	3.80 (1.38)	-0.63
43	3.61 (1.44)	-0.47
44	3.83 (1.31)	-0.71
45	3.78 (1.42)	-0.69
46	3.80 (1.37)	-0.66
47	3.73 (1.36)	-0.57
48	3.85 (1.37)	-0.76
49	3.75 (1.35)	-0.65
50	4.12 (1.16)	-1.09

Table 2: Variance Inflation factor (VIF) for CFA study

Item	VIF	Consideration
1	1	
2	5.026	
3	6.97	
4	6.52	
5	5.35	
6	8.95	
7	6.16	
8	4.7	
9	6.39	
10	6.83	
11	7.26	
12	9.7	
13	8.08	
14	6.6	
15	5.39	
16	5.31	
17	7.89	
18	8.25	
19	6.75	
20	4.28	

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Item	VIF	Consideration
21	3.84	
22	6.4	
23	10.86	Keep due to the nature of process
24	7.78	
25	4.45	
26	6.62	
27	3.1	
28	6.4	
29	6.9	
30	4.92	
31	4.53	
32	4	
33	8.5	
34	8.2	
35	6.06	
36	8.7	
37	6.41	
38	8.77	
39	5.43	
40	8.3	
41	15.12	Keep due to the nature of process
42	12.63	Keep due to the importance and the nature of process
43	9.6	
44	9.09	
45	10.12	
46	9.88	
47	11.37	Keep due to the nature of process
48	12.766	Keep due to the nature of process
49	7.85	
50	7.7	

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Figure 1: the R script for Variance inflation factor (VIF) in CFA study n =323

```
# for VIF
modelV = lm(R1 ~., data = R)
library(car)
vif(modelV)
vif(modelV)
mean(vif(modelV))
Y1 <- mean(vif(modelV))
Y1 <- as.table(Y1)
Y <- vif(modelV)
Y < - as.table(Y)
```

Table 3: Sampling adequacy CFA study n = 323

KMO and Bartlett's Testa		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.96
Bartlett's Test of Sphericity	Approx. Chi-Square	2154 2.5
	df	1176
	Sig.	0

Appendix J

Output of CFA

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Figure 1: Omega reliability diagram for repositioning practice final version

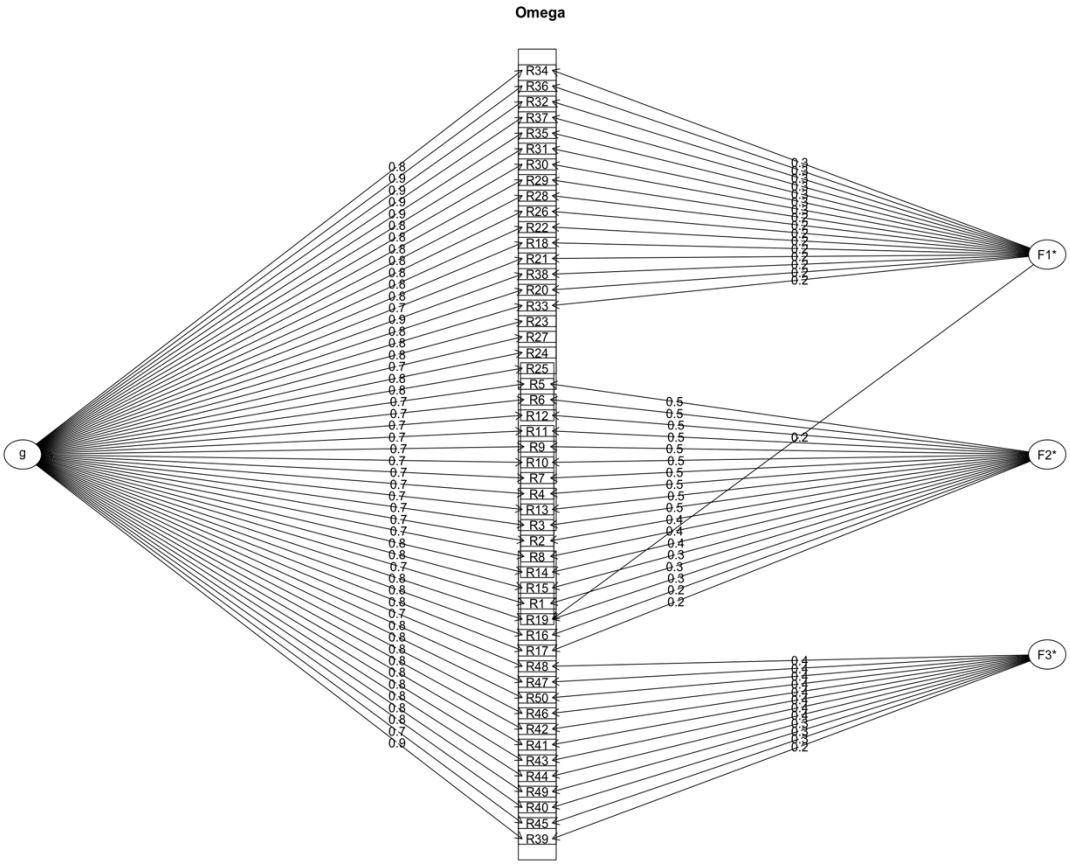

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Figure 2: Path analysis for Perpetration sub scale

