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Effectiveness of Website Barcode-Based Non-Pharmacological Pain Management (Paincode) on Pain Reduction in Post-Appendectomy Patients at Cilegon City Hospital

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ABSTRACT
Background Appendectomy is an invasive procedure that involves making an incision in the abdomen, which causes pain. Pain is a common problem experienced by patients after appendectomy. One nursing intervention to reduce pain is non-pharmacological pain management. In the digital era, information can be accessed easily through smartphones, including website barcodes. Website barcode-based technology can help manage pain while maintaining the benefits of non-pharmacological techniques. **Object:** This study aims to determine the effectiveness of website barcode-based non-pharmacological pain management (PAINCODE) on reducing pain levels in post-appendectomy patients at Cilegon City Hospital. **Methode:** This quantitative study used a quasi-experimental design with a two-group pretest-posttest design. The sample consisted of 28 respondents divided into an intervention group (14) and a control group (14). Pain was measured using observation sheets and PAINCODE. **Results:** Paired t-test showed differences in mean pain scores before and after the intervention in both groups ($p < 0.05$). Independent t-test showed no significant difference between both groups ($p = 0.279$). **Conclusion:** The intervention showed no significant effect.

Keywords: Appendectomy, Website Barcode, Pain Scale

BACKGROUND

An appendectomy is a surgical procedure to remove the appendix. This operation removes the infected appendix. An appendectomy should be performed as soon as possible to reduce the risk of complications. (Dikson et al., 2019).

According to the World Health Organization (WHO) in 2018, appendectomy is the most commonly performed abdominal surgery in the world. In the United States, the number of appendectomy cases in 2017 reached a total of 734,138 people, increasing to 739,117 people in 2018 (WHO, 2018 dalam Ahmad & Kardi, 2022). According to the Indonesian Ministry of Health, the number of appendectomies in Indonesia in 2018 was 591,819, and in 2019 it jumped to 596,132. According to data obtained from the Ministry of Health of the Republic of Indonesia in 2019, the incidence of appendectomies was 596,132 people (3.36%), and increased to 621,435 people (3.53%) in 2020 (Kemenkes RI, 2020).

Appendectomy was the second most common surgical procedure in Indonesia in 2019 and 2020. Pain is a common problem experienced by patients after appendectomy. Therefore, nurses play an important role in providing comprehensive nursing care (Wulandari & Arifin, 2020).

In general, patients who have undergone appendectomy will experience discomfort and pain as a result of the surgical procedure. Pain often interferes with the quality and quantity of sleep,

resulting in fatigue and possible confusion, so pain management is necessary to address this problem (Heriyanda et al., 2023).

Pain management is the process of treating pain, which can be divided into two types: pharmacological and non-pharmacological (Ningrum & Lestari, 2023). Pharmacological pain management often uses analgesics to relieve discomfort such as pain in patients. Non-pharmacological pain management is used as a treatment solution in care to relieve short-term pain, which can be achieved through various non-pharmacological approaches such as relaxation (Febriawati et al., 2023). Relaxation techniques are therapeutic exercises designed to help patients reduce physical and psychological stress and anxiety. Deep breathing relaxation, finger grip relaxation, and Benson relaxation are some of the most commonly used relaxation techniques (Novita, 2019).

Research conducted by Nugraha et al., (2022) with the title "*Pain Assessment Stimulation and Healing Application* (PASHA): Perancangan Aplikasi Berbasis Web" demonstrating the importance of technological innovation in the health sector, which is essential in the provision of pain management services. One such technological innovation is the development of a barcode website, which aims to assist healthcare professionals in improving the quality of healthcare services and service recipients or patients. This barcode-based website technology will help healthcare professionals monitor patients and make it easier for patients to manage the discomfort of pain associated with surgical wounds (Wihardja & Sukihananto, 2020).

In today's digital age, it is undeniable that all information can be accessed via smartphones, one of which is the barcode website, a website that helps post-operative patients manage their pain effectively (Anfal, 2020). One barcode website that can help nurses monitor patients' pain levels remotely is PAINCODE. PAINCODE is a barcode website that contains information on non-pharmacological pain management aimed at helping to alleviate the pain often experienced by patients after appendectomy surgery in hospital (Prasetyo et al., 2022).

RESEARCH METHODS

This study used a quasi-experimental design with a pre-test-post-test approach and a control group. The study was conducted in the operating room of Cilegon City Hospital from 27 February to 18 March. The sample consisted of 28 patients who had undergone appendectomy, selected using purposive sampling and divided into two groups: 14 respondents in the intervention group and 14 in the control group (Tania & Syahfitri, 2021).

