THE IMPACT OF IMPROVING ELECTRONIC HEALTH LITERACY SPECIFICALLY BY IMPLEMENTING E-PATIENT PROGRAMS IN THE INTERNAL MEDICINE AND SURGERY CLINICS TO DIMINISH WAITING TIMES AT WEST SULAWESI PROVINCIAL HOSPITAL

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ABSTRACT

Introduction: Associated with quality management, the aspect of long waiting time for patients to get health services is one of the important things and greatly determines the quality of health services provided by a health service unit, as well as reflecting how hospitals process service components that are tailored to patient situations and expectations. This study aims to analyze the effect of using e-patients through *electronic health literacy* on reducing waiting time in internal medicine and surgery clinics at West Sulawesi Provincial Hospital. **Research Methodology**: This

study used quantitative methods with the design of the *Experimental Quasy* study. The informants in the study amounted to 180 people in the intervention group and 180 people in the control group. Data analysis using *Wilcoxon, Mann Whitney, Hoteling T2,* and *Manova tests*. **Research Results:** The results showed significant differences in the variables of ability to process information, involvement in self-health, ability to actively engage with health services, safe and controlled, motivation to engage with digital services, access to digital services, and digital services that are in accordance with needs with a value of $p < 0.05$.

Keywords: *Electronic Health Literacy*, Waiting Time, e-Patient.

Introduction

The World Health Organization (WHO) campaigns three important points so that the world community gets adequate health services. The three points are equality in access to health, quality of health services, and financial risk protection of patients. According to Stephen Jones (2012), access to health services is the ability of everyone to find the health services needed. Access to health care is an important determinant of health [1]. So that equalization obstacles in health access need to be overcome.

Looking at the conditions above, an alternative that is widely developed today is to take advantage of advances in online-based digitalization technology. As smartphone technology evolves as this 5th generation cellular network expansion will play a key role in future healthcare medicine, patient referral, consultation, ergonomics, and many other expanded healthcare applications [2].

The Regional General Hospital of West Sulawesi Province is developing services by making online registration which for now can be accessed through the website. This online registration service is called e-Patient. It's just that the use of e-Patients is still very low in clinics that have the most patient visits. Based on data on repeat visits (long) in 2021, internal medicine clinics amounted to 1,623 people and surgical clinics were 1,227 people. Due to the large number of patients, the accumulation of patients at the two clinics resulted in an average waiting time of over 128.3 minutes while the waiting time in Indonesia was set by the Ministry of Health of the Republic of Indonesia through minimum service standards. The minimum outpatient service based on the Ministry of Health Number 129 / Menkes / SK / II / 2008 is less or equal to 60 minutes.

According to Buhang (2007) in research [3] waiting time for services is a problem that is still widely encountered in health care practices, and one of the components that has the potential to cause dissatisfaction, where waiting for a long time causes dissatisfaction with patients. Satisfaction is the customer's response to his needs, meaning an assessment of a form of privilege of a good or service, providing the level of comfort associated with meeting a need, including meeting needs below or exceeding customer or patient expectations [4]. Patient satisfaction reflects the quality of health services.

Accessing digital health services via the internet requires certain literacy skills. Starting from searching, finding, choosing, to applying it to overcome a health problem. This literacy is

known as electronic health *literacy*, which is the ability to search, find, understand, and assess health information from electronic sources and apply the knowledge gained to overcome or solve health problems [5]. In 2015, the World Health Organization (WHO) defined e-health as the use of information and communication technology for health. Digital health literacy is an extension of health literacy and uses the same operational definition, but in the context of technology [6]. There are seven domains in electronic health literacy according to [7], namely: the ability to process information, involvement in one's own health, the ability to actively engage with digital services, feeling safe and in control, motivated to engage with digital services, access to functioning digital services, and digital services that fit individual needs

Method

This research uses quantitative methods with the study design **"***Quasy Experiment***"**, namely pre-test and post-test with control group design, by conducting pre-test or initial measurements. This study was divided into 2 (two) groups consisting of 1 (one) intervention group and 1 (one) control group. The proportion of the intervention group and the control group has a ratio of 1 : 1. The intervention group has introduced the development of e-Patients on *smartphones and* carried out at the internal medicine and surgery clinic of West Sulawesi Provincial Hospital. The control group was not given intervention and was carried out at the internal medicine and surgery clinic of RSUD Polewali Mandar District. The intervention was carried out 14 (fourteen days) after the *pre-test*. The posttest is carried out 30 (thirty) days after the intervention. The research design scheme is as follows:

