



APPLICATION OF EDUCATIONAL MEDIA OF INSULIN INJECTION ROTATION SCHEME TO IMPROVE INSULIN INJECTION SKILLS OF T2DM PATIENTS

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ABSTRACT

The number of Diabetes Mellitus patients is increasing and the average patient will use insulin injections independently to maintain their glycemic levels. Therefore, proper education is needed to improve insulin injection skills so that glycemic can be controlled. There are still many locations where insulin injections are carried out by patients and nurses in the arm (deltoid) or in the abdomen, but rotation is rarely carried out. This happens because it is to the patient's understanding and familiarity with the arm area. In general, patients say they are hesitant to inject insulin in the other part. Objective to determine the effect of the application of education using a rotation scheme on the skills of T2DM patients. This research method was with a quasi-experimental design, with the respondents being T2DM patients who received insulin injection therapy with a sampling technique using simple random sampling. With improved insulin injection skills, the patient can control his glycemic muscles. The results showed that there was an increase in the average skill score in the intervention group by applying educational media of the insulin injection rotation scheme higher than that of the control group. There was a significant difference (p-value 0.000). Education with the medium of insulin injection rotation scheme is effective in improving the skills of T2DM patients. Education using props will make it easier for T2DM patients to practice injecting independently precisely and correctly.

Keywords: diabetes mellitus; educational media; insulin injection; rotation scheme

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INTRODUCTION

Diabetes Mellitus Type 2 (T2DM) is a chronic disease that occurs when the pancreas does not produce enough insulin or when the body is unable to use the insulin produced effectively. T2DM is characterized by the appearance of hyperglycemia, a condition in which blood glucose increases (Picke *et al.*, 2019). According to WHO, in 2019 there were 463 million people suffering from diabetes mellitus in the world and it is predicted that the number will increase to around 578 million people by 2030 (International Diabetes Federation; 2019). Meanwhile, the number of DM sufferers in Indonesia reaches 10.7 million people. Diabetes mellitus ranks fourth as the cause of death due to NCDs. In addition, diabetes mellitus is also included in the top 10 leading causes. (Riskesdas 2018 in Numbers, Indonesia II, n.d.) *Of Disability Adjusted Life years (DALYs)*. (General *et al.*, 2022)

Based on DI Yogyakarta profile data in 2021, there were 83,568 cases of diabetes mellitus and 50,530 cases or 60.5% of those who received health services according to the standards (Yogyakarta Health Office, 2022). Bantul Regency is one of the districts in DI Yogyakarta with a high incidence of DM. In 2021, the number of DM cases reached 20,991, with service achievements of around 63.3%. Looking at the phenomenon of the number of DM patient cases, it shows that the average patient will use insulin injections independently to maintain

their glycemic levels. One of the right insulin injection techniques is to use a rotation technique in the abdomen; because the abdomen has a layer of fat tissue so that insulin is absorbed faster and fat tissue is easy to find, and easy to reach by patients when doing it themselves. Changing the injection point is very important, because repeated injections in the same place can cause other complications, namely the formation of fibrous tissue (fine scars) that it causes the tissue to harden and lipohypertrophy (accumulation of fat under the surface of the skin) which can interfere with insulin absorption so that glycemic cannot be properly controlled (Gusti *et al.*, 2023).

