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Article

Telepharmacy Model of Clinical Pharmacy Services in The Islands Region: A Study in A Government Hospital of The Bangka Belitung Islands Province

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Abstract: Archipelagic regions are areas that are vulnerable to health problems due to geographical factors. Transformation in the health system needs to be carried out through telepharmacy as a solution for pharmaceutical services in the island region. This research is a mix-method research with a qualitative method, phenomenological approach and a quantitative method, cross-sectional descriptive analytical observational design and experimental research using the Pre and Post Test Group Design method in August 2023-March 2025 at the Type D Government Hospital in the Bangka Belitung Islands Province. The research results show that the telepharmacy model of clinical pharmacy services is carried out by pharmacists based on standard operational procedures with an average time of 17 minutes 16 seconds synchronously and asynchronously using electronic media cellphones/smartphones with the WhatsApp application (calls, messages and video calls) or telephones accompanied drug information (name, efficacy, method/rules for use, dosage, dosage form, time interval, storage and side effects as well as actions that need to be taken if side effects arise). Telepharmacy model that is effective in increasing the implementation and effectiveness of clinical pharmacy services in the Bangka Belitung Islands region is simple application-based telepharmacy with the strengthening of pharmacists (quantity and quality) and internet networks.

Keywords: Telepharmacy, Hospital, Archipelago Region

1. Introduction

Island areas are very vulnerable to health problems [1]. Geographical factors are the reason why there are still many areas that are difficult to reach with existing transportation facilities [2]. Some other problems are climate change, the absence of a holistic management plan, infectious diseases, non-communicable diseases, economic problems, population growth, health services and the availability of health facilities and personnel [1,3,4,5]. Therefore, it is necessary to transform the health system. One of the activities of the Ministry of Health is the design of telemedicine communication, information and education (KIE) consultation services, clinical consultations, examination support and telepharmacy support services for equitable health services and the development of telemedicine, especially in underdeveloped, outermost and frontier areas (3T)[6].

Telepharmacy is a health service, especially pharmaceutical services that utilizes telecommunications and information technology to overcome geographical challenges [7,8]. Telepharmacy provides easy access to health services in remote, rural and island locations, economic benefits, patient satisfaction due to access to treatment and information, effective counseling, solutions to the problem of shortage of pharmacists and minimal local pharmaceutical services as well as ensuring timely access to

pharmaceutical services and is a solution in the era of the Covid-19 pandemic [7,8,9,10,11].

Telepharmacy also improves the health and well-being of elderly patients [12] or veterans [13] and patients with limited mobility/disabilities [14,15]. The use of telepharmacy by elderly patients is strongly influenced by social factors (friends, family, social media) and personal relevance, especially for patients with chronic diseases [12]. Therefore, a user-friendly telepharmacy service platform design is more advisable for elderly patients in the Philippines (an island nation) [11]. The implementation of telemedicine in the Bangka Belitung Islands Province, which is one of the archipelagic provinces in Indonesia, has not yet synergized with the implementation of telepharmacy. Telepharmacy has begun to be implemented in the Bangka Belitung Islands Province, but needs development. Telepharmacy is starting to be implemented in community pharmacy services in Pangkalpinang City, Belitung Regency and East Belitung Regency. In contrast to other regions, Bangka, Central Bangka and South Bangka Regencies have not yet implemented it. Telepharmacy in hospitals has also not been implemented, although most have digitized services through the SIMRS application [16].

The obstacles faced are the availability and readiness of pharmacists and other pharmaceutical personnel, the knowledge of some pharmacists about the ease of telepharmacy services, the lack of clarity in regulations, technological and internet network constraints, service times, facilities and infrastructure, scientific concepts and mindsets from management and the public who are not yet familiar with the term telepharmacy (most doctors only know about telemedicine) [16]. The Pangkalpinang POM Hall Annual Report for 2021 shows that there were findings of non-compliance with the provisions regarding the delivery of medicines to all health service facilities on Bangka Island (the work area of Pangkalpinang POM Hall) with the highest percentage in hospitals, namely 18.2% [17]. Patient compliance with prescription antibiotics in Pangkalanbaru, Central Bangka Islands Regency, Bangka Belitung Province is in the low category during the Covid-19 pandemic. The contributing factor is that the drug information provided is incomplete, namely only the rules and how to use it [19]. The drug information that patients also receive is drug indication [18], in fact some patients at the Pangkalpinang City Health Center do not even receive any information [19]. Inappropriate use of drugs due to not obtaining complete drug use information from pharmaceutical staff [20]. Patients get more drug information from social media, internet networks and WhatsApp [20] as well as personal or family experiences [21].