The population in this study was old patients or patients who had repeat visits in outpatient settings in internal medicine and surgical clinics. Based on data on old visits or outpatient revisits at West Sulawesi Provincial Hospital in 2021, the number of visits to internal medicine clinics was 1,623 people, and surgical clinics 1,227, so that the population in this study was 2,850 people. The sampling technique uses *probability sampling* through *simple random sampling*. The determination of the number of samples in each clinic is based on the Lemeshow formula with the following calculation method:

$$n = \frac{N \cdot Z^2 \cdot P \cdot Q}{d^2 \cdot (N - 1) + Z^2 \cdot P \cdot Q}$$

Information:

n = number of samples

N = population

Z = level of meaning (1,96)

P = approximate proportion of population (0,5)

$Q = 1 - P = 1 - 0,5 = 0,5$

d = Error rate 10% (0,1)

Using the formula above, the sample size of outpatients in each clinic is 180 samples with the following calculation:

a. Internal Medicine Clinics

$$n = \frac{1.623 \cdot (1,96)^2 \cdot 0,5 \cdot 0,5}{(0,1)^2 \cdot (1.623 - 1) + (1,96)^2 \cdot 0,5 \cdot 0.5}$$

$$n = \frac{1.558,729}{17,180}$$

$$n = 91 \text{ person}$$

b. Surgery Clinic

$$n = \frac{1.227 \cdot (1,96)^2 \cdot 0,5 \cdot 0,5}{(0,1)^2 \cdot (1.227 - 1) + (1,96)^2 \cdot 0,5 \cdot 0.5}$$

$$n = \frac{1.178,411}{13,220}$$

$$n = 89 \text{ person}$$

Result

1. Research Variables

The scoring results on the variables ability to process information, involvement in one's own health, ability to actively engage with services, safe and controlled, motivated to engage with digital services, access to digital services, and digital services that are appropriate to needs can be seen in table 1.

Table 1. Distribution of respondents based on those who took the pretest and postest in each group.

N	Variable	Pretest	
		Intervention	Control

		N	Mean	SD	Min-	Max	N	Mean	SD	Min-	Max
1	Ability to process information	180	8,91	1.460	3	12	180	9,13	1,202	3	12
2	Involvement in one's own health	180	9,07	1.457	3	12	180	9,33	1,218	3	12
3	Ability to actively engage with services	180	11,82	2.110	4	16	180	12,1	1,586	4	16
4	Safe and controlled	180	6,03	1.051	2	8	180	6,22	0,814	2	8
5	Motivated to engage with digital services	180	5,97	1.065	2	8	180	6,22	0,913	2	8
6	Access to digital services	180	15,05	2.506	5	20	180	15,48	2,081	6	20
7	Digital services that fit your needs	180	5,98	1.035	2	8	180	6,14	0,885	2	8

NO	Variable	Postest									
		Intervention					Control				
		N	Mean	SD	Min-	Max	N	Mean	SD	Min-	Max
1	Ability to process information	180	9,5	1,06	7	12	180	8,99	1,517	3	12

2	Involvement in one's own health	180	9,48	1,121	6	12	180	8,90	1,669	3	12
3	Ability to actively engage with services	180	12,63	1,487	8	16	180	11,37	2,119	4	16
4	Safe and controlled	180	6,3	0,877	2	8	180	5,84	1,291	2	8
5	Motivated to engage with digital services	180	6,33	0,777	4	8	180	5,83	1,388	2	8
6	Access to digital services	180	15,81	2,006	7	20	180	14,19	3,469	6	20
7	Digital services that fit your needs	180	6,32	0,737	4	8	180	5,57	1,395	3	8

In the table, there was an increase in scores in the intervention group and control group after the e-patient development intervention. The increase in scores in the intervention group was on average greater than the increase in scores in the control group. Increased scores in the control group although no e-patient development intervention was carried out, but at Polewali Mandar Hospital (control group) socialization of the use of JKN Mobile has been carried out. JKN Mobile Application is an application that can be accessed via smartphone. This application is a new breakthrough for BPJS Kesehatan which can provide convenience to register, and change membership data, easy to get information on family participant data, easy to see the cost of paying participant contributions, easy to get FKTP (First Level Health Facility) and FKTL (Advanced Level Referral Facility) services and easy for the public if they want to submit suggestions or complaints [8].

a. Bivariate Analysis

This bivariate analysis was carried out in order to obtain a picture of the differences in each research variable in the treatment and control groups, before the intervention and after the intervention. The differences to be measured are as follows:

1. Differences in information processing ability, involvement in one's own health, ability to actively engage with health services, safe and controlled, motivation to engage with digital services, access to digital services, and appropriate digital services before and after intervention.

