

# THE IMPLEMENTATION OF COMPLIANCE MODEL FOR COMPLIANCE BASED ON THEORY OF KING INTERACTION SYSTEM AND ITS EFFECT ON LUNG COMPLIANCE PATIENTS IN LUNGS IN THE PUSKESMAS AREA OF JAYAPURA CITY

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**Abstract---***Background Pulmonary tuberculosis is an infectious disease caused by the bacteria Mycobacterium tuberculosis and is chronic. In 2017, there are an estimated 1,020,000 TB cases in Indonesia. National clinical pulmonary tuberculosis prevalence is 0.99%. Papua Province, which is 1.73%. The spread of pulmonary tuberculosis can be found in almost all districts/cities in Papua Province, both in Biak Numfor (2.2%), Nabire (1.9%), Merauke (1.6%), Jayapura Regency (1.8 %), and in Jayapura City (1.1%) (Ministry of health, 2018). This research is to determine the effectiveness of the application of the theory of compliance improvement model based on the interaction system of King to the compliance of patients with pulmonary tuberculosis in the working area of Puskesmas KotaJayapura. This research is a quasi-experimental study with the One Group Pre and Posttest Design approach. Only use one group or without using a control group (comparison). Before being given treatment, the experimental group was given a pretest, then given treatment (treatment) using a model of compliance based on the theory of King's system interaction with training methods and after that conducted a posttest. Application of Compliance Improvement Model Based on King's Interaction System Theory and Its Effect on Compliance with Lung Tuberculosis Patients in Jayapura City Health Center Work Area shows that there are significant differences. The conclusion is the model that applied in the work area of Jayapura City Health Center was proven to have an effect on increasing the knowledge of pulmonary TB patients, proven to have an effect on increasing self-efficacy of pulmonary TB patients, proved to have an effect on increasing motivation of TB patients lung, has been proven to have an effect on increasing adherence to prevention of transmission of pulmonary TB patients, has been proven to have an effect on increasing nutritional compliance of pulmonary TB patients, has been shown to have an effect on increasing compliance with pulmonary TB patient treatment.*

**Keywords---***Compliance Model, System Theory, King Interaction, Patient Compliance, Lung Tuberculosis*

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## I. Background

Pulmonary tuberculosis is an infectious disease caused by the bacteria *Mycobacterium tuberculosis* and is chronic. Although the number of deaths due to tuberculosis decreased by 22% between 2000 and 2015. WHO in 2017, predicted there were 1,020,000 TB cases in Indonesia, but only reported to the Ministry Health as many as 420,994 cases (Risksdas, 2018). The national clinical prevalence of pulmonary tuberculosis (TB) is 0.99%. There are 12 provinces which have a prevalence above the national prevalence, including Papua Province, which is 1.73%. The spread of pulmonary tuberculosis can be found in almost all districts/cities in Papua Province, both in Biak Numfor (2.2%), Nabire (1.9%), Merauke (1.6%), Jayapura Regency (1.8 %), and in Jayapura City (1.1%) (Ministry of health, 2018).

Jayapura City is the capital of Papua Province which has 13 Puskesmas and has implemented the Directly Observed Treatment Short-course (DOTS) program. In 2015 Jayapura City succeeded in finding 294 positive smear cases and increased in 2016 to 383 cases so that a positive BTA TB Case Notification Rate of 253 per 100,000 population was obtained, while the TB overall was 751 cases resulting in a CNR figure of 607 Per 100,000 population. The CNR coverage illustrates that efforts to access services and their use in finding TB cases are good but at the same time provide an illustration that in Jayapura District the TB problem is still a serious health problem so it needs attention from all parties because of the high number of cases. While the success of the Lung TB Program still not significant with TB discovery. In 2017, there were 112 patients evaluated for treatment results in all Jayapura City Health Centers. The results of the evaluation found 66 patients recovered (58.9%), 29 patients dropped out of treatment/drop out (25.9%), 11 patients moved (9.8%), and 6 patients died (5.4%). This shows that the drop out rate is still quite high even though the Puskesmas has implemented the DOTS program (Jayapura Health Office, 2017).