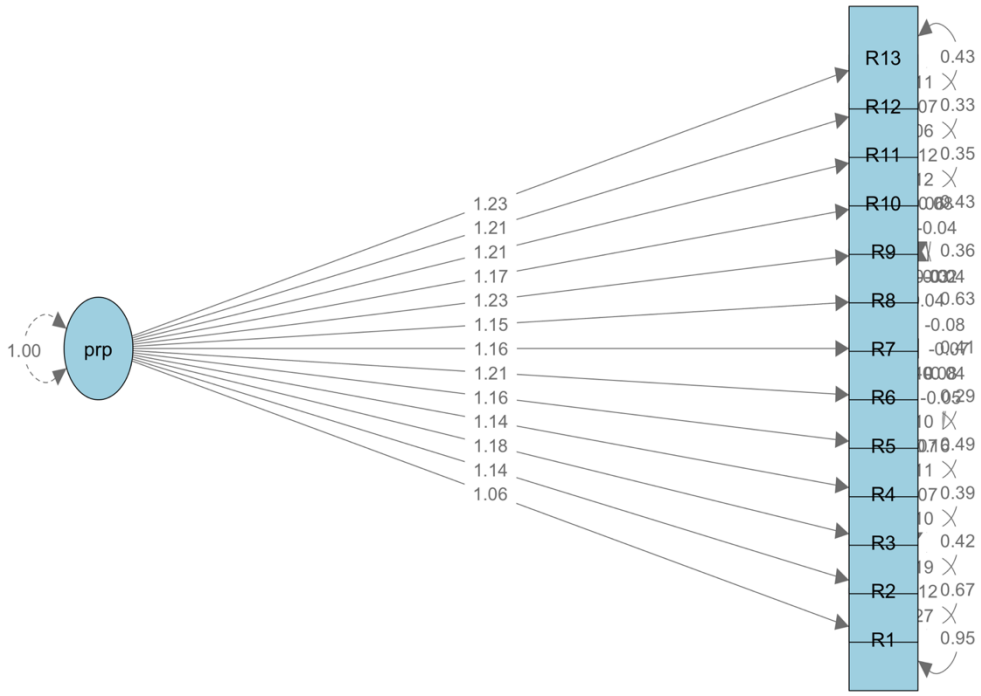

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Figure 3: Path analysis for Posturing Sub Scale

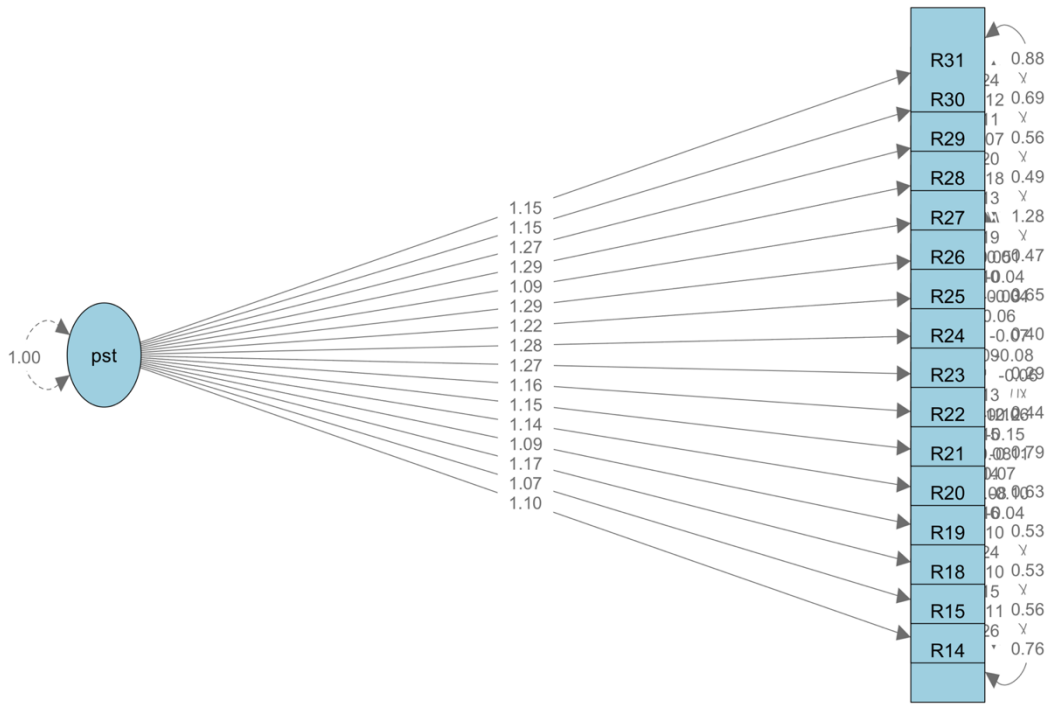

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Figure 4: Path analysis for documenting sub scale