Table 2. Differences Before and After Intervention in Treatment and Control Groups Using *Wilcoxon Rank Test*

	Intervention Group				
Variable		**Mean**	**SD**	**Mean Difference**	**P**
Ability to process information	Pre	8.91	1,460	0.59	0,000
	Post	9.5	1.06		
Involvement in one's own health	Pre	9,07	1,457	0.41	0,004
	Post	9.48	1.121		
Ability to actively engage with services	Pre	11,82	2,110	0.81	0,000
	Post	12.63	1.487		
Safe and controlled	Pre	6,03	1,051	0.27	0,015
	Post	6.3	0.877		
Motivated to engage with digital services	Pre	5,97	1,065	0.36	0,001
	Post	6.33	0.777		
Access to digital services	Pre	15,05	2,506		0,002
	Post	15.81	2.006	0.76	
Digital services that fit your needs	Pre	5,98	1,035	0.34	0,001
	Post	6.32	0.737		
	Control Group				

Intervention Group

Variable		Mean	SD	Mean Difference	P
Variable		Mean	SD	Mean Difference	P
Ability to process information	Pre	9.13	1.202	0.14	0,397
	Post	8.99	1.517		
Involvement in one's own health	Pre	9.33	1.218	0.37	0,031
	Post	8.96	1.669		
Ability to actively engage with services	Pre	12.1	1.586	0.73	0,000
	Post	11.37	2.119		
Safe and controlled	Pre	6.22	0.814	0.38	0,001
	Post	5.84	1.291		
Motivated to engage with digital services	Pre	6.22	0.913	0.39	0,002
	Post	5.83	1.388		
Access to digital services	Pre	15.48	2.081	1.29	0,000
	Post	14.19	3.469		
Digital services that fit your needs	Pre	6.14	0.885	0.57	0,000
	Post	5.57			

All variables in the control group showed improvement despite no intervention. But there were variables that did not experience significant improvement, namely the ability to process information and involvement in one's own health. The increase in the two variables was 0.14 points each with a p >0.05 value. On the variables of ability to engage actively, safely and in control, motivated to engage with digital services, access to digital services, and services that suit needs increased with a value of p<0.05.

2. Differences in information processing ability, involvement in one's own health, ability to actively engage with health services, safe and controlled, motivation to engage with digital services, access to digital services, and digital services appropriate to intergroup needs before and after intervention.

Table 3. Differences Between Groups Before and After Intervention Using
Whitney's Mann Test

Variable		Pretest			
		Mean	SD	Mean Difference	P
Ability to process information	Control	9.13	1.202	0.22	0,087
	Intervention	8.91	1,460		
Involvement in one's own health	Control	9.33	1.218	0.26	0,061
	Intervention	9,07	1,457		
Ability to actively engage with services	Control	12.1	1.586	0.28	0,321
	Intervention	11,82	2,110		
Safe and controlled	Control	6.22	0.814	0.19	0,037
	Intervention	6,03	1,051		
Motivated to engage with digital services	Control	6.22	0.913	0.25	0,030
	Intervention	5,97	1,065		
	Control	15.48	2.081	0.43	0,216

Pretest

Variable		Mean	SD	Mean Difference	P
Access to digital services	Intervention	15,05	2,506		
Digital services that fit your needs	Control	6.14	0.885	0.16	0,070
	Intervention	5,98	1,035		