The contributing factor to not being provided with complete drug information during the Covid-19 period was the implementation of health protocol rules by maintaining distance to reduce the risk of infection [22,23,24,25,26]. The contributing factor during the Covid-19 pandemic was the long total waiting time for health services. The number of patient queues piles up at one time, resulting in patients who can no longer wait. Most patients feel in a hurry to go home immediately because they have waited too long from the registration process to the doctor's examination and finally at the pharmacy [27]. These results are also supported by other research in Indonesia which shows that services such as drug counseling, prescription review, PIO, drug therapy monitoring, and pharmaceutical homecare are still largely carried out traditionally [28,29,30]. In contrast to the island nation of the Philippines, free online telepharmacy services were widely developed during the Covid-19 pandemic [31].

Providing appropriate drug information can increase compliance and accuracy in drug use [32,33,34]. Therefore, it is necessary to implement telepharmacy to access appropriate drug information by pharmacists [23,35] and overcome long patient waiting times [7,9]. Pharmacists have a very important role in overcoming misinformation about medicines [35] by providing material on the correct use of medicines to the public [12] and improving personal quality through the use of telepharmacy with various media

[11,36]. Based on the description above, telepharmacy information services and drug therapy monitoring are very important to be implemented in island areas by using media that are easy to use or easily accessible to the public. Therefore, it is necessary to carry out research that formulates an effective telepharmacy service model in government hospitals in dealing with problems of compliance and appropriate use of medicines by patients as well as waiting times for services. It is also hoped that the telepharmacy service model meets the needs of the community so that it can synergize with telemedicine services in the Bangka Belitung Islands Province.

2. Materials and Methods

This research is a mix-method research with a qualitative method, phenomenological approach and a quantitative method, cross-sectional descriptive analytical observational design and experimental research using the Pre and Post Test Group Design method. The research stages consisted of 6 stages, namely preparing research instruments using a mix-method, analyzing the implementation of clinical pharmacy services qualitatively, evaluating the effectiveness of clinical pharmacy services using a mix-method, identifying the need for telepharmacy services using quantitative methods, formulating a qualitative telepharmacy service model design and testing telepharmacy service models using experimental research using Pre and Post Test Group Design.

Data collection methods were carried out through in-depth interviews, FGDs, surveys and direct observation. Data collection was carried out in August 2023-March 2025 at the Type D Government Hospital in the Bangka Belitung Islands Province. Data analysis was carried out qualitatively and quantitative analysis univariately and bivariately using the t test statistical test. The qualitative analysis method uses the Miles and Huberman Model. The independent variable is the telepharmacy service model (type of service, activities, media, applications used and drug information) while the dependent variable is the implementation of clinical pharmacy services and service effectiveness (number of services, average service time, compliance and accuracy of drug use).

Phase I research consists of 2 steps, namely preparing the instrument (literature study, expert panel and expert judgment, as well as validity and reliability testing) and testing the instrument. The expert panel involved 5 experts and 7 expert judgment teams. All involved are pharmacists. Key informants are the total population of pharmacists in the research locus. Additional informants were 7 people (Other Health Personnel with positions as Head Room Nurse, Head Room Midwife, Doctor, Head of the Pharmacy and Therapy Team, Head of Nutritionist/Nutritionist and Head of Medical Records as well as representatives of Hospital Management) and 30 people from the community (patients and/patient's families) in stage I, 100 people in stages III and VI, and 424 people in stage IV. In stage IV there were also informants from hospitals and the Provincial/Regional Government Health Service as telepharmacy service providers (a total of 10 people).

3. Results

The results are explained into two chapter is implementation of clinical pharmacy services and evaluation of the effectiveness of clinical pharmacy services.

Table 1 Comparison of the Implementation of Clinical Pharmacy Services Before and After the Implementation of Telepharmacy Services