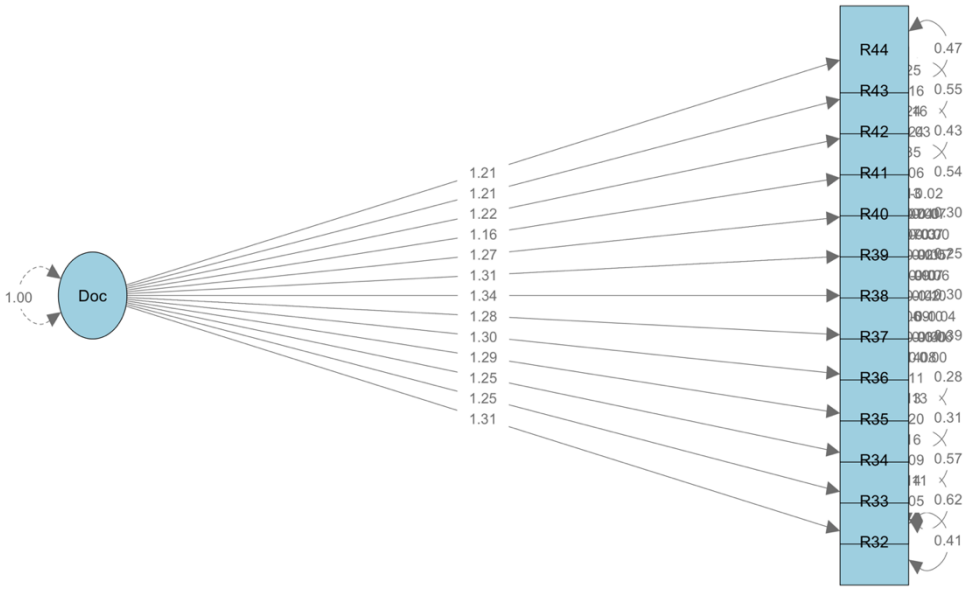

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Figure 5: Path analysis for evaluating sub scale

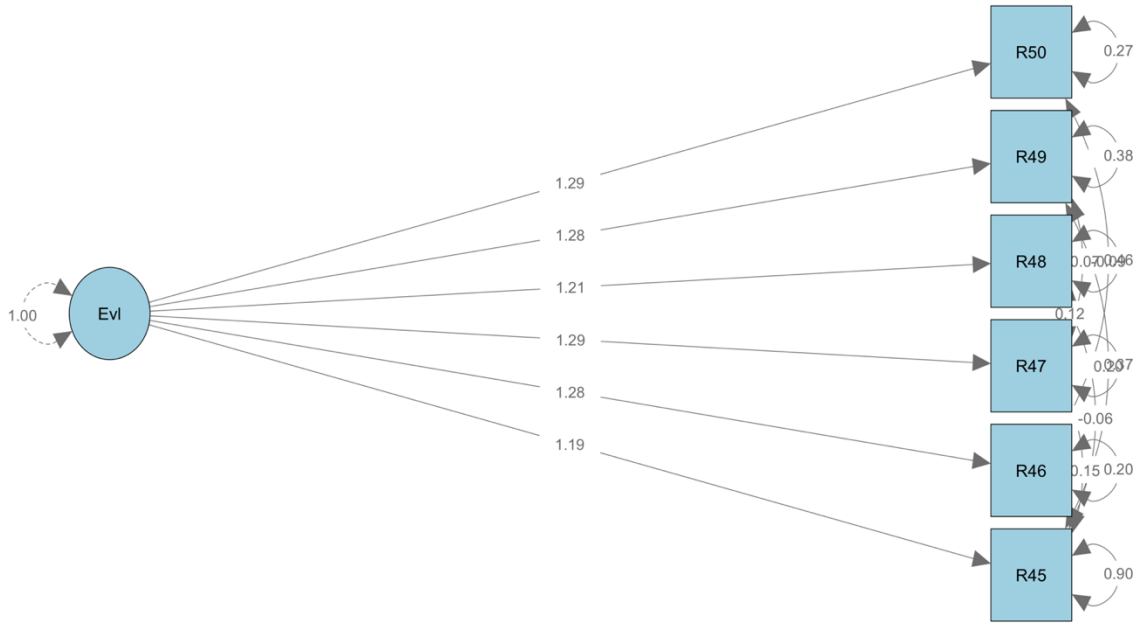

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Figure 6: Items correlation CFA study (n=323) all colored part one