T2DM patients who are treated at Panembahan Senopati Hospital Bantul on average are caused by chronic complications from T2DM itself and also due to instability of blood sugar levels. From the patients who were found that the location of insulin injection, both carried out by the patient and the nurse, was carried out in the arm (deltoid) or in the abdomen, but rotation was rarely carried out. This happens because it is by the patient's understanding and familiarity with the arm area. In general, patients say they are hesitant to inject insulin in the other part. The insulin injection position in the arm is sometimes difficult to do in some cases, causing it to depend on other people. When inspection and palpation were carried out in the deltoid area of T2DM patients with insulin therapy, *changes in skin contour* in the form of thickening and elasticity were palpable. This is in line with research conducted saying that the barriers to adherence in to the use of insulin are fear of syringes and not knowing the correct way to inject. These barriers will make the patient non-compliant for with the correct use of insulin. The use of video media equipped with demonstrations of insulin injection techniques can be one of the solutions in improving patient understanding and patient knowledge, so it is expected to increase patient compliance in the therapy program (Vazini & Barati, 2014). Based on the results of observations and interviews with employees of Panembahan Senopati Bantul Hospital, there is no media in the form of a rotation scheme to provide education to patients about insulin injection techniques. So the researcher is interested in conducting research with the title of the application of educational media for insulin injection rotation scheme to improve insulin injection skills of T2DM patients at Panembahan Senopati Hospital Bantul.

METHOD

This study is a *quasi-experimental* research with a quantitative approach that uses *a pretest and posttest research design with a control group design*. The variable of this study is insulin injection skills. The study involved 40 T2DM patients randomly selected (*simple random sampling*) at the Internal Medicine Poly of Panembahan Senopati Hospital Bantul, using insulin injection therapy for both new and old patients. The research sample was divided into two treatment and control groups (20 respondents each). The intervention for the treatment group was an education on the rotation scheme of insulin injection and insulin injection exercises using the medium of the rotation scheme, while for the control group was education and exercises according to hospital standards. Data collection is carried out after the ethical protocol is approved by the Research Ethics Committee and has obtained *informed consent* from prospective respondents.

The collection of research data was carried out in October 2024. Data were collected using a demographic data questionnaire consisting of seven question items, namely age, gender, education, last HBA1C score, length of suffering from Diabetes Mellitus, frequency of insulin administration per day, length of insulin use, and frequency of changing insulin needles. The insulin injection technique instrument uses an observation sheet consisting of twenty-one assessment items to assess insulin injection skills. The answer choice uses two "yes" and "no" options. The skill assessment instrument is measured by assessing the ability to perform

insulin injections. The intervention to provide education and insulin injection exercises in this study consists of two stages. The first stage is education and demonstration of insulin injection using a specially designed insulin injection rotation scheme media using a frame from a sponge, a vinyl material coated with an injection rotation sticker, and then the media is attached to the waist like a belt. In the second stage, respondents were asked to re-practice the insulin injection technique with guidance until the patient could do it independently. The research data was analyzed using an independent sample t-test to test in the control group and treatment group, with a significance level of p-value < 0.05, it can be concluded that education on the insulin injection rotation scheme can improve insulin injection skills in patients with Type 2 Diabetes Mellitus.

RESULT

Table 1
Characteristics of Respondents

Characteristic	f	%
Age		
< 35 years	2	5
35 – 45 years old	5	12,5
46 – 55 years old	13	32,5
56 – 65 years old	10	25
> 65 years	10	25
Gender		
Man	17	42,5
Woman	23	57,5
Education		
Not in school	1	2,5
SD	5	12,5
JUNIOR	7	17,5
SMA	12	30
College	15	37,5
Last HBA1C rating		
4-6	0	0
< 7	0	0
7-8	2	5
>8	21	52,5
Long Suffering from DM (years)		
<1	4	10
1-5	13	32,5
6-10	9	32,5
11-15	6	15
>15	8	20
Frequency of Insulin Administration per Day		
1 time	5	12,5
2 times	26	65
3 times	8	20
4 times	1	2,5
Length of Insulin Use (years)		
<1	12	30
1-5	12	30
6-10	9	22,5
11-15	5	12,5
>15	2	5
Frequency of Use of Insulin Needles		
Disposable	1	2,5
>3 times	39	97,5

Table 1 shows that most patients are 46-55 years old (32.5%), female (57.5%), have a college education (37.5%), have suffered from DM for a long time 1-10 years (67%), the frequency of

insulin administration per day is 2 times (65%), and the duration of using insulin ranges from <1-5 years (60%).