No	Types of Clinical Pharmacy Services	Treatment Group Hospital				Control Group Hospital				Delta / Δ percentage difference achieved a vs b	Delta / Δ percentage difference achieved c vs d	Delta / Δ percentage difference achieved a vs c	Delta / Δ percentage difference achieved b vs d
		Pre Test (a)		Post Test (b)		Pre Test (c)		Post Test (d)					
		Implemented (%)	Not implemented (%)	Implemented (%)	Not implemented (%)	Implemented (%)	Not implemented (%)	Implemented (%)	Not implemented (%)				
1	Assessment and Prescription Services												
	a. Recipe Review	100	0	100	0	100	0	100	0	0	0	0	0
	b. Prescription Services	100	0	100	0	100	0	100	0	0	0	0	0
2	Look for a history of drug use	91.67	8.33	100	0	91.67	8.33	100	0	8.33	8.33	0	0
3	Reconciliation	100	0	100	0	75	25	75	25	0	0	25	25
4	Drug Information Service	83.33	16.67	83.33	16.67	16.67	83.33	16.67	83.33	0	0	66.66	66.66
5	Counseling	100	0	100	0	0	100	83.33	16.67	0	83.33	100	16.67
6	Visit	75	25	100	0	75	25	0	100	25	(-)75	0	100
7	Drug Therapy Monitoring	100	0	100	0	100	0	0	100	0	(-)100	0	100
8	Monitoring Medication Side Effects	60	40	80	20	0	100	20	80	20	20	60	60
9	Medication Use Evaluation	100	0	100	0	0	100	0	100	0	0	100	100
10	Dispensing Sterile Preparations	33.33	66.67	0	100	0	100	0	100	66.67	0	33.33	0
11	Blood Drug Level Monitoring	0	100	0	100	0	100	0	100	0	0	0	0
Percentage Amount		943.33	256.67	963.33	236.67	558.33	641.66	495	705	20	(-)63.33	385	468.33
Average Percentage		78.61	21.39	80.28	19.72	46.53	53.47	41.25	58.75	**1.67**	**(-)5.28**	**32,08**	**39.03**

Source: Primary data that has been processed

Table 2 Comparison of Telepharmacy Implementation of Clinical Pharmacy Services Before and After Implementation of the Telepharmacy Model

No	Types of Clinical Pharmacy Services	Treatment Group Hospital				Control Group Hospital			
		Pre Test (a)		Post Test (b)		Pre Test (c)		Post Test (d)	
		Implemented (%)	Not implemented (%)	Implemented (%)	Not implemented (%)	Implemented (%)	Not implemented (%)	Implemented (%)	Not implemented (%)
1	Assessment and Prescription Services								
	a. Recipe Review	√		√			√		√
	b. Prescription Services	√		√			√	√	
2	Look for a history of drug use	√		√			√		√
3	Reconciliation	√		√			√		√
4	Drug Information Service		√	√			√		√
5	Counseling		√	√			√		√
6	Visit		√	√			√		√
7	Drug Therapy Monitoring		√	√			√		√
8	Monitoring Medication Side Effects		√	√			√		√
9	Medication Use Evaluation		√	√			√		√
10	Dispensing Sterile Preparations		√		√		√		√
11	Blood Drug Level Monitoring		√		√		√		√
	Total types of service	4	7	10	2	0	12	1	11
	Delta / Δ difference is realized a vs b					6			
	Delta / Δ difference is realized c vs d					1			
	Delta / Δ difference is realized a vs c					4			
	Delta / Δ difference is realized b vs d					9			

Source: Primary data that has been processed

Table 3 Comparison of Quantity Indicator Achievements (Achievement of Target Number of Clinical Pharmacy Services) Before and After Implementation of Telepharmacy Services

Activity	Treatment Group Hospital				Control Group Hospital			
	Pre Test (a)		Post Test (b)		Pre Test (c)		Post Test (d)	
	inpatient	outpatient	inpatient	outpatient	inpatient	outpatient	inpatient	outpatient
Assessment and Prescription Services	100%	100%	100%	100%	100%	100%	100%	100%
a. Recipe Review	100%	-	100%	100%	100%	-	100%	-
b. Prescription Services	100%	-	100%	100%	100%	-	100%	-
Look for a history of drug use	-	-	-	100%	-	-	-	-
Reconciliation	-	-	-	100%	100%	-	100%	6%
Drug Information Service	100%	-	100%	100%	-	-	-	-
Counseling	100%	-	100%	100%	-	-	-	-
Visit	-	-	-	100%	-	-	-	-
Drug Therapy Monitoring	-	-	-	100%	-	-	-	-

Monitoring Medication Side Effects	-	-	-	-	-	-	-	-
Medication Use Evaluation	-	-	-	-	-	-	-	-
Percentage Amount	500%	100%	500%	900%	400%	100%	400%	106%
Average percentage	45.45%	9.09%	45.45%	**81.82%**	36.37%	9.09%	36.37%	9.64%
Δ/Difference a vs b outpatient	72.73%							
Δ/Difference c vs d outpatient	0.55%							
Δ/Difference b vs d outpatient	72.18%							
Inpatient	there is no difference							