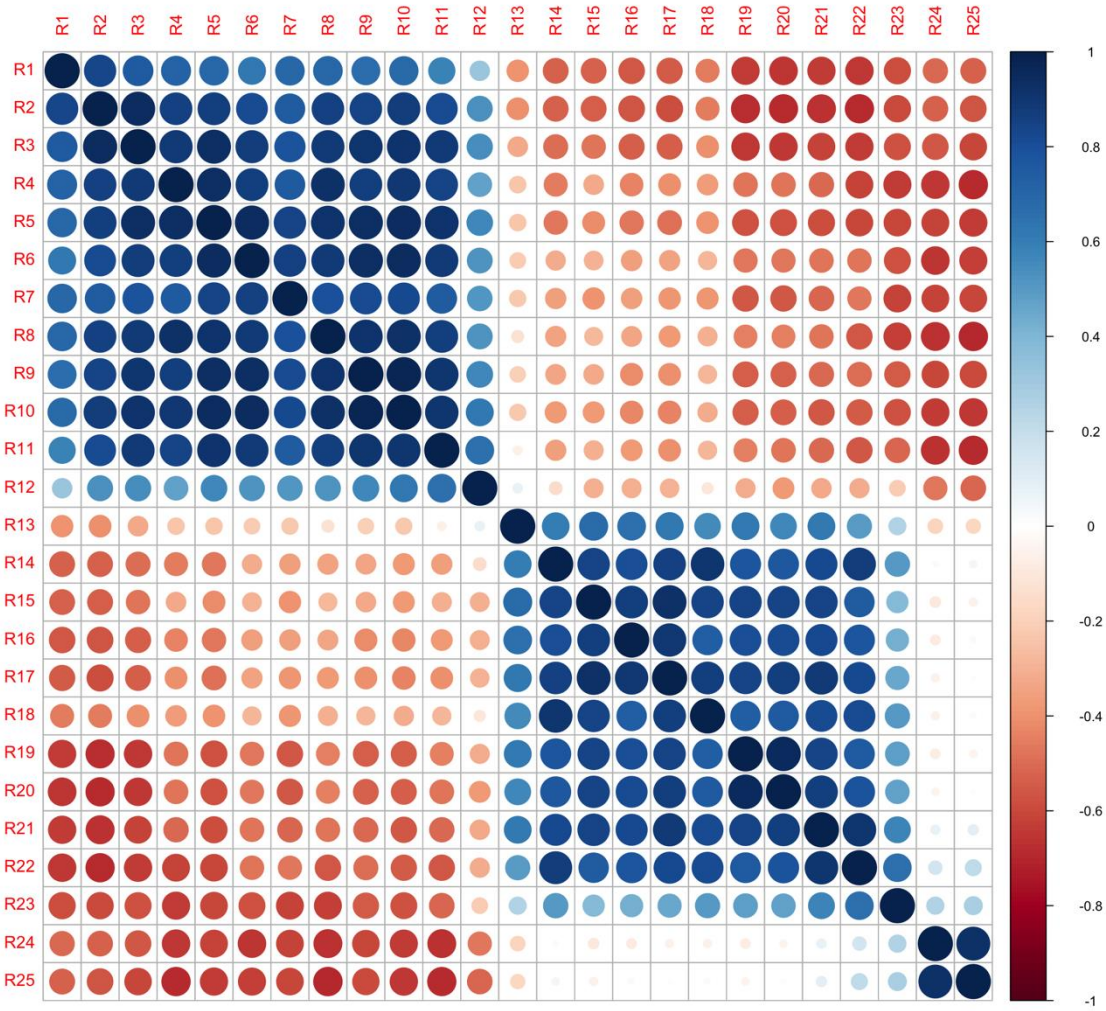

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Figure 7: Items correlation CFA study (n=323) all colored part two

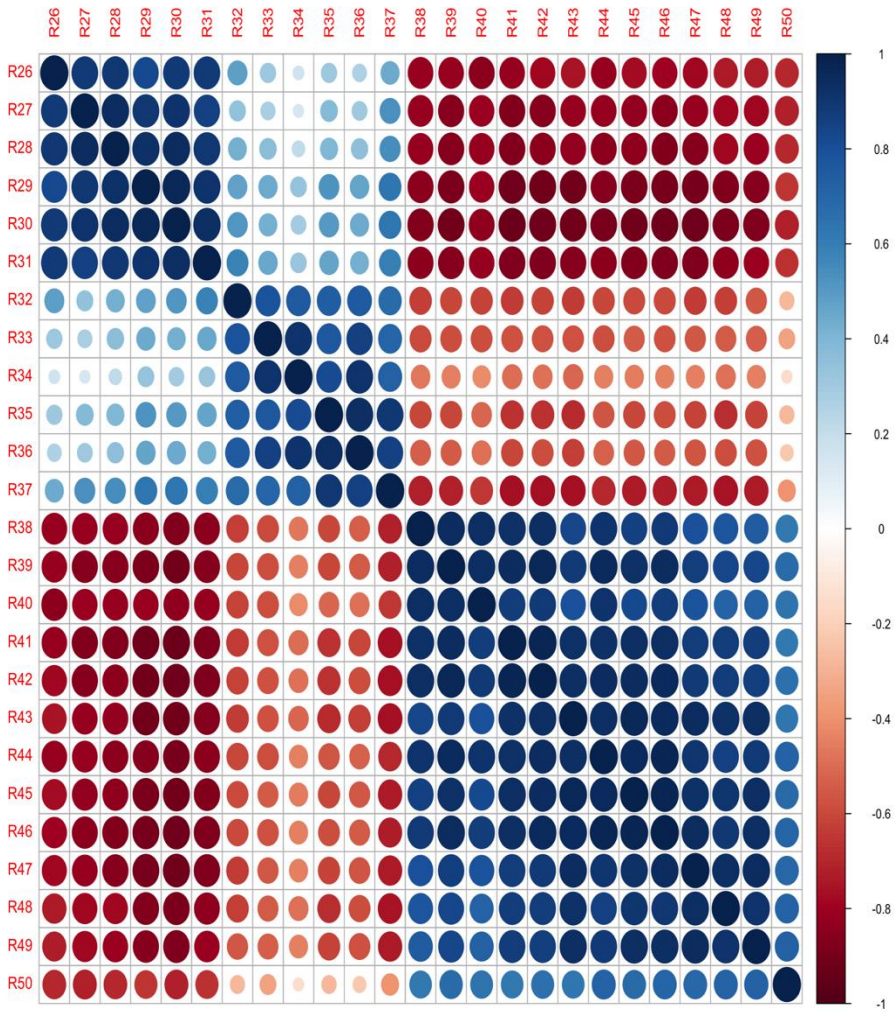

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Figure 8: Items correlation CFA study (n=323) all with numbers part one (Item 1 to item 25)

