

# Assessing effectiveness of regular repositioning in preventing pressure ulcers in children

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## Abstract

Pressure ulcers have adverse effects on health. Thus, early detection of damage to skin integrity is important for preventing the occurrence of pressure sores. Meanwhile, two-hourly repositioning is a nursing intervention performed to prevent pressure ulcers. This study aimed to evaluate the implementation of regular repositioning for preventing pressure sores. The Braden Q Scale is an instrument that predicts skin breakdown caused by pressure ulcers. The designs used *quasi-experiment pretest* and *posttest nonequivalent control group*; 93 participants were selected through a nonprobability sampling technique by consecutive sampling (43 for the intervention group and 50 for the control group). Respondents in the intervention group were repositioned every 2 hours, and the control group received pressure mattress, which is done for 14 days or until the child can go home. The findings suggest that there is a significant difference in the Braden Q scores from before and after repositioning of the intervention group and the control group using pressure mattress ( $P < 0.001$ ). Nurses are expected to be able to detect early damage to skin integrity and to implement regular repositioning by using the Braden Q Scale.

## Introduction

Pressure ulcers could be affected for health due to their increasing occurrence. Pediatric clients have a risk of pressure ulcers during hospitalization.<sup>1</sup> The prevalence of pressure ulcers in children in the United States (US) was 1.4%.<sup>2</sup> In Spain, the prevalence of pressure ulcers in children from 23 hospitals was 3.31%; 1.79% of these cases happened in pediatric's general wards, and 9.39% occurred in pediatric intensive care units.<sup>3</sup> The highest prevalence was in children aged a year (4.77%), followed by children 1-3 years (2.89%).<sup>4</sup> From 2013 to 2016, there were 28 children

in Medan who had pressure ulcers; 13 of these children (46.4%) were younger than 5 years. In a top referral hospital in Jakarta, the incidence of pressure ulcers in the pediatric units was higher in 2018 (9 children [0.22%]) than in 2017 (6 children [0.1%]), and the ulcers mostly appeared on children who had prolonged bed rest.

Pressure ulcers are affected by tissue pressure and tolerance. Pressure intensity and the duration of being in a certain position could increase the risk of developing pressure ulcers.<sup>5</sup> Meanwhile, tissue tolerance is affected by age, tissue, medicines, nutritional status, medical diagnosis, body temperature, and physical condition.<sup>1</sup> Some intrinsic and extrinsic factors need to be taken into account in assessing tissue tolerance.<sup>1</sup> The intrinsic factors include age, nutrition, oxygenation, and tissue perfusion, and the extrinsic factors include friction, skin moisture, and the equipment used.<sup>1</sup>

Pressure ulcers require a long healing process and affect children's emotions. Pediatric clients might have the risk of infection, prolonged hospital stay, decreased rest time, and skin breakdown due to topical medication, which negatively impact children's mental development,<sup>6</sup> and increase the cost of hospitalization.<sup>7</sup> The increased incidence of pressure ulcers affects the medical expenses of clients and health care systems.<sup>8-11</sup>

Preventing pressure ulcers and repairing damaged tissue integrity are the main focus with regard to health services. Initial assessments are expected to prevent pressure ulcers. Early detection could be conducted using the Braden Q Scale, which is an instrument that assesses the risk of pressure ulcers and predicts risky and risk-free clients.<sup>1,9</sup> Common preventive interventions for children's treatment include the use of gel/water pillows and decubitus beds and repositioning.<sup>12</sup>

Regular repositioning could reduce pressure and prevent prolonged ischemia.<sup>13</sup> In addition, it could be the most effective way to prevent pressure ulcers because it could modify pressure sores.<sup>5</sup> Repositioning every two hours effectively reduced pressure ulcer incidences by 14%.<sup>14</sup> Two-hourly repositioning should be performed regularly within 24 hours, and it requires cooperation from patients' parents.<sup>15</sup> Children highly depend on their parents psychologically; therefore, parents' help is needed in order to provide a convenient ambiance for the children. Such prevention could be performed by reducing the pressure around bony prominences and paying attention to the children's comfort, such as by using pillows and cotton and by hand folding, given that repositioning can be

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Ethical approval: Ethical clearance was issued by the Research Ethics Committee of the Faculty of Nursing Universitas Indonesia (No. 38/UN2.F12.D/HKP.02.04/2019).

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uncomfortable.<sup>16</sup> Children would experience friction if repositioning is not performed correctly. Considering this background, this work used the Braden Q Scale to study the implementation of repositioning to prevent pressure ulcers in children.

## Materials and Methods

The study designs were quasi-experiment pre-test and post-test nonequivalent control group. The researcher assigned respondents into intervention and control groups. The intervention group was children who were treated in an acute room who underwent regular repositioning with 2-hourly repositioning should be given regularly within 24 hours, while the control

group was children who were treated in a non-infectious room received standard intervention in pediatric units using pressure mattress. The study population comprised pediatric patients on the pediatric room and the respondents were selected through a nonprobability sampling technique by consecutive sampling. The inclusion criteria were being aged between 1 month and 18 years and having a treatment length of 24 hours. Children who were anxious, lacked cooperation, edema, and had previous pressure ulcers were excluded. The total sample of this innovation project involved 93 children. This research was conducted in the pediatric area within 10 weeks (January 28, 2019, to April 5, 2019).

