

Experimental study of assistant aids and new nursing method in nursing care work¹

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Abstract. This study seeks to evaluate the effect of regular and new nursing methods in nursing care work. Nursing care work often causes low back pain in nursing care worker. The principle of not lifting when transferring patients has been proposed as one way to prevent low back pain. This principle incorporates the use of the patient's strength and assistant aids. A sliding seats and transfer boards have been proposed as assistant aids for the transferring patients. It is necessary to evaluate the effectiveness of these assistant aids in preventing low back pain. Ten subjects performed two tasks in this experiment. Five were nursing experienced persons and five were the inexperienced. EMG results indicated that the new nursing method was less stressful than the methods. A questionnaire revealed that the new method was evaluated more highly than the regular method. Based on these results, we propose that a sliding seats and transfer boards be used in nursing care work.

Keywords: assistive devices, electromyography, workload

1. Introduction

In Japan, which is already experiencing an aging society, many care workers suffer from work-related musculoskeletal disorders since assistive devices have not been adopted in care-work sites. Nurses and care takers often suffer low back pain when assisting patients. The principle of not lifting when transferring patients has been proposed as one way to prevent low back pain. This principle incorporates the use of the patient's strength and assistant aids. Sliding seats and transfer boards have been proposed as assistant aids for transferring patients. It is necessary to evaluate the effectiveness of these assistant aids in preventing lower back pain. This study seeks to evaluate the effect of regular and new nursing methods in nursing care work.

2. Method

Ten subjects performed two tasks in this experiment. Five were nursing experienced persons with a

mean age of 61.4±4.1 years, and five were inexperienced person with a mean age of 26.2±8.0 years. The experienced persons had a mean height of 157.2±4.3cm and a mean weight was 56.0±5.4kg. Inexperienced persons had a mean height of 161.0±1.7cm and a mean weight of 55.0±4.4kg.

They were all judged to be in good physical health and claimed never to have had any musculoskeletal or cardiovascular problems.

The subjects were evaluated with respect to task time and electromyography (EMG) of the biceps brachii, the trapezius, L4 (low back), and rectus femoris and were asked to complete a questionnaire about tasks. The work examined was transferring from a supine position on the bed to sitting in a wheelchair and a patient from sitting in a wheelchair to supine position on the bed.

The task conditions could be accomplished by two methods (Figure1). The regular nursing method transferred the subject in the usual way. The new nursing method was to transfer the subject using a sliding seat and the transfer boards.

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3. Result

3.1. Task time

Mean task times for transfer from a bed to a wheelchair were 140.7 ± 61.3 seconds for the regular nursing method and 239.4 ± 61.3 seconds for the new nursing method. The effect was statistically significant ($p < 0.05$) (Table 1). Mean task time for transfer from a wheelchair to a bed were 129.8 ± 52.0 seconds for the regular nursing method and 186.7 ± 29.6 seconds for the new nursing method. The effect was statistically significant ($p < 0.05$) (Table 1).

3.2. EMG

The mean values of L4 (low back) (right) in %MVC transfers from a bed to a wheelchair were

24.8% for the regular nursing method and 18.8% for the new nursing method (Table 2). The mean values of L4 (low back) (left) in %MVC showed 24.8% for the regular nursing method and 20.1% for the new nursing method. The %MVC at L4 (low back) (left and right) was maximum for the regular nursing method. EMG results thus revealed that the new nursing method had lower loads than the regular nursing method. The effect was statistically significant in all body parts ($p < 0.001$). The mean %MVC values for L4 (low back) (right) when transferring from a wheelchair to a bed were 25.5% for the regular nursing method and 21.8% for the new nursing