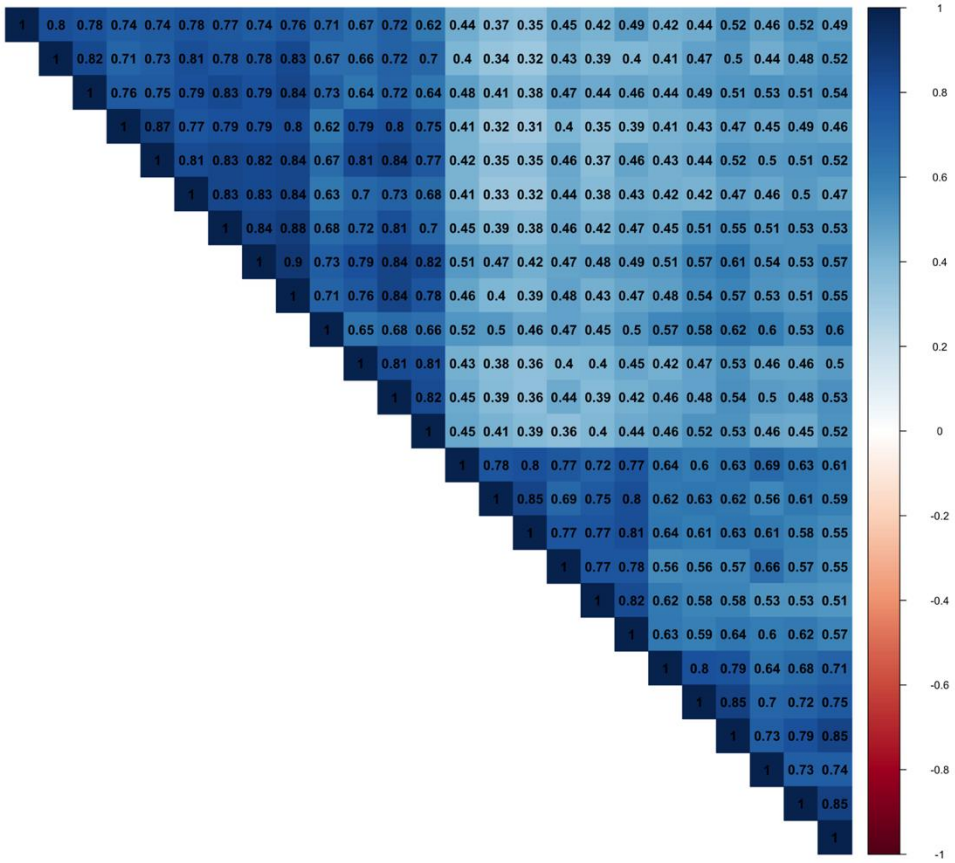

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Figure 9: Items correlation CFA study (n=323) all with numbers part two (Item 26 to item 50)

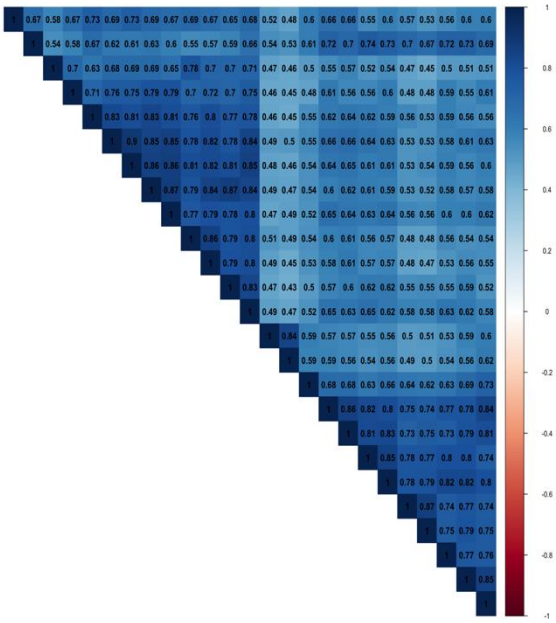

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Figure 10: Items correlation CFA study (n=323) in Preparing sub scale