The instrument used in this study to collect data on the respondents' characteristics was an observation checklist that covered age, sex, parents' socio-economy and education, two-hourly repositioning records, Braden Q scores, and nutritional status. The data analysis comprised univariate and bivariate analyses. The bivariate analysis involved an independent t test and a paired t test. Ethical clearance was issued by the Ethical Committee of the Faculty of Nursing of Universitas Indonesia (No. 38/UN2.F12.D/HKP.02.04/2019).

## Results

Table 1 shows that the respondents in the intervention group were younger by 47.42 months than those in the control group.

Table 2 shows that the respondents in the intervention group were mostly females (23 respondents [53.5%]), and the most common medical diagnosis was on the respiratory system (12 respondents [27.9%]). Meanwhile, the control group was dominated by male respondents (31 respondents [62%]), and the most common medical diagnosis was on the musculoskeletal system (21 respondents [42%]). That most of the parents earned  $\geq$  IDR 2,000,000 (34 respondents in the intervention group [79.1%] and 49 respondents in the control group [98%]). The respondent distribution based on education shows that most of the mothers were senior high school (SMA) graduates (26 respondents in the intervention group [60.5%] and 38 respondents in the control group [76%]). In addition, most of the parents were private/BUMN employees (20 respondents in the intervention group [46.5%] and 31 respondents in the control group [62%]).

Table 3 shows the mean scores of the respondents' characteristics based on their Braden Q scores before and after interven-

tion. The Braden Q scores for the intervention group before and after intervention were 16.77 and 18.77, respectively, and the corresponding Braden Q scores for the control group were 20.02 and 20.64, respectively.

Table 4 shows a significant difference in the Braden Q scores obtained before and after repositioning in the intervention group and before and after the standard intervention in the control group ( $P < 0.05$ ).

Table 5 shows a significant difference in the Braden Q scores obtained after repositioning in the intervention group and after standard intervention in the control group ( $P = 0.002$ ;  $\alpha = 0.05$ ).

## Discussion

Age can determine one's health condition. In this innovation project, the average ages of the intervention and control groups

were 47.42 and 75.48 months, respectively. The average age applied in this study was similar to that in a previous study that stated that pressure ulcers frequently happened to children aged 5.9 years and prevalent in children older than 3 years.<sup>4,17</sup> The intervention group of this innovation project was dominated by females (23 respondents [53.5%]), and the most common medical diagnosis was pneumonia (12 respondents [27.9%]). Meanwhile, the control group was dominated by male respondents (31 respondents [62%]), and the most frequent medical diagnosis was osteosarcoma (14 respondents [28%]). In previous research, from 65,359 children aged 0-18 years who experienced pressure ulcers, 56.7% were males, and 43.3% were females.<sup>4</sup> Children aged 0-2 years, who have limited communication skills, had more cases of pressure ulcers than did other age groups. Such increased risk of pressure ulcers is often

**Table 1. Respondents' age.**

Respondents' characteristics	Mean	SD	Min	Max	95% CI
<b>Age</b>					
Intervention	47.42	60.297	2	208	28.86-65.98
Control	75.48	60.171	2	215	58.38-92.58

**Table 2. Characteristics based on sex, medical diagnosis, parents' socio-economy, education, and occupation.**

Respondents' characteristics	Frequency			
	Intervention	%	Control	%
<b>Sex</b>				
Female	23	53.5	19	38
Male	20	46.5	31	62
<b>Medical diagnosis</b>				
Respiratory system	12	27.9	3	6
Digestive system	9	20.93	1	2
Urinary system	4	9.3	21	42
Musculoskeletal system	1	2.3	7	14
Nervous system	7	16.3	14	28
Immune system	6	14	4	8
Cardiovascular system	3	6.97		
Sensing system	1	2.3		
<b>Socio-economy</b>				
< Rp 2,000,000	9	20.9	1	2
$\geq$ Rp 2,000,000	34	79.1	49	98
<b>Mother's education</b>				
Elementary and junior high school	8	18.6	6	12
Senior high school	26	60.5	38	76
Higher education	9	20.9	6	12
<b>Occupation</b>				
Unemployed	3	7	1	2
Civil servant	6	14	4	8
Private/BUMN employee	20	46.5	31	62
Laborer	5	11.6	1	2
Entrepreneur	8	18.6	12	24
Fisherman	1	2.3	1	2

observed in children with limited communication capabilities, such as neonates, infants, toddlers, and children with neurological problems.<sup>7,18</sup>

Pressure ulcers appear on the outermost layer of the skin due to external pressure and can expand into the deeper layers.<sup>7,19</sup> The Braden Q Scale is an instrument that assesses the risk of pressure ulcers. It can predict the possibility of pressure ulcer occurrences based on the recommendation from the *National Pressure Ulcer Advisory Panel (NPUAP)*, which covers mobility, activity, moisture, friction, nutrition, oxygenation, tissue perfusion, and sensory perception. According to the distribution table of the intervention group's results, the average Braden Q scores were 16.77 and 18.47 before and after repositioning, respectively. This condition was similar to that of the control group, wherein the Braden Q scores before and after treatment were 20.02 and 20.64, respectively. These findings show an increase in the Braden Q scores, which meant decreased risk of pressure ulcers.