King's interaction system theory model is a theoretical model that focuses on the dynamic interaction of personal systems, interpersonal systems, and social systems. This can be used to improve compliance with Lung Tuberculosis patients. Personal systems according to King describe the characteristics of individuals and individuals are seen as open systems (Sukartini, 2015). Interpersonal systems describe the interactions of two or more people like the relationship between patients and nurses. While the social system is an interaction that describes the broader relationship of interpersonal such as the relationship between patients, nurses, families and community groups. King views humans as personal systems consisting of concepts of perception, self, growth, and development, self-image, learning, time, space and coping. Interpersonal systems are formed when two or more individuals interact. Understanding interpersonal systems require knowledge of communication, interactions, roles, stressors, stressors, and transactions. While the social system is a system of group interaction in society (Sukartini, 2015).

Based on the description above, it is necessary to do a model approach that can optimize the implementation of nursing care in patients that focus on patient interaction systems to improve compliance with pulmonary TB patients. The approach of nursing models based on King's interaction system theory aims to optimize the level of compliance in the treatment of pulmonary TB patients. Considering the high drop out rate and the high non-compliance with taking medication for pulmonary TB patients in the working area of Jayapura City Health Center, the researchers wanted to apply a model of compliance improvement based on the King's interaction system theory and find out how far the effect of the application of the model on pulmonary tuberculosis patients in the region Jayapura City Health Center work.

## II. RESEARCH METHODS

This type of research is a quasi-experimental study with the One Group Pre and Posttest Design approach that only uses one group or without using a control group (comparison). Before being given treatment, the experimental group was given a pretest, then given treatment (treatment) using a model of compliance based on the theory of King's system interaction with training methods and after that conducted a posttest. The study was conducted at Jayapura City Community Health Center in May 2019, the population in this study were Community Health Centers in Jayapura using random sampling stratification based on Puskesmas accreditation, Kwano Entrop Health Center 17 Lung Tuberculosis patients, Kotaraja Health Center 24 Lung Tuberculosis Patients, 36 Lung Tuberculosis Patients. The population in this study was 77 patients with pulmonary tuberculosis. Samples in research. These are the respondents who met the inclusion criteria, 196 samples.

## III. RESEARCH RESULT

### Characteristics of Respondents

At this stage, a univariate analysis was carried out for the general characteristics of respondents including gender, age group, marital status, education level, employment to find out the frequency distribution of respondents.

Table 1. Characteristics of Respondents in Working Areas of Puskesmas in Jayapura City in 2019

Characteristics of Respondents	N	%
Gender		
Male	34	53,1
Female	30	46,9
Age Group		
18-25 Year	23	35.9
26-35 Year	23	35.9
36-45 Year	13	20.3
46-55 Year	5	7.8
Marital Status		
Married	36	56.2
Single	28	43.8
Level of education		
No school	1	1.6
Primary school	2	3.1
Junior high school	22	34.4
Senior High School	27	42.2
College	12	18.8
work		
Does not work	25	39.1
PNS/Polri/TNI	11	17.2
Farmers	9	14.1
Personal	19	29.7
Amount	64	100

### Normality test

Below will be described the results of tests of normality of knowledge data, self-efficacy, motivation, prevention of transmission, nutritional compliance, and medication adherence before and after the implementation of the King's theory-based compliance improvement model.

Table 2 shows the results of normality test results above can be seen that most data are normally distributed or  $p > 0.05$ . Henceforth the data were tested with paired T-test to see the effectiveness of the application of the theory-based model of compliance interaction with the King to the compliance of patients with pulmonary tuberculosis in the working area of Jayapura City Health Center.