The intervention group was given the PAINCODE method and the control group was given the intervention directly by the researcher. Pain scale was measured using the Numeric Rating Scale (NRS) before and after treatment. Data analysis was performed using paired t-test and independent t-test (Swarjana, 2023).

RESULTS AND DISCUSSION

Table 1.

Pain Scale of Patients After Appendectomy in the Intervention Group at RSUD Cilegon City

No. Responden	Deep Breathing Relaxation Technique						Finger Grip Relaxation Technique					
	Day 1		Day 2		Day 3		Day 1		Day 2		Day 3	
	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
R1	6	5	4	3	4	2	4	2	4	2	3	2
R2	6	5	4	2	3	1	4	2	3	2	3	1
R3	5	4	5	3	4	2	5	3	4	2	4	3
R4	7	4	5	3	4	3	3	2	3	2	3	2
R5	6	4	5	4	5	3	5	4	3	1	3	2
R6	6	4	5	3	4	3	4	3	4	2	3	1
R7	7	5	6	4	5	3	5	4	4	3	3	2
R8	6	5	5	4	4	3	4	4	4	3	3	2
R9	6	5	5	3	5	4	4	3	5	4	3	2
R10	7	6	6	5	5	3	4	3	5	4	3	2
R11	7	5	5	4	5	3	5	4	3	2	2	2
R12	6	5	5	4	4	3	4	4	3	3	2	1
R13	7	6	6	4	3	2	6	5	4	3	3	2
R14	6	5	5	3	3	2	4	3	4	4	2	2

Tabel 1 showed pain scale results in post-appendectomy patients in the intervention group at RSUD Cilegon City, with 14 respondents out of a total of 28 respondents.

Table 2.

Pain Scale of Post-Operative Appendectomy Patients in the Control Group RSUD Cilegon City

No. Responden	Deep Breathing Relaxation Technique						Finger Grip Relaxation Technique					
	Day 1		Day 2		Day 3		Day 1		Day 2		Day 3	
	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
R1	5	4	6	3	4	2	4	2	4	2	3	1
R2	6	4	5	3	4	2	4	2	3	2	3	1

No. Responden	Deep Breathing Relaxation Technique						Finger Grip Relaxation Technique					
	Day 1		Day 2		Day 3		Day 1		Day 2		Day 3	
	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
R3	6	5	6	4	4	2	5	3	4	2	4	3
R4	5	3	4	3	3	2	3	2	3	2	3	1
R5	6	5	5	3	4	3	5	4	3	1	3	2
R6	5	4	6	4	4	3	4	3	4	2	3	1
R7	6	5	5	4	4	2	5	4	4	3	3	3
R8	6	4	5	4	3	3	4	4	4	3	3	2
R9	5	4	6	5	4	3	4	3	5	4	3	1
R10	5	4	5	5	5	3	4	3	5	4	3	2
R11	6	5	4	3	3	2	5	4	3	2	2	2
R12	5	4	4	3	3	2	4	4	3	3	2	1
R13	7	6	6	5	4	3	6	5	5	4	3	2
R14	6	4	5	4	4	2	4	3	4	4	2	1

Tabel 2 showing pain scale results in post-operative appendectomy patients in the control group at RSUD Cilegon City, consisting of 14 respondents out of a total of 28 respondents.

Table 3.

Pre-Test Results for the Intervention Group and Control Group

Pre-test (Before)	Mean	SD	Min-Maks	95% CI
Intervention Group	6,36	0,633	5 – 7	5,99 – 6,72
Control Group	5,64	0,633	5 – 7	5,25 – 6,01

Tabel 3 shows that the pre-test results for the intervention group had an average pain scale of 6.36 with a standard deviation of 0.633. Furthermore, the pre-test results for the control group had an average of 5.64 with a standard deviation of 0.633.

Table 4.

Post-Test Results for the Intervention Group and Control Group

Post-test (Setelah)	Mean	SD	Min-Maks	95% CI
Intervention Group	1,79	0,579	1 – 3	1,45 – 2,12
Control Group	1,64	0,745	1 – 3	1,21 – 2,07

Tabel 4 shows that the post-test results for the intervention group had an average pain scale of 1.79 with a standard deviation of 0.579. Furthermore, the post-test results for the control group had an average of 1.64 with a standard deviation of 0.745.

Tabel 5

Normality Test for the Intervention Group and Control Group in RSUD Cilegon City (N=28)

	Statistic	Df	Sig
Pre-test Intervention Group	0.905	14	0.131
Post-test Intervention Group	0.888	14	0.076
Pre-test Control Group	0.902	14	0.120
Post-test Control Group	0.881	14	0.060

Tabel 5 The results show a normal distribution, with a pre-test sig. value of 0.131 and a post-test sig. value of 0.076 in the intervention group. The pre-test sig. value in the control group was 0.120 and the post-test sig. value was 0.060. From these results, it can be concluded that the research data on the effectiveness of barcode-based non-pharmacological pain management on websites (PAINCODE) in reducing pain scores in post-appendectomy patients is normally distributed. Therefore, the bivariate statistical tests used in this study were dependent sample t-tests and independent sample t-tests.