Source: Primary data that has been processed

Table 4 Comparison of Achievements of Service Time Indicators (Average Clinical Pharmacy Service Time) Before and After Implementing Telepharmacy Services

Indicator	**Treatment Group Hospital**		**Control Group Hospital**	
	Pre Test	Post Test	Pre Test	Post Test
Average Service Time	1. Concoctions are not measured 2. Non-mixed 07 minutes 41 seconds 3. Telepharmacy is not measured because it only goes to health workers via CPPT SIMRS	1. Concoction 20 minutes 57 seconds 2. Non-mixed 06 minutes 51 seconds 3. Telepharmacy 17 minutes 16 seconds	1. Concoction 12 minutes 18 seconds 2. Non-mixed 15 minutes 33 seconds 3. Telepharmacy is not measured because it is not implemented	1. Concoction 18 minutes 09 seconds 2. Non-mixed 05 minutes 01 seconds 3. Telepharmacy is not measured because it is not implemented

Source: Primary data that has been processed

Table 5 Comparison of Respondent Characteristics in Treatment and Control Group Hospitals

Variabel	Category	Treatment Hospital				Control Hospital				Sig (2-tailed) a vc c	Sig (2-tailed) b vc d
		Pre Test (a)		**Post Test (b)**		Pre Test (c)		**Post Test (d)**			
		Amount (n)	Percentage (%)	Amount (n)	Percentage (%)	Amount (n)	Percentage (%)	Amount (n)	Percentage (%)		
Gender	a. Man	18	18	18	18	43	43	43	43	**<0.001**	**<0.001**
	b. Woman	**82**	**82**	**82**	**82**	**57**	**57**	**57**	**57**		
Last Education	a. No School	5	5	5	5	10	10	10	10	**0.008**	**0.008**
	b. Basic Education (TK/PAUD and SD)	**62**	**62**	**62**	**62**	**37**	**37**	**37**	**37**		
	c. Secondary education (middle school and high school)	27	27	27	27	31	31	31	31		
	d. Higher Education (Diploma and Bachelor)	6	6	6	6	22	22	22	22		
Age	a. Infants (0-1 years)	2	2	2	2	2	2	2	2	0.705	0.705
	b. Children (2-10 years)	5	5	5	5	8	8	8	8		
	c. Teenagers (11-19 years)	6	6	6	6	7	7	7	7		
	d. Adult (20-60 years)	**81**	**81**	**81**	**81**	**62**	**62**	**62**	**62**		
	e. Elderly (> 60 years old)	6	6	6	6	21	21	21	21		
Job	a. **Doesn't work**	**70**	**70**	**70**	**70**	46	46	46	46	**<0.001**	**<0.001**
	b. Work other than in the health sectorn	30	30	30	30	**53**	**53**	**53**	**53**		
	c. Work in the pharmaceutical field	0	0	0	0	1	1	1	1		

Source: Primary data that has been processed

Table 6 Comparison of Respondents' Compliance and Accuracy in Medication Use in Treatment and Control Group Hospitals

Variabel	Category	Treatment Hospital					Control Hospital					Sig (2-tailed) a vc c	Sig (2-tailed) b vc d	Sig (2 tailed delta treatment vs control	Odd Ratio
		Pre Test (a)		Post Test (b)		Sig (2-tailed) a vs b	Pre Test (c)		Post Test (d)		Sig (2-tailed) c vs d				
		Amount (n)	Percentage (%)	Amount (n)	Percentage (%)		Amount (n)	Percentage (%)	Amount (n)	Percentage (%)					
Compliance	**a. Obedient**	**76**	**76**	**96**	**96**	**< 0.001**	**83**	**83**	**82**	**82**	0.820	0.222	**0.002**	**0.017**	**2.688**
	b. Not obey	24	24	4	4		17	17	18	18					
Accuracy	**a. Appropriate**	**28**	28	60	60	**< 0.001**	40	40	30	30	0.058	0.074	**< 0.001**	**< 0.001**	**4.758**
	b. Not exactly	**72**	**72**	**40**	**40**		**60**	**60**	**70**	**70**					
Exact Method/Rules for Use	**a. Appropriate**	**100**	**100**	**100**	**100**		**98**	**98**	**100**	**100**	0.158	0.158		**0.155**	**-**
	b. Not exactly	0	0	0	0		2	2	0	0					
Exact Usage Time Interval	**a. Appropriate**	28	28	60	60	**< 0.001**	44	44	31	31	**0.009**	**0.018**	**< 0.001**	**< 0.001**	**7.373**
	b. Not exactly	**72**	**72**	**40**	**40**		**56**	**56**	**69**	**69**					
Correct Dosage for Use	**a. Appropriate**	**100**	**100**	**100**	**100**		**100**	**100**	**100**	**100**		-		**-**	**-**
	b. Not exactly	0	0	0	0		0	0	0	0					
Exact Delivery Time	**a. Appropriate**	**76**	**76**	**100**	**100**	**< 0.001**	**82**	**82**	**95**	**95**	**0.000**	0.300	**0.025**	**0.045**	**2.113**
	b. Not exactly	24	24	0	0		18	18	5	5					
Beware of Medication Side Effects	**a. Appropriate**	10	10	31	31	**< 0.001**	20	20	11	11	**0.000**	**0.048**	**< 0.001**	**< 0.001**	**13.025**
	b. Not exactly	**90**	**90**	**69**	**69**		**80**	**80**	**89**	**89**					