Table 2. Knowledge Normality test, self-efficacy, motivation, prevention of transmission, nutritional compliance, and medication adherence In the working area of Puskesmas in Jayapura city in 2019

Variable	Significance
Knowledge Pre	0,001
Knowledge Post 1	0,000
Knowledge Post 2	0,000
self-efficacy Pre	0,119
self-efficacy Post 1	0,248
self-efficacy Post 2	0,234
Motivation pre	0,057
Motivation Post 1	0,069
Motivation Post 2	0,051
Preventive compliance Pre	0,146
Preventive compliance Post 1	0,051
Preventive compliance Post 2	0,010
Nutritional compliance Pre	0,015
Nutritional compliance Post 1	0,074
Nutritional compliance Post 2	0,166
Medication adherence Pre	0,000
Medication adherence Post 1	0,000
Medication adherence Post 2	0,000

### Bivariate Analysis

#### Relationship between Respondent Characteristics and Treatment Compliance

Table 3 presented the results of the analysis of the relationship between the two variables above using the Chi-Square Test statistic shows the significance/significance of the relationship between the two variables is ( $p = 0.013 < 0.05$ ), meaning

that there is a relationship between the sex of the respondent with TB treatment compliance in the work area Puskesmas in the city of Jayapura.

Table 3. Relationship between respondents' Gender and TB Treatment Compliance in the Work Area of Health Centers in Jayapura city in 2019 (= 64)

Gender	Medication compliance				N	%	<i>P value</i>
	Obedient		Not obey				
	n	%	n	%			
Male	28	82,4	6	17,6	34	100	0,013
Famale	15	50,0	15	50	30	100	
Amount	<b>43</b>	<b>67,2</b>	<b>21</b>	<b>32,8</b>	<b>64</b>	<b>100</b>	

Table 4 shows that the results of the analysis of the relationship between the two variables above using the Chi-Square Test shows the significance/significance of the relationship between the two variables is ( $p = 0.125 < 0.05$ ), meaning that there is no relationship between the age group of respondents with TB treatment compliance in the working area of Puskesmas in the city of Jayapura.

Table 4. Relationship between the age group of respondents with TB treatment compliance in the working area of Puskesmas in Jayapura city in 2019 (= 64)

age group	Medication compliance				N	%	<i>P value</i>
	Obedient		Not obey				
	n	%	n	%			
< 35 Year	34	73,9	12	26,1	46	100	0,125
> 35 Year	9	50	9	50	18	100	
Amount	<b>43</b>	<b>67,2</b>	<b>21</b>	<b>32,8</b>	<b>64</b>	<b>100</b>	

Table 5 illustrated that the results of the analysis of the relationship between the two variables above using the Chi-Square Test shows the significance/significance of the relationship between the two variables is ( $p = 0.149 < 0.05$ ), meaning that there is no relationship between respondents' marital status and TB treatment compliance in the working area of Puskesmas in the city of Jayapura. Table 5. Relationship between respondents' Marital Status and TB Treatment Compliance in the Work Area of Health Centers in Jayapura City in 2019 (=64)

Table 5. Relationship between respondents' Marital Status and TB Treatment Compliance in the Work Area of Health Centers in Jayapura City in 2019 (= 64)

Marital status	Medication compliance				N	%	<i>P value</i>
	Obedient		Not obey				
	n	%	n	%			
Married	21	58,3	15	41,7	36	100	0,149
Single	22	78,6	6	21,4	28	100	
Amount	43	67,2	21	32,8	64	100	

Table 6 shows that the results of the analysis of the relationship between the two variables above using the Chi-Square Test showed that the significance/significance of the relationship between the two variables was ( $p = 0.001 < 0.05$ ), meaning that there was a relationship between the respondent's education level and compliance with TB treatment in the work area Puskesmas in the city of Jayapura.

Table 6. Relationship of Education Level of Respondents with TB Treatment Compliance in Community Health Centers in Jayapura City in 2019 (= 64)

Level of education	Medication compliance				N	%	<i>P value</i>
	Obedient		Not obey				
	n	%	n	%			
High	33	84,6	6	15,4	39	100	0,001
Low	10	40	15	60	25	100	
Amount	43	67,2	21	32,8	64	100	

Table 7 presented the results of the analysis of the relationship between the two variables above using the Chi-Square Test shows the significance/significance of the relationship between the two variables is ( $p = 0.019 < 0.05$ ), meaning that there is a relationship between the respondent's employment status and TB treatment compliance in the region Puskesmas work in Jayapura city.