The medical condition also affects the Braden Q score. In this evidence-based practice, children who suffered from neurological problems, such as encephalitis and hydrocephalus, had lower Braden Q scores compared with children who suffered from diarrhea, pneumonia, febrile, pericardial effusion, urinary tract infection, and other infectious diseases. The occurrences of pressure ulcers were caused by a lack of mobility, sensory perception, and mother's or caregiver's knowledge about neurological problems. Repositioning is a common nursing intervention that can be performed by nurses independently to prevent the risk of skin breakdown, especially in children who are immobile due to neurological problems, such as encephalitis and hydrocephalus. These children suffer from motor skills disorders and need their nurses and

parents to perform repositioning every two hours to prevent pressure ulcers.<sup>16</sup>

The risk factors that could cause pressure ulcers were divided into two types, namely, intrinsic and extrinsic factors. Several steps need to be conducted to reduce the impacts of risk factors, such as assessing the risk of pressure ulcers and implementing preventive actions (skin treatment and pressure management). The Braden Q Scale is recommended for assessing the risk of pressure ulcers.<sup>20</sup> This instrument can predict the occurrence of pressure ulcers.<sup>1</sup>

There are many interventions designed to prevent pressure ulcers in children; such measures include using supporting surfaces (like bed, integrated bed system, sheet, and pillow), repositioning, improving nutrition, applying skin treatment, and using topical creams.<sup>21</sup> One of the nursing interventions implemented in this evidence-based practice was repositioning. Regular repositioning can reduce pressure and the likelihood of prolonged ischemia.<sup>13</sup> Pressure ulcers can be prevented by reducing the pressure on bony prominences while paying attention to the children's comfort, such as by using pillows, cotton, and hand folding.<sup>16</sup> Psychologically, children highly depend on their parents; therefore, good cooperation from parents is required to provide a safe

and comfortable situation for child patients.<sup>16</sup>

In this evidence-based practice, two-hourly repositioning effectively improved the Braden Q scores. There was a significant difference in the Braden Q scores before and after treatment (16.77 and 18.47, respectively, in the intervention group [ $P < 0.05$ ] and 20.02 and 20.64, respectively, in the control group [ $P < 0.05$ ]). Although both groups showed significant differences, the control group showed a larger gap (1.7) than did the intervention group (0.62). Such conditions happened because the lengths of stay in the control group were shorter than those in the intervention group. Some respondents in the control group were hospitalized for chemotherapy and allowed to return home unless the chemotherapy had any adverse effect, thereby reducing the risk of developing pressure ulcers. There were also clients in the control group who had decreased Braden Q scores due to deteriorated physical condition, *i.e.*, many bony prominences and resulting high risk of pressure ulcers. Pressure ulcers commonly appeared on the sacrum area after hours of sitting on chairs, wheelchairs, and beds.<sup>22</sup> Gel or foam pillows cannot redistribute pressure until a certain time, thereby failing to properly prevent the risk of pressure ulcers.<sup>22</sup>

**Table 3. Respondents' Braden Q Score.**

Group	Mean ± SD	95% CI
<b>Intervention</b>		
Before	16.77 ± 2.707	15.93-17.60
After	18.47 ± 3.034	17.53-19.40
<b>Control</b>		
Before	20.02 ± 3.365	19.06-20.98
After	20.64 ± 3.457	19.66-21.62

**Table 4. Differences in Braden Q Scores before and after repositioning.**

Variable	Intervention			P	Control			P
	Mean	SD	95% CI		Mean	SD	95% CI	
<b>Braden Q Score</b>								
Before	16.77	2.707	-2.289; -1.106	<0.001*	20.02	3.365	-0.954; -0.286	<0.001*
After	18.47	3.034			20.64	3.457		

\*Significant at  $P < 0.05$ .

**Table 5. Braden Q Scores after repositioning.**

Variable	Intervention		Control		95% CI	P
	Mean	SD	Mean	SD		
Braden Q Score	18.47	3.034	20.64	3.457	-3.525; -0.825	0.002*

\*Significant at  $P < 0.05$ .

Children who are required to be on bed rest are made to lie on decubitus beds. Administering decubitus bed treatment does not mean that the nurses, in giving of comprehensive care, should ignore the risk of pressure ulcers. The control group yielded low Braden Q scores, which meant increased risk of pressure ulcers. Therefore, providing a decubitus bed is insufficient; two-hourly repositioning should be performed while still paying attention to patient comfort in order to prevent the risk of pressure ulcers in children.

## Conclusions

The implementation of two-hourly repositioning effectively increases Braden Q scores and can thus be conducted to prevent hospitalized children from developing pressure ulcers. The results of this evidence-based practice can be implemented as a nursing intervention for preventing pressure ulcers in children. Limitations of the study require cooperation from parents to 2-hourly repositioning should be given regularly within 24 hours.

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