Source: Primary data that has been processed

Table 7 Summary of Telepharmacy Model for Clinical Pharmacy Services in the Islands Region

Variabel	Results	
	Strong	Weak
Clinical Pharmacy Services		
a. Assessment and Prescription Services	>>>	
b. Drug Use History Search	>>>	
c. Medication Reconciliation	>>>	
d. Drug Information Service	>>	
e. Counseling	>>>	
f. Visite	>>>	
g. Drug Therapy Monitoring	>>>	
h. Monitoring Drug Side Effects	>>	
i. Evaluation of Medication Use	>>>	
j. Dispensing Sterile Preparations		>>>
k. Monitoring Drug and Blood Levels		>>>
Media		

a. Print Online		>>>
b. Elektronic	>>>	
Applications used		
a. WhatsApp Chat	>	
b. SMS		>>>
c. WhatsApp Video Call	>	
d. WhatsApp Call	>>>	
d. Telephone	>>>	
Drug Information		
a. Drug name	>>>	
b. Benefits	>>>	
c. How/Rules for Use	>>>	
d. Dose	>>>	
e. Usage Time Interval	>>>	
f. Drug Side Effects	>>>	
g. Actions to take when ESO appears	>>>	
Compliance	>>>	
Accuracy of Medication Use	>>>	
a. The Right Way to Use Medicine		
b. Exact Delivery Time Interval	>>>	
c. Right Dosage		
d. Exact Delivery Time	>>>	
e. Beware of Side Effects	>>>	
Human Resources		
a. Amount		>
b. Commitement	>>>	
c. Competence	>>	
Facilities and Infrastructure		>

4. Discussion

4.1 Implementation of clinical pharmacy services

The results of in-depth interviews and field observation surveys before and after the implementation of the telepharmacy model for clinical pharmacy services can be seen in detail in Tables 1 and 2. Based on Table 1, the implementation of clinical pharmacy services in the treatment group increased by 1.67% in measurements before and after the implementation of the telepharmacy model for clinical pharmacy services. This result is very different from the implementation of clinical pharmacy services in the control group which experienced a decrease of 5.28%. This result is supported by the fact that at the beginning of the measurement (pre test) there was a gap in the percentage of implementation of clinical pharmacy services in the treatment and control groups of 32.08%. Therefore, at the end of the measurement (post test) there was also a gap in the percentage of implementation of clinical pharmacy services in the treatment and control groups of 39.03%.

The control group RSUD showed a decline in the quality of implementation of clinical pharmacy because there were 2 types of services that had been implemented previously but were no longer implemented, namely PTO and visits. The main factor is the number of different human resources. The number of human resources in the treatment group met the minimum requirements (3 pharmacists and 5 TTKs) while the control group did not meet the minimum requirements because only 2 pharmacists were assisted by 3 TTKs. The Ministry of Health states that the number of pharmacists at class D regional hospitals is a minimum of 3 pharmacists and a minimum of 2 TTK people.

The number of pharmacists actively working in the RSUD control group was only 1 person, namely the Head of the Pharmacy Installation, so they could not carry out all activities during the post test measurements. One pharmacist and 1 TTK ASN PPPK who had just joined were pregnant and at the time the research data was collected were on maternity leave so there was no meaningful participation in the implementation of clinical pharmacy. Human resource development has a good and very strong influence on performance productivity [37]. A significant problem in developing health human resources is the inequality of health workers and the number of formations that are not ideal [38]. Indonesia still experiences a shortage of health human resources in health facilities outside the capital area which results in low quality of work due to work overload [39].