Table 7. Relationship between respondent's employment status and TB treatment compliance in the working area of Puskesmas in Jayapura city in 2019 (= 64)

Job status	Medication compliance				N	%	<i>P value</i>
	Obedient		Not obey				
	n	%	n	%			
Work	31	79,5	6	20,5	39	100	0,019
Does not work	12	48,0	13	52,0	25	100	
<b>Amount</b>	<b>43</b>	<b>67,2</b>	<b>21</b>	<b>32,8</b>	<b>64</b>	<b>100</b>	

### Effect of Compliance Improvement Model Based on King's Interaction System Theory on Lung TB Patient

#### Knowledge

From Table 8 illustrated the results of the analysis using a paired sample t-test obtained a p-value of  $0,000 < \alpha = 0.05$ . This means that there is a significant difference in knowledge after 1-month intervention model of compliance improvement based on the theory of King's interaction system ( $p = 0.000$ ) with a very weak difference of strength of 14.1% and after 2 months of intervention ( $p < 0.000$ ) with strength a difference of 22.9%. Overall, the difference in knowledge was significant from before the intervention and after 2 months of intervention ( $p < 0,000$ ).

Table 8. Knowledge of pulmonary TB patients before and after the intervention model of compliance improvement based on the theory of King's interaction system in the working area of Puskesmas in Jayapura city in 2019 (= 64)

Variable	Mean	Correlation	T count it	p value
Knowledge				
Pre Test	1,36			
Pre Test - Post Test 1	3,41	0.141	15.227	0.000
Post Test 1-Post Test 2	6,72	0.229	27.678	0.000
Pre Test – Post Test 2	6,72	0110	36.127	0,000

### The Effect of Compliance Improvement Model Based on King's Interaction System Theory on Self Efficacy of

#### Lung TB Patients

From Table 9 shows the results of the analysis using a paired sample t-test obtained a p-value of  $0,000 < \alpha = 0.05$ . This means that there is a significant difference in self-efficacy after 1-month intervention model of compliance improvement based on the theory of King's interaction system ( $p = 0.000$ ) with a strong difference of 67.1% and after 2 months of intervention ( $p < 0,000$ ) with strength very strong difference 97.6%. Overall, the differences in self-efficacy were significant from before the intervention and after 2 months of intervention ( $p < 0.000$ ).

Table 9. Self-efficacy of pulmonary TB patients before and after the intervention model of compliance improvement based on the theory of King's interaction system in the working area of Puskesmas in Jayapura city in 2019 (= 64)

Variable	Mean	Correlation	T count it	p value
Self-Efficacy				
Pre Test	32,05			
Pre Test - Post Test 1	36,45	0,671	17.238	0.000
Post Test 1-Post Test 2	46,06	0,976	139.129	0.000
Pre Test – Post Test 2	46,06	0,708	58,057	0,000

### The Effect of Compliance Improvement Model Based on King's Interaction System Theory on Motivation of Lung

#### TB Patients

From Table 10 the results of the analysis using paired sample t-test obtained p-value of  $0,000 < \alpha = 0.05$ . This means that there is a significant difference in motivation after 1-month intervention model of compliance improvement based on the theory of King's interaction system ( $p = 0.000$ ) with a very weak difference of power of 1% and after 2 months of intervention ( $p < 0,000$ )

with a strength of difference of 85.0%. Overall, the difference in motivation was significant from before the intervention and after 2 months of intervention ( $p < 0.000$ ).

Table 10. The motivation of pulmonary TB patients before and after the intervention model of compliance improvement based on the theory of King's interaction system in the working area of Jayapura City Health Center in 2019 (= 64)

Variable	Mean	Correlation	T count it	p value
Motivation				
Pre Test	31,48			
Pre Test - Post Test 1	36,19	-0.017	12.000	0.000
Post Test 1-Post Test 2	44,30	-0.850	13.146	0.000
Pre Test – Post Test 2	44,30	0,028	33,558	0,000

#### The Effect of Compliance Improvement Model Based on King's Interaction System Theory on Compliance Prevention of Transmission of Lung TB Patients

From Table 11 shows the results of the analysis using a paired sample t-test obtained a p-value of  $0,000 < \alpha = 0.05$ . This means that there is a significant difference in prevention adherence after 1-month intervention model of compliance improvement based on the theory of King's interaction system ( $p = 0.000$ ) with a strength of difference of 18.3% and after 2 months of intervention ( $p < 0.000$ ) with a strength of difference 34.4%. Overall, the difference in prevention adherence was significant from before the intervention and after 2 months of intervention ( $p < 0,000$ ).