Postest

Variable		Mean	SD	Mean Difference	p
Ability to process information	Control	8.99	1.517	0.51	0,037
	Intervention	9.5	1.06		
Involvement in one's own health	Control	8.96	1.669	0.52	0,000
	Intervention	9.48	1.121		
Ability to actively engage with services	Control	11.37	2.119	1.26	0,000
	Intervention	12.63	1.487		
Safe and controlled	Control	5.84	1.291	0.46	0,002
	Intervention	6.3	0.877		
Motivated to engage with digital services	Control	5.83	1.388	0.5	0,000
	Intervention	6.33	0.777		
Access to digital services	Control	14.19	3.469	1.62	0,000
	Intervention	15.81	2.006		
Digital services that fit your needs	Control	5.57	1.395	0.75	0,000

	Pretest			
Variable	**Mean**	**SD**	**Mean Difference**	**P**
Intervention	6.32	0.737		

Table 3. shows that there were no differences in initial conditions between the intervention group and the control group prior to the intervention on variables of ability to process information, involvement in self-health, motivation to engage with digital services, access to digital services, and appropriate digital services. This is indicated by the value of p>0.05 in all these variables. While in the variable ability to actively engage with services and the variable safe and controlled, there were differences in initial conditions in both groups with a value of p<0.05.

After the intervention, all quantitative research variables obtained a value of p<0.05. Thus, there was a significant difference between the intervention group and the control group after the intervention.

b. Multivariate Analysis

This multivariate analysis was used to assess all quantitative research variables simultaneously in the treatment and control groups before and after the intervention. Differences in information processing ability, involvement in self-health, ability to actively engage with health services, safety and control, motivation to engage with digital services, access to digital services, and appropriate digital services simultaneously in both groups before and after the intervention can be seen in the following table:

Table 4. Differences in intervention and control groups simultaneously before and after intervention using *Hotelling's Trace test*

Effect Before		**Mean Square**	**p Value**	**Hotelling's Trace (p Value)**
Group **(Intervention and Control)**	Ability to process information	4.669	0.107	0,428
	Involvement in one's own health	5.878	0.072	

Effect Before		Mean Square	p Value	Hotelling's Trace (p Value)
	Ability to actively engage with services	7.225	0.151	
	Safe and controlled	3.211	0.058	
	Motivated to engage with digital services	5.625	0.017	
	Access to digital services	16.900	0.075	
	Digital services that fit your needs	2.500	0.102	
Effect After		**Mean Square**	**p Value**	**Hotelling's Trace (p Value)**
Group (Intervention and Control)	Ability to process information	23.511	0.000	0,000
	Involvement in one's own health	24.025	0.001	
	Ability to actively engage with services	143.136	0.000	
	Safe and controlled	19.136	0.000	

Effect Before	Mean Square	p Value	Hotelling's Trace (p Value)
Motivated to engage with digital services	22.500	0.000	
Access to digital services	235.225	0.000	
Digital services that fit your needs	51.378	0.000	

Table 4. shows that there was no difference in all quantitative research variables in the intervention group and control group before the intervention with a p>0.005 value. After the intervention, there were differences in all quantitative research variables simultaneously in the treatment and control groups with a p value of <0.005.

Discussion

Based on this, the intervention carried out in this study is considered to have an effect in improving *Electronic Health Literacy* to reduce waiting time in internal medicine and surgical clinics. The waiting time before intervention at the internal medicine clinic was 146.6 minutes and the surgical clinic was 134.6 minutes. After the intervention, there was a decrease in waiting time at both clinics, at the internal medicine clinic by 26.3 minutes (120.3 minutes) and the surgical clinic by 30.3 minutes (104.3 minutes). The decrease in waiting time at the two clinics is not in accordance with the Hospital's Minimum Service Standards, which is under 60 minutes. This is assumed because the specialist who performs the service is only one person, certainly not proportional to the number of patients who register on that day.

Based on data on the number of specialists at West Sulawesi Provincial Hospital, internal medicine specialists on duty are 4 people and surgical specialists are 2 people. When viewed from the number of specific doctors in the two clinics, it is necessary to maximize their involvement in outpatient clinics, thereby reducing the number of patient queues.

Conclusion

Interventions using e-patient development in the form of adding *WhatsApp Bot features* proved that there were significant differences in the variables of ability to process information, involvement in one's own health, ability to actively engage with health services, safe and controlled, motivation to engage with digital services, access to digital services, and digital

services that are appropriate to needs with a value of $p < 0.05$. The design of intervention media in the form of e-patient development is carried out with the addition of the WhatsApp Bot feature, which is a WhatsApp Business API feature that can reply to messages automatically for 24 hours.

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