The control group hospital already has additional facilities, namely a counseling room, but counseling activities have only been carried out for 3 patients, namely in November 2023 only. After that it was never implemented again because only 1 pharmacist was active. Apart from that, SIMRS Klik Medic also experienced additional infrastructure in early 2024. The use of SIMRS has had an impact on the implementation of e-prescribing so that patient waiting times are faster for prescription services. The weakness of SIMRS is that there is no feature for reviewing recipes so that reviewing recipes is still manual/traditional.

Information system innovation in hospitals increases service efficiency [40]. SIMRS also improves the quality of health services and facilitates health service management activities41. In contrast to the control group RSUD which has long been facilitated with an internet network by the Hospital Management, the treatment group RSUD has just been provided with a WiFi internet network facility. Previously the internet network used individual quota packages, now it is facilitated by Hospital Management. The problem is that there is no lightning protection, so if the computer is hit by lightning, the server will be damaged, resulting in the service being carried out manually and re-inputting it to the computer.

Based on Table 2, it can be seen that there has been an increase in the implementation of clinical pharmacy telepharmacy services in the treatment group Regional Hospital, from initially 4 activities carried out to 10 activities carried out. This result is due to the implementation of the telepharmacy model for clinical pharmacy services implementing 8 types of clinical pharmacy services, namely tracing drug use history, reconciliation, PIO, Counseling, Visite, PTO, MESO, and EPO using electronic media cell phones/cellphones/smartphones with the WhatsApp application accompanied by drug information, drug name, efficacy, dosage form, dosage, how to use the drug, storage and side effects of the drug.

Telepharmacy clinical pharmacy services were carried out by 3 pharmacists in the treatment group regional hospital using the WhatsApp application, either by message/chat, call or video call. Apart from that, telephones are also used for patients who do not use Android smartphones or regular cellphones. There were 58 patients (58%) contacted using WhatsApp with details of 54 WhatsApp calls (93.10%), 1 WhatsApp video call (1.73%) and 3 WhatsApp chats (5.17%). There were 42 patients contacted using ordinary telephones (42%). Therefore, it can be concluded that most telepharmacy clinical pharmacy services are carried out using WhatsApp, namely WhatsApp calls.

The use of WhatsApp as a communication medium is increasingly popular because of the convenience it offers. WhatsApp directly connects to the number stored in your cellphone contacts without needing to use a password. This application functions as an easy and effective replacement for SMS in sending messages in a timely manner. Apart from that, WhatsApp has various advantages compared to other chat applications. This application is simple and easy to understand, light enough to save battery and saves internet data usage. Patients who were not contacted again using WhatsApp were patients who did not use the WhatsApp application and/or only used ordinary cellphones [42].

The research results also show that the most widely used method is the synchronous method. This is because most of the time it is done in real time, namely the communication between the pharmacist and the patient is both online and can carry out two-way communication directly providing feedback. When implementing telepharmacy clinical pharmacy services, pharmacists have carried out activity stages based on the SOPs that have been implemented. Evaluation of the implementation of telepharmacy was also carried out based on documentation of recordings or photos of activities carried out by all pharmacists as well as direct interviews of researchers with patients during the post test. The average telepharmacy time for clinical pharmacy services is 17 minutes 16 seconds.

The results of interviews with patients in the RSUD treatment group also showed that 71% of patients (71 people) were very satisfied and 24% of patients (24 people) were satisfied with telepharmacy service activities. Patient satisfaction is due to the many benefits felt. At most 35% of patients (35 people) felt that the pharmacist cared about the patient's health so that the patient felt they had a better understanding of the medication they were taking, the pharmacist was a reminder to take medication and take medication more timely. The second and third highest positions were 23% of patients (23 people) felt the benefit of additional knowledge and understanding about the medicines they received and 15% of patients (15 people) felt the benefit that the pharmacist reminded patients to comply with taking medicines or served as a reminder/alarm for taking medicines.

The main advantage of telepharmacy is a high level of satisfaction43. Apart from that, it is also effective in implementing PTO, MESO, and understanding drug information [10]. The reasons stated by the patient indicate that there is an increase in the active role of pharmacists in clinical pharmacy services. This has a positive impact on

health and public trust in pharmacists (trending brand name). As many as 92% of patients (92 people) said that telepharmacy clinical pharmacy services were very important for patients and needed to be continued.