Table 11. Compliance prevention of transmission of pulmonary TB patients before and after intervention model of compliance improvement based on the theory of King's interaction system in the working area of Puskesmas in Jayapura city in 2019 (= 64)

Variable	Mean	Correlation	T count it	p value
Compliance prevention				
Pre Test	28,08			
Pre Test - Post Test 1	35,70	0.183	19.305	0.000
Post Test 1-Post Test 2	44,09	0.344	38.937	0.000
Pre Test – Post Test 2	44,09	0,073	43,325	0,000

#### Effect of Compliance Improvement Model Based on King's Interaction System Theory on Nutrition Compliance of Lung TB Patients

From Table 12 shows the results of the analysis using a paired sample t-test obtained a p-value of  $0,000 < \alpha = 0.05$ . This means that there is a significant difference in adherence crisis after 1-month intervention model of compliance improvement based on the theory of King's interaction system ( $p = 0.000$ ) with a power difference of 49% and after 2 months of intervention ( $p < 0,000$ ) with a strength of difference of 34.7%. Overall, differences in nutritional adherence were significant from before the intervention and after 2 months of intervention ( $p < 0.000$ ).



Table 12. Nutrition adherence of pulmonary TB patients before and after the intervention model of compliance improvement based on the theory of King's interaction system in the working area of Puskesmas in Jayapura city in 2019  
(= 64)

Variable	Mean	Correlation	T count it	p value
Nutrition compliance				
Pre Test	28.92			
Pre Test - Post Test 1	38.22	0.490	47,670	0.000
Post Test 1-Post Test 2	42.50	0.347	13,443	0.000
Pre Test – Post Test 2	42.50	0,307	43,348	0,000

#### The Effect of Compliance Improvement Model Based on King's Interaction System Theory on Treatment Compliance of Pulmonary TB Patients.

From Table 13 shows the results of the analysis using paired sample t-test obtained p-value  $0.007 < \alpha = 0.05$ . This means that there is a significant difference in compliance with treatment after 1-month intervention model of compliance improvement based on King's theory of interaction systems ( $p = 0.007$ ) with a very strong difference in strength of 96.8% and after 2 months of intervention ( $p < 0.000$ ) with strength quite a difference of 48.2%. Overall, the difference in treatment adherence was significant from before the intervention and after 2 months of intervention ( $p < 0.000$ ).

Table 13. Treatment compliance for pulmonary TB patients before and after the intervention model of compliance improvement based on the theory of King's interaction system in the working area of Puskesmas in Jayapura city in 2019  
(= 64)

Variable	Mean	Correlation	T count it	p value
Treatment compliance				
Pre Test	1.64			
Pre Test - Post Test 1	1.75	0.968	2.782	0.007
Post Test 1-Post Test 2	2.62	0.482	7.000	0.000
Pre Test – Post Test 2	2,62	0,408	6,946	0,000

#### IV. CONCLUSION

The Application of Compliance Improvement Model Based on King's Interaction System Theory and Its Influence on Compliance of Lung Tuberculosis Patients in the Work Area of Jayapura City Health Center was proven to have an effect on increasing the knowledge of pulmonary TB patients, proven to have an effect on increasing the self efficacy of pulmonary TB patients, proved to influence the increase in motivation of pulmonary TB patients, proven to have an effect on increasing adherence to prevention of transmission of pulmonary TB patients, proven to have an effect on increasing nutritional compliance of pulmonary TB patients, proven to have an effect on improving compliance with treatment of pulmonary TB patients.

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