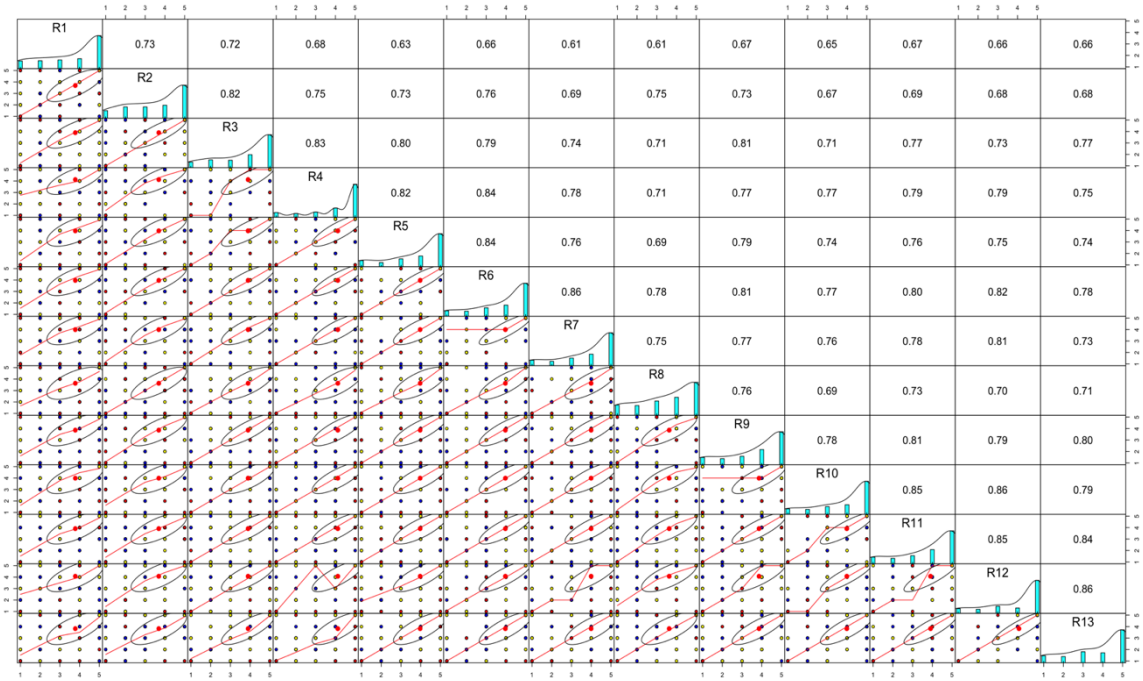

Figure 11: Items correlation CFA study (n=323) in Posturing sub scale

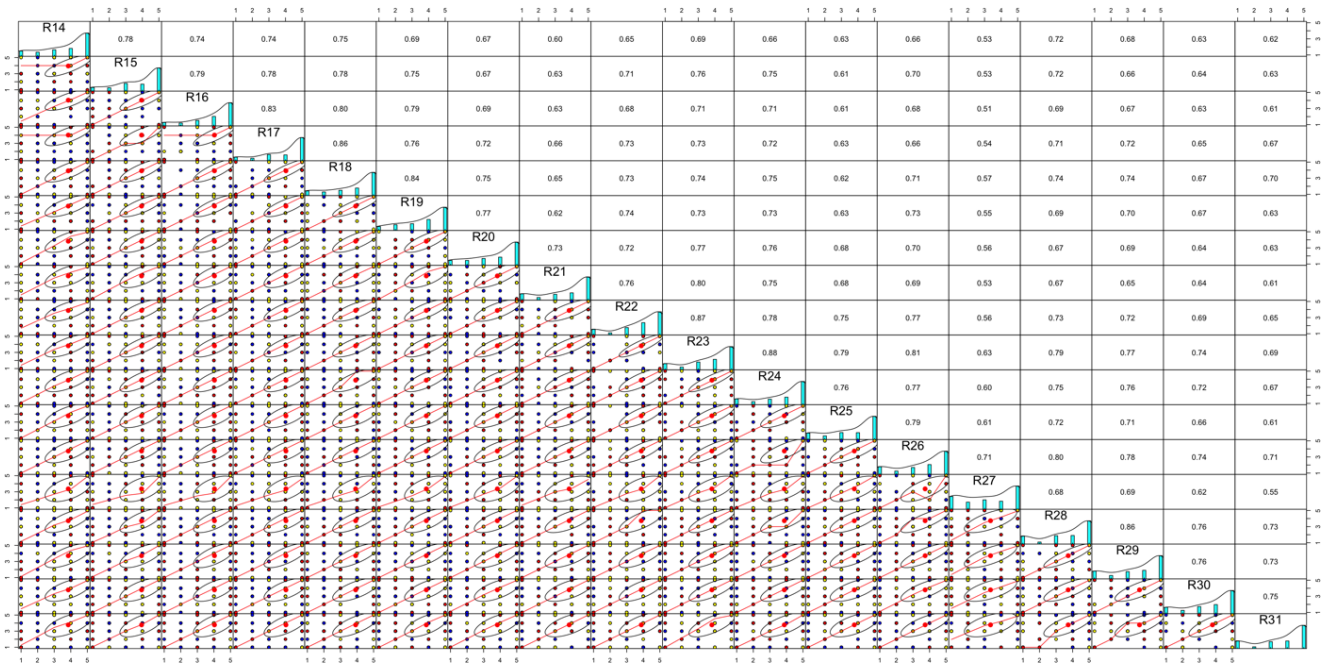

Figure (12) Items correlation CFA study (n=323) in Documenting sub scale

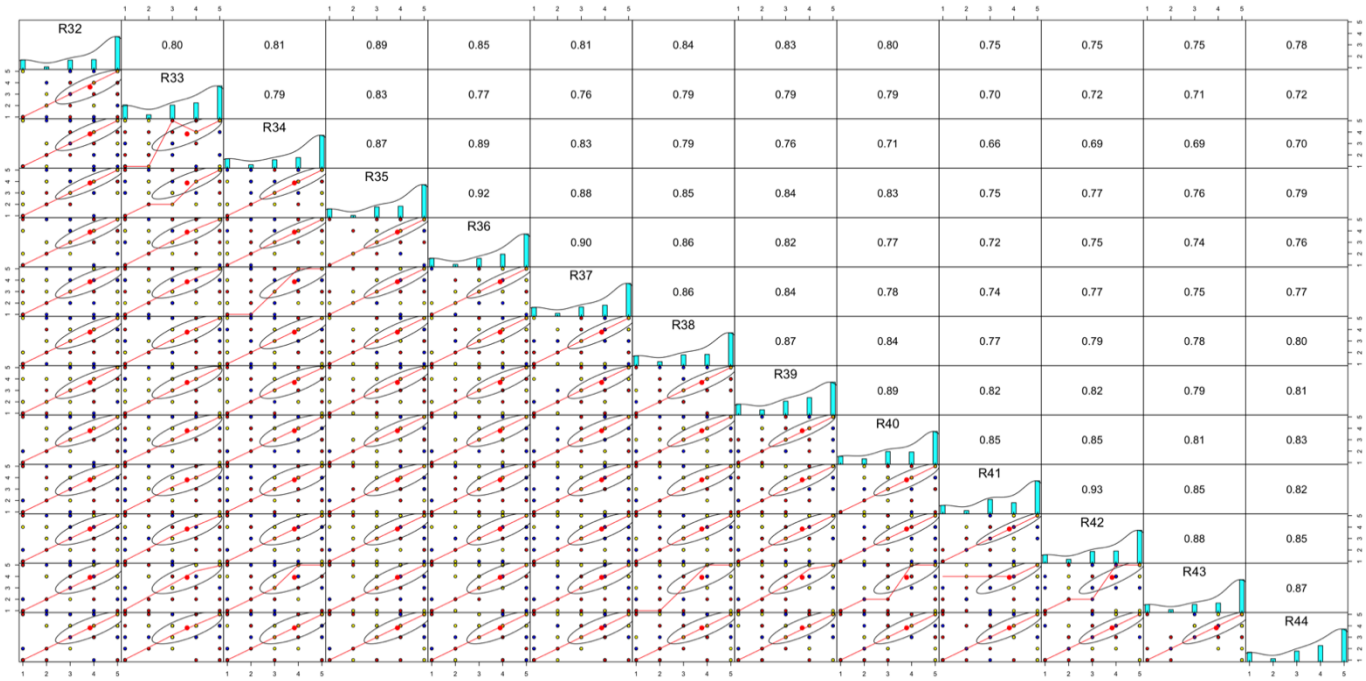

Figure (13) Items correlation CFA study (n=323) in Evaluating sub scale

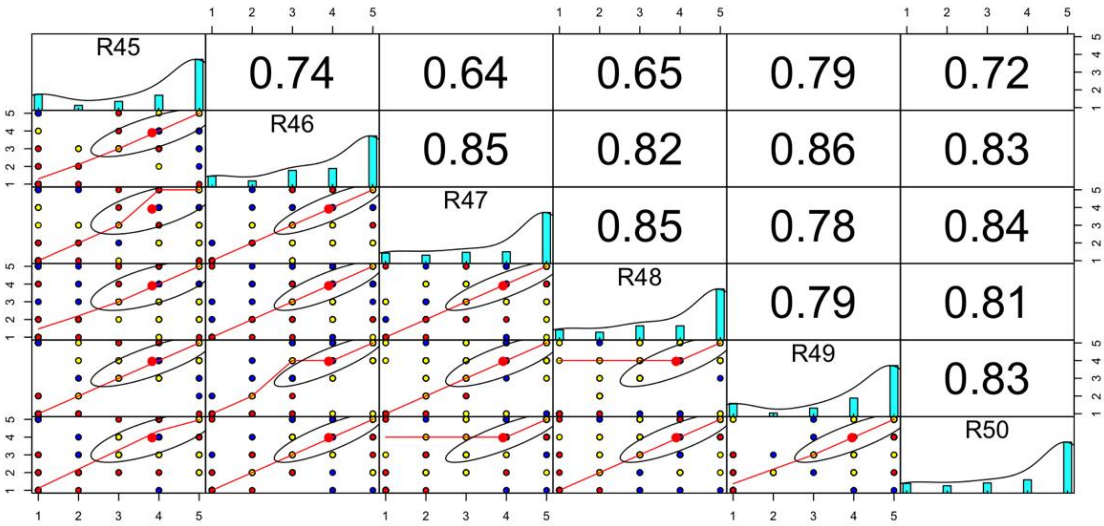

Figure 14: Transcript (2) CFA code for hypothesized model and modified model

```
R script for all statistical procedure
# Read the data
Conf1 <- read.csv("CFA324_A.csv", header = T)
head(Conf1)
Summary(Conf1)
# Call for the library
library(lavaan)
library(semTools)
#creating model of CFA MODEL 1 no restrications on COV
model1 <- 'preparing =~ R1+ R2+ R3+ R4 + R5+ R6 + R7 + R8 + R9 + R10 +
R11 + R12 + R13
posturing =~ R14 + R15 + R18 + R19 + R20 + R21 + R22 + R23 + R24 +
R25 + R26 + R27 + R28 + R29 + R30 + R31