Table 2
Output Statistics

	Sample	N	Mean	Std. Deviation	Std. Error Mean
Skill Results	Intervention	20	89,2870	5,54523	1,23995
	Control	20	57,8560	6,42208	1,43602

Based on table 2, it is known that the number of treatment groups is 20 patients with Type 2 Diabetes Mellitus, and the control group is 20 patients with Type 2 Diabetes Mellitus. The average value of the skills of patients with Type 2 Diabetes Mellitus after receiving insulin injection education with the injection scheme medium for the intervention group was 89,287, while for the control group, it was 57,856. It can be concluded that there is a difference in the average results of insulin injection skills between the intervention group and the control group.

Table 3
Independent Sample Test Results

		Levene's Test for Equality of Variances				t-test for Equality of Means			95% Confidence Interval of the Difference	
		F	Sig	t	Df	Sig.(2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Value	Equal variances assumed	.381	.541	16.566	38	.000	31.43100	1.89727	27.59017	35.27183
	Equal variances not assumed			16.566	37.209	.000	31.43100	1.89727	27.58749	35.27451

Based on Table 3 above, this study shows that there is a significant difference in insulin injection skills in the intervention group and the control group after education with insulin injection rotation media (p-value 0.000).

DISCUSSION

T2DM management is generally aimed at improving the quality of life of people with T2DM. These efforts include controlling blood glucose, blood pressure, weight, and body fat values through independent patient management and behavior changes. T2DM treatment is grouped into 5 pillars, namely: education, meal planning, physical exercise, pharmacological intervention, and blood sugar check. Effective management of T2DM is an important thing that must be maintained by patients with T2DM, this requires self-management support. This support is interpreted as a resource that helps patients to maintain skills, knowledge, and behavior change (PERKENI, 2021). Nurses have several roles including caregivers, community leaders, educators, advocates, and researchers. The role of nurses as educators is to carry out a learning and teaching process between nurses and patients to change the behavior obtained from new knowledge or technical skills. The importance of a nurse as an educator in providing diabetes education to patients can correct misconceptions related to their disease. (Farida, 2018).

In the treatment of diabetes mellitus, if the insulin regimen is chosen as a pharmacological therapy for diabetes mellitus, it must be supported by comprehensive education according to age, level of understanding, and individual needs. Healthcare providers should pay more attention to insulin administration education and evaluate insulin injection practices over time. (Kamrul-Hasan *et al.*, 2020). Insulin injection skills are influenced by several factors, including education, employment, duration of insulin therapy, length of diabetes, and the patient's level of knowledge. (Netere *et al.*, 2020).

The results of this study showed that education using the media of the insulin injection rotation scheme which was carried out during two meetings within one month was able to improve the skills of T2DM patients in performing insulin injections (p-value 0.000). Therefore, it can be concluded that there is a significant influence on the results of pretest and posttest in the intervention group after being given injection education using the medium of insulin injection rotation scheme. Research conducted by Liang et al. (2021), showed that by providing education using *simulation tools*, the results of the skill level score before the intervention was given were in the poor category, on the contrary, after the intervention was given, the level of knowledge increased to the good category.

Although there have been established guidelines and evidence stating that the right insulin injection technique can control blood sugar levels and reduce diabetes complications, there are still many obstacles for patients and health workers in optimizing the correct insulin injection technique. Education and exercise are effective methods to improve insulin injection techniques, control glycemic diseases, improve compliance, and reduce the risk of lipohypertrophy. The implementation of a comprehensive insulin management program in healthcare facilities is essential to ensure the safe and effective use of insulin by establishing standard procedures and reducing the risk and improper administration of insulin. (Kalra *et al.*, 2023).

CONCLUSION

Pharmacological therapy of insulin administration is an important treatment for diabetics and for insulin administration to be effective, the use of injections must be by standards changing the injection point is very important, not only the right type and dose, because it will indirectly affect insulin absorption so that glycemic can be well controlled. The results of the study showed that education using insulin injection rotation media was effective in improving insulin injection skills in patients with Type 2 Diabetes Mellitus.

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