Table 6.

Uji Dependent Sample T-test

Pain Scale	*Mean*	SD	Df	T	*P-Value*
Intervention Group					
Before (*Pre-test*)	6.36	0.633	13	17.673	0.00
After (*Post-test*)	1.93	0.616			
Average difference	4.43				

Pain Scale	*Mean*	SD	Df	T	*P-Value*
Control Group					
Before (*Pre-test*)	5.64	0.633	13	22.030	0.00
After (*Post-test*)	1.64	0.746			
Average difference	4.00				

Tabel 6 shows the average difference in pain scale reduction in the intervention group before and after the intervention was administered to be 4.43 with a p-value of 0.00 < 0.05, indicating a difference in the average pain scale reduction before and after the intervention was administered in the intervention group. Meanwhile, the mean difference in pain scale reduction before and after in the control group was 4.00 with a p-value of 0.00 < 0.05, indicating a difference in the mean pain scale reduction before and after in the control group.

Table 7.

Uji Homogenitas

	N	Levanse Statistic	P-Value (Sig)
Based on Mean	**28**	**2.637**	**0.116**

Tabel 7 shows that the homogeneity test result obtained a sig. value > 0.05, namely 0.116, so the population variance is declared homogeneous. Therefore, for the final conclusion on the independent sample t-test, see equal variances not assumed.

Table 8.

Uji Independent Sample T-Test

	Group	N	Mean	SD	SE. Mean	T	Df	P-Value
Result	*Post-Test* **Intervention**	14	1.93	.616	.165	1.106	26	.279
	Post-Test Control	14	1,64	.745	.199	1.106	25.110	.279

Tabel 8 shows that the mean pain scale score in the post-test of the intervention group was 1.93 and in the post-test of the control group was 1.64. The average pain scale score of the intervention group was higher than that of the control group, and the p-value (equal variances not assumed) was 0.279 > 0.05, meaning that there was no significant difference between the average scores of the intervention group and the control group.

DISCUSSION

Based on the results of the study, there were significant changes in the pain scale of post-appendectomy patients in both the intervention and control groups. The intervention group showed a pre-test average pain scale of 6.36 with a standard deviation of 0.633, while the control group showed a pre-test average of 5.64 with a standard deviation of 0.633. After the post-test intervention, all respondents in both groups showed a significant reduction in pain. These results demonstrate the effectiveness of the interventions, both the technology-based intervention (PAINCODE) in the intervention group and the standard care provided directly to the control group (Notoatmodjo, 2018).

Although both groups showed a reduction in pain, the success of the intervention group can be attributed to the use of PAINCODE, a website-based barcode system that provides guidance on deep breathing and finger grip relaxation techniques. This intervention is relatively simple, has no side effects, and can be performed independently by patients. These findings are consistent with research by Nugraha et al., (2022) which states that non-pharmacological interventions based on information technology can reduce pain intensity and accelerate post-operative recovery.

According to Heriyanda et al. (2023) the reduction in pain in the control group is also noteworthy. Although PAINCODE was not used, respondents still received direct treatment from the researchers. This is in line with the view that Ningtyas et al., (2023) that effective pain management through direct support, such as environmental, psychological, and patient education support.

Based on the results of the study, there was a difference in the mean pain scale reduction before and after both the intervention and control groups, as evidenced by a p-value of 0.00 > 0.05. The mean difference in pain scale reduction in the intervention group (4.43) was higher than that in the control group (4.00), indicating that the non-pharmacological pain management approach based on a barcode website (PAINCODE) is more effective in reducing pain scale than manual or direct methods.

Based on the results of the independent sample t-test, it shows that the average decrease in pain scale in the post-test of the intervention group (1.93) was higher than the mean value in the post-test of the control group (1.64), and a p-value of 0.279 > 0.00 was obtained. Therefore, it can be concluded that there was no significant difference in the mean value of the pain scale between the intervention group and the control group.

CONCLUSION

Respondent Characteristics: There were 28 respondents, with an average age of 25.57 years for the intervention group and 29.93 years for the control group. The majority of respondents were male with a high school education. Pain Scale Reduction: the intervention group experienced a reduction in pain scale from 6.36 to 1.93, while the control group experienced a reduction from 5.64 to 1.64. Pain reduction was significant in both groups (p-value = 0.000). Group comparison: although the intervention group showed a greater reduction, there was no significant difference between the two groups (p-value = 0.279).

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