Docu =~  R32 + R33 + R34 + R35 + R36 + R37 + R38 + R39 + R40 + R41 +
R42 + R43 + R44
Eval =~  R45 + R46 + R47 + R48 + R49 +R50'
# Run fit for CFA for Model1
fitmodel1 <- cfa(model1, data=Conf1, std.lv = T)
summary(fitmodel1, fit.measures=T, standardized = T, rsquare=T)
# run modification for the fit 1
mi1 <- modificationindices(fitmodel1, minimum.value = 10, sort = T)
# modify the model1 based on modifications and call it model1mi
model1mi <- 'preparing =~ R1+ R2+ R3+ R4 + R5+ R6 + R7 + R8 + R9 +
R10 + R11 + R12 + R13
posturing =~ R14 + R15 + R18 + R19 + R20 + R21 + R22 + R23 + R24 +
R25 + R26 + R27 + R28 + R29 + R30 + R31
Docu =~  R32 + R33 + R34 + R35 + R36 + R37 + R38 + R39 + R40 + R41 +
R42 + R43 + R44
Eval =~  R45 + R46 + R47 + R48 + R49 +R50
R41 ~~ R42
R34 ~~ R36
preparing =~ R14
R35 ~~ R36
R42 ~~ R43
R18 ~~ R19
R36 ~~ R37
Eval =~ R44
Eval =~ R43
R43 ~~ R44
R22 ~~ R23
```