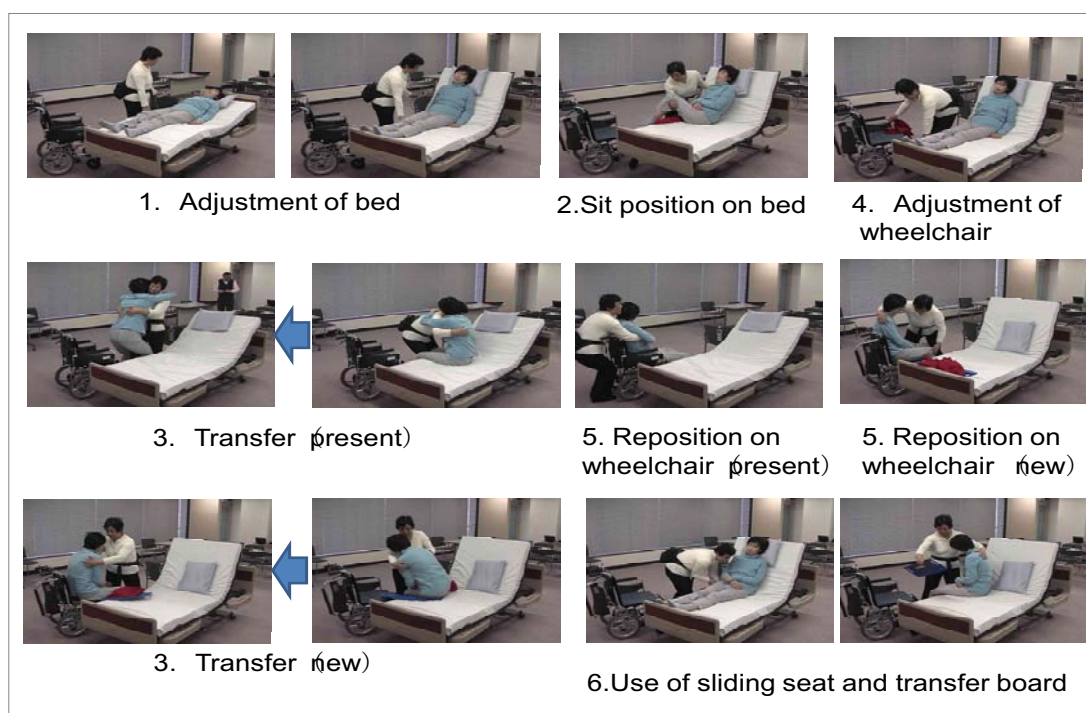


Figure1. Transferring subject from a bed to a wheelchair.

Table 1
Task time (mean and SD)

Subjects	Transfer from a bed to a wheelchair.			Subjects	Transfer from a wheelchair to a bed.		
	Regular mehod	New mehod	t value		Regular mehod	New mehod	t value
all subjects	140.7(61.3)	239.4(96.7)	2.73*	all subjects	129.8(52.0)	186.7(29.6)	3.01*
Experienced subjects	121.0(37.0)	192.4(39.3)	2.96*	Experienced subjects	115.8(37.0)	187.4(40.5)	2.92*
Inexperienced subjects	160.4(78.3)	286.4(118.2)	1.99	Inexperienced subjects	143.8(65.0)	186.0(18.2)	1.40

* $p < 0.05$

Table 2
%MVC of EMG (mean and SD)

EMG	Transfer from a bed to a wheelchair.			EMG	Transfer from a wheelchair to a bed.		
	Regular mehod	New mehod	t value		Regular mehod	New mehod	t value
Biceps brachii(right)	20.3(17.5)	14.7(13.7)	10.30***	Biceps brachii(right)	23.5(20.4)	15.1(14.9)	12.64***
Biceps brachii(left)	21.6(19.4)	16.7(13.8)	8.35***	Biceps brachii(left)	24.7(20.5)	15.9(14.2)	13.36***
Trapezius(right)	18.4(17.0)	14.4(13.3)	7.59***	Trapezius(right)	20.6(18.6)	15.5(14.4)	8.24***
Trapezius(left)	17.6(15.8)	13.1(11.2)	9.33***	Trapezius(left)	18.3(16.4)	14.0(11.4)	8.14***
Low back(L4)(right)	24.8(18.0)	18.8(14.6)	9.90***	Low back(L4)(right)	25.5(17.1)	21.8(15.2)	5.73***
Low back(L4)(left)	24.8(16.4)	20.1(13.2)	7.16***	Low back(L4)(left)	29.6(19.6)	22.4(15.7)	8.67***
Rectus femoris(right)	21.0(18.9)	11.7(9.9)	17.06***	Rectus femoris(right)	17.4(14.7)	12.2(10.9)	10.71***
Rectus femoris(left)	19.1(18.4)	10.3(10.0)	16.67***	Rectus femoris(left)	16.6(15.3)	9.9(10.2)	13.79***

***p<0.001

***p<0.001

Table 3
Questionnaire on tasks for subjects

Transfer of tasks	Workload of tasks		
	Good	Neutral	Bad
Regular mehod	0	6	4
New mehod	6	4	0

method (Table 2). The mean values for L4 (low back) (left) in %MVC were 29.6% for the regular nursing method and 22.4% for the new nursing method (Table 2). L4 (low back) (left) exhibited maximum %MVC for the regular nursing method. EMG results indicated that the loads in the new nursing method were less stressful than those in the regular method. The effect was statistically significant in all body parts ($p<0.001$).

3.3. Questionnaire on tasks

The results of questionnaire about transfer tasks indicated that the new nursing method was evaluated more highly than the regular nursing method (Table 3). The effect was statistically significant ($p<0.01$).

The results of a questionnaire about workloads indicated that the new nursing method was evaluated more highly than the regular nursing method (Table 3). The effect was statistically significant ($p<0.05$).

4. Discussion

This study sought to evaluate the effect of regular and new nursing methods in nursing care work.

Task time analysis results indicated that the new nursing method took longer than the regular nursing method because the new nursing method employed assistant aids for the transfer (Table 1).

EMG results indicated that loads in the new nursing method were less than those in the regular nursing method (Table 2). The effect was statistically significant in all body parts ($p<0.001$). We observed that the new nursing method, which employed assistant aids muscle loads.

Questionnaire results indicated that the new nursing method was evaluated more highly than the regular nursing method (Table 3). Experienced persons evaluated the new nursing method as being especially good. Patients commented that they could not detect any difference in comfort between the new nursing method and the regular nursing method.

Based on these results, we propose that a sliding seats and transfer boards be used in nursing care work.

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