The research results were better than other studies which showed that as many as 86.63% of respondents stated that they really needed telepharmacy services [44]. This is because telepharmacy actively involves patients in the management of their condition [43]. In addition, telepharmacy can promote health facilities and pharmacists and increase patient loyalty and better document patient treatment history, reduce workload and streamline human resources [45]. This is in line with the implementation of telepharmacy clinical pharmacy services which can carry out 8 types of clinical pharmacy services. This means that clinical pharmacy activities can be carried out at one time so that the number of human resources can be made more efficient with the tasks being carried out.

The results of in-depth interviews with other health workers also show that almost all types of clinical pharmacy services have been implemented. There are other health workers who do not know that counseling has been carried out either face-to-face or telepharmacy. Direct face-to-face counseling is carried out in a separate room by a pharmacist and this room does not yet have a name or directions. Apart from that, some respondents did not know that telepharmacy provided clinical pharmacy services. Therefore, it is necessary to carry out socialization again. In line with research which states that the majority (56.98%) of respondents do not know about health service facilities implementing telepharmacy [44]. Therefore, there is a need for appropriate health promotion media for the public regarding the use of telepharmacy. Telepharmacy is a new service that is not yet widely known by laypeople [45].

Based on the explanation above, it can be concluded that the implementation of clinical pharmacy services at Type D Hospital, Bangka Belitung Islands Province is not in accordance with the 2016 Standards for Pharmaceutical Services in Hospitals. Telepharmacy services have begun to be implemented in most types of clinical pharmacy services. The implementation of clinical pharmacy services in the treatment group RSUD was better compared to the control group RSUD both in quantity and quality. This is because it is influenced by the number of human resources and the availability of facilities and infrastructure.

4.2 Evaluation of the effectiveness of clinical pharmacy services

The detailed evaluation results of the effectiveness of clinical pharmacy services are explained in Table 3-Table 6. Table 3 shows that in the pre-test measurements, the treatment group hospitals achieved the target indicator for the number of inpatient services more than the control group hospitals because the treatment group hospitals achieved the target number of services of 5 types of services, while the control group hospitals only achieved 4 types of services. However, there was no difference in outpatient services.

Post test measurements in the two groups showed a very large difference (72.18%) in outpatient services. The percentage increase in the treatment group also reached 72.73% in outpatient services. These results were obtained because the RSUD in the treatment group implemented clinical pharmacy services via telepharmacy. There is no change in service to inpatients in achieving service targets after post test measurements (same as pre test). Based on Table 4, the achievement of the average service time indicator shows that the average service time in both groups is in accordance with the Minimum Service Standards from the Ministry of Health in 2008, namely the waiting time for service for ready-made/non-concocted medicines is ≤ 30 minutes and for concocted medicines ≤ 60 minutes. These results are supported by the results of researchers' observations which show that the work focus of pharmaceutical staff is more on prescription services. The control group hospitals have also used SIMRS in

prescription services. However, the SOP for prescription services still requires patients to go back and forth (after returning from the pharmacy to finance for payment, the patient can take the medicine that the pharmacy has prepared). The medicine has been prepared by pharmacy staff before the patient comes to the counter. Pharmacy staff received assistance from vocational school students who were doing internships when the researchers collected post-test data. Therefore, the prescription service time is faster than before using SIMRS. SIMRS in hospitals provides many benefits in improving the efficiency and quality of health services [46.] SIMRS also plays a role in increasing the accessibility of health services by facilitating smoother data exchange between health facilities. In this way, patients in remote areas can receive treatment that is timely and appropriate to their needs [47].

Based on Table 4, it can also be seen that the average time for clinical pharmacy telepharmacy services is 17 minutes 16 seconds covering 8 types of services, namely tracing drug use history, reconciliation, PIO, Counseling, Visite, EPO, PTO and MESO. The total service time when combining the average non-concoction service time with the average telepharmacy service time is 24 minutes 07 seconds and the total concoction service time is 38 minutes 13 seconds. The total time for each drug service still meets the Minimum Service Standards from the Ministry of Health in 2008, namely the waiting time for finished/non-concocted drug services is ≤ 30 minutes and for compounded drugs ≤ 60 minutes. These results show that the advantages of implementing the telepharmacy model for clinical pharmacy services are the application of 9 types of clinical pharmacy services to outpatients.