R28 ~~ R29
R35 ~~ R42
R34 ~~ R35
R10 ~~ R12
R41 ~~ R43
Docu =~ R31
R23 ~~ R24
R14 ~~ R15
R36 ~~ R41
Eval =~ R42
R2 ~~ R3
R47 ~~ R48
R34 ~~ R41
R39 ~~ R40
R6 ~~ R7
R12 ~~ R13
R36 ~~ R40
R34 ~~ R40
R35 ~~ R41
R35 ~~ R43
R10 ~~ R11
R36 ~~ R42
R12 ~~ R14
Eval =~ R37
Eval =~ R41
R34 ~~ R42
Docu =~ R1
R45 ~~ R47
R42 ~~ R44
R32 ~~ R35
R40 ~~ R41
preparing =~ R15
Eval =~ R1
R21 ~~ R23
R1 ~~ R2
Docu =~ R29
R3 ~~ R12
Docu =~ R30
R47 ~~ R49
R45 ~~ R49
R27 ~~ R39

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R30 ~~ R38
R34 ~~ R44
R19 ~~ R20
R31 ~~ R32
R35 ~~ R37
R25 ~~ R26
R36 ~~ R43
Eval =~ R36
R37 ~~ R47
R37 ~~ R40
R2 ~~ R12
R18 ~~ R25
R24 ~~ R44
R15 ~~ R18
R34 ~~ R43
R34 ~~ R37
R26 ~~ R27
R36 ~~ R48
R30 ~~ R31
R3 ~~ R4
R3 ~~ R10
R21 ~~ R22
R36 ~~ R44
R40 ~~ R42
R1 ~~ R30
R25 ~~ R47
R32 ~~ R42
Docu =~ R45
R13 ~~ R19
Docu =~ R49
R5 ~~ R6
R13 ~~ R18
R37 ~~ R41
R2 ~~ R8
Docu =~ R23
Eval =~ R32
R35 ~~ R44
Eval =~ R35
R21 ~~ R39
R24 ~~ R43
Docu =~ R47

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R18 ~~ R23
R11 ~~ R13
R41 ~~ R44
preparing =~ R19
R31 ~~ R45
R15 ~~ R29
posturing =~ R1
R42 ~~ R46
R18 ~~ R34
R27 ~~ R29
R30 ~~ R42
R33 ~~ R34
R11 ~~ R12
R20 ~~ R21
R36 ~~ R49
R47 ~~ R50
R41 ~~ R46
R13 ~~ R14
Docu =~ R20
R2 ~~ R11
R23 ~~ R44
R32 ~~ R43
R12 ~~ R27
R14 ~~ R24
R37 ~~ R44
R14 ~~ R18
R20 ~~ R28
R15 ~~ R19
R38 ~~ R47
R13 ~~ R26
R12 ~~ R15
R15 ~~ R25
R45 ~~ R48
R23 ~~ R35
R2 ~~ R18
R37 ~~ R38
Eval =~ R34
R30 ~~ R47
R4 ~~ R5
posturing =~ R49
R30 ~~ R44

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R41 ~~ R47
R18 ~~ R26
R1 ~~ R14
R4 ~~ R13
R34 ~~ R39
R36 ~~ R47
R32 ~~ R34
R32 ~~ R41
R2 ~~ R32
R37 ~~ R42
R14 ~~ R47
R18 ~~ R35
Docu =~ R22
R27 ~~ R28
R5 ~~ R29
R2 ~~ R10
R23 ~~ R25
R13 ~~ R15
R13 ~~ R21
R19 ~~ R28
R2 ~~ R33
R21 ~~ R32
R31 ~~ R47
R13 ~~ R23
R12 ~~ R26
R33 ~~ R35
R37 ~~ R43
R1 ~~ R3
R25 ~~ R37
Eval =~ R2
R4 ~~ R28
R13 ~~ R22
R10 ~~ R30
R35 ~~ R46
R15 ~~ R46
R19 ~~ R22
R13 ~~ R31
R4 ~~ R6
R1 ~~ R44
R12 ~~ R29
R4 ~~ R9

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```
Eval =~ R40
R14 ~~ R48
R27 ~~ R50
R7 ~~ R24
R9 ~~ R49
R32 ~~ R37
R21 ~~ R24
R7 ~~ R12
R11 ~~ R28
R6 ~~ R19
R22 ~~ R34
R7 ~~ R19
Docu =~ R28
R8 ~~ R44
R15 ~~ R33'
# run the CFA for the model1mi
fitmodel_mi <- cfa(model1mi, data=Conf1, std.lv = T)
summary(fitmodel_mi, fit.measures=T, standardized = T, rsquare=T)
# make the graph and plot
library("tidySEM")
library("tidySEM")
library(psych)
library(corrplot)
library(ggplot2)
library(car)
library(semPlot)
semPaths(fitmodel1 , what = "paths", whatlabels = "stand" , rotation =1)
semPlotModel(fitmodel_mi)
semPlotModel_lavaanModel(fitmodel_mi)
semPlotModel_Onyx(fitmodel_mi)
semPlotModel_Amos(fitmodel_mi)
semPaths(fitmodel_mi, "std")
sem.2stage(fitmodel1)
?`semPlot-package`
library(semPlot)
graph_sem(fitmodel1)
graph_sem(fitmodel_mi)
graph_sem(fitmodel1)
semPaths( object = fitmodel3, what ="path")
graph_sem(spacing_x = 2.5, fix_coord = TRUE)
tidy_sem(fitmodel1
```

VITA

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