Based on Table 5, it can be seen that there was no change in the characteristics of respondents in the pre and post tests. Analysis of the Paired Sample t-test in Table 6 for the treatment groups shows significant differences before and after implementing the telepharmacy model for clinical pharmacy services in indicators of compliance (with p value <0.001) and accuracy of medication use (with p value <0.001). Significant differences in the accuracy of drug use in the accuracy of the time interval of use (with a p value <0.001), the accuracy of the duration of administration (with a p value <0.001) and ESO alert (with a p value <0.001). These results are supported by research that shows telepharmacy services can reduce patient barriers to following therapy regimens and significantly increase compliance and achievement of treatment targets [48]. Telepharmacy also provides significant results in terms of clinical status and compliance with medication use in hypertensive patients as seen from the patient's blood pressure being more controlled [49].

Based on Table 6, it can be seen that in the Treatment Group Hospital there was an increase in compliance and accuracy indicators. The results of the Chi Square Test in both groups showed a significant relationship (p value 0.017) in changes in compliance with the implementation of the telepharmacy model of clinical pharmacy services. The Odd Ratio value of 2.688 indicates that patients who are given telepharmacy clinical pharmacy services will be 2,688 times more compliant compared to patients who are not given telepharmacy clinical pharmacy services.

Likewise with the accuracy of patient medication use, the Chi Square test results also show a significant relationship (p value < 0.001) in changes in accuracy of medication use with the implementation of the telepharmacy model of clinical pharmacy services. The Odd Ratio value of 4.758 indicates that patients who are given telepharmacy clinical pharmacy services will use drugs 4,758 times more correctly than patients who are not given telepharmacy clinical pharmacy services. Based on these results, it can be concluded that the implementation of the telepharmacy model for clinical pharmacy services is effective in increasing compliance and accuracy in medication use.

These results are also supported by the results of the Paired Sample t-test analysis on control group patients showing that there are no significant differences before and after measurement in indicators of compliance and appropriateness of drug use. However, there were significant differences in the accuracy of the interval of use (with a p value of 0.009), the accuracy of the duration of administration (with a p value <0.001) and ESO alert (with a p value <0.001). This is because the control group was not given the telepharmacy service model treatment.

Analysis of the Independent t test showed that in the treatment and control groups there were significant differences after the implementation of telepharmacy clinical pharmacy services in indicators of compliance (with a p value of 0.002) and accuracy of drug use (with a p value of <0.001), especially in the accuracy of the time interval for use (with a p value of <0.001), awareness of side effects (with a p value of <0.001) and accuracy of the duration of administration (with a p value of 0.025).

Other causal factors are significant differences in gender (with p value <0.001), and highest level of education (with p value 0.008), occupation (with p value <0.001). Gender is a factor that significantly influences compliance with type 2 Diabetes Mellitus treatment [50]. In general, women tend to be more concerned about their health condition, while men often pay less attention to their health and underestimate the symptoms of the disease that appear, even though they have experienced certain diseases. Employment status also influences health behavior, especially in terms of compliance with treatment for hypertension patients. This is influenced by the availability of time, someone who works usually does not have much free time to visit available health services [51].

Therefore, based on the results obtained, it can be concluded that the effectiveness of the implementation of clinical pharmacy services is less effective in both the treatment and control group RSUDs. This is because both hospitals did not achieve targets on quality indicators (service output, namely compliance and appropriate use of medicines). The effectiveness of clinical pharmacy services in the treatment group RSUD was better compared to the control group RSUD. This result is because the RSUD in the treatment group only did not achieve quality indicators, but there was a significant difference in the quality of compliance and accuracy of patient medication use before and after the implementation of telepharmacy for clinical pharmacy services. In contrast to the control group RSUD, there were 2 indicators that did not reach the target, namely quantity and quality indicators. There was also no significant difference in the quality of compliance and accuracy of patient medication use before and after the trial measurements. Based on the research results, it can be concluded that the telepharmacy model of clinical pharmacy services increases the implementation and effectiveness of clinical pharmacy services. A summary of the telepharmacy model for clinical pharmacy services can be seen in Table 7.

5. Conclusions

Based on the research results, it can be concluded that:

1. The implementation of clinical pharmacy services in the Type D Government Hospital of Bangka Belitung Islands Province is not yet in accordance with the 2016 Standards for Pharmaceutical Services in Hospitals.
2. Clinical pharmacy services at type D government hospitals in the Bangka Belitung Islands Province are less effective in achieving quantity indicators (target number of services) and service quality indicators (service output, namely compliance and correct use of medicines.
3. An effective telepharmacy model to increase the implementation and effectiveness of clinical pharmacy services in the Bangka Belitung Islands region is simple application-

based telepharmacy with the strengthening of pharmacists (quantity and quality) and internet networks.

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