ORIGINAL ARTICLE

Unveiling quality, clinical, and financial Impacts of Pulmonary Tuberculosis Clinical Pathway Implementation in Magelang Public Hospital, Indonesia

Andriyani Dhaniaputri[1,2] Merita Arini[2,3]

[1]Magister of Hospital Administration, University of Muhammadiyah Yogyakarta, Indonesia
[2]Department of Family Medicine and Public Health Sciences, Medical Education, Faculty of Medicine and Health Sciences, University of Muhammadiyah Yogyakarta, Indonesia
[3]Sustainable Development Goals (SDGs) Center, University of Muhammadiyah Yogyakarta, Indonesia

Corresponding Author: Andriyani Dhaniaputri **Email:** a.dhaniaputri.psc22@mail.umy.ac.id

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ABSTRACT

Tuberculosis (TB) is a popular endemic disease in Indonesia with increased risk outcomes. The clinical pathway (CP) is crucial to enhancing healthcare services and resource efficiency despite discrepancies in service variability reduction, clinical outcomes improvement, and cost saving. Therefore, this study aimed to assess pulmonary TB CP and evaluate its impacts on clinical and financial results, as well as barriers to implementation at Tidar Hospital in Magelang, Indonesia. A sequential explanatory mixed-method design was used from July 2022 to January 2023. The study began with a retrospective analysis of medical records of TB patients (total sampling, n=92). In-depth interviews (IDIs) were conducted with healthcare workers including the quality and medical committee, case manager, CP team, inpatient and non-inpatient nursing sub-coordinators, and pulmonary specialists. In addition, eight multidiscipline healthcare professionals attended the focus group discussions (FGDs). The audio recordings were transcripted verbatim and subjected to thematic analysis. The results showed that the quality and content of CP based on TB evaluation using the Integrated Clinical Pathway Assessment Tool (ICPAT) was 62.6%. Four themes were obtained: 1) CP implementation techniques, 2) supportive factors in the success of CP, 3) organization support in CP implementation, and 4) TB patient outcomes. Furthermore, procedure compliance after CP implementation was 33%. There were no significant differences in the length of stay (p=0.77), diagnosis investigation and therapy appropriateness (100%), mortality (4 vs 3 patients; p=0.589), and cost efficiency with an average cost of care (Rp 6.994.508,- vs Rp 5.521.091,-; p=0.083) before and after CP implementation. Readmission rates were low before and after deployment (1 vs. 2 patients). This study found no significant clinical or financial benefits in TB CP implementation. These results imply the need for hospital leadership and a multidisciplinary team to overcome CP implementation hurdles.

Key words:
clinical pathway, pulmonary tuberculosis, quality of care, patient outcomes

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INTRODUCTION

Tuberculosis (TB) is a severe threat to global health, with over 10 million new cases detected each year, of which less than two-thirds are officially recorded. This disease can affect anyone, but certain groups are more prone to infection such as individuals with HIV, healthcare personnel, and those in areas with high TB transmission rates.[1]

The Sustainable Development Goals 'End Tuberculosis' approach by the World Health Organization (WHO) aims to eliminate this global pandemic. The goal of this plan is to envision "a world free of TB" with zero fatalities, sickness, and misery.[2] Indonesia is recognized as the country with the second-highest number of TB sufferers after India. In 2020, India, Indonesia, and the Philippines accounted for 67% of cases globally. TB cases in Indonesia reached approximately 969,000 (one person every 33 seconds) in 2021.[3] This represents a 17% increase from the figure in 2020 namely 824,000 cases. For every 100,000 individuals, 354 are infected with TB. Based on the reports, only 443,235 (45.7%) of the predicted cases were found, while 525,765 (54.3%) were not. In 2019, 430,667 cases were undetected but the figure dropped to 393,323 in 2020.

The clinical pathway (CP) is a multidisciplinary treatment strategy based on clinical practice for specific disease groups. The primary aims are to minimize treatment delays, maximize care quality, and optimize clinical outcomes.[4] Although CP has shown great potential to improve patient health and reduce LoS (length of stay) in previous studies, conflicting results were reported due to biases. In Indonesia, hospital accreditation requires CP document and implementation,[5] which combines therapy protocols, nursing care plans, and other health services to define patient outcomes. CP usually targets high-volume, high-risk, and high-cost illnesses as well as procedures.[6]

Staff compliance should be evaluated periodically to ensure proper CP implementation. Assessing the financial and patient outcomes, including LoS, appropriateness of therapy to avoid therapeutic variations that cause patient difficulties and acceptability of diagnosis investigations are essential to evaluate CP impact. However, there is a lack of evidence regarding the effects on TB case management's financial and clinical outcomes in Indonesia. This study aimed to assess pulmonary TB CP and evaluate its impacts on clinical and financial results, as well as barriers to implementation at Tidar Hospital in Magelang, Indonesia.

METHODS

Study Design

This study used the mixed method with an explanatory sequential design to ensure that the data obtained were more comprehensive, valid, reliable, and objective.[7] Both qualitative and quantitative data were collected and analyzed. The quantitative analysis was cross-sectional and followed by an explorative qualitative approach.[8]

Study Setting

This study was carried out at Tidar Hospital, Central Java, Indonesia. This hospital reportedly had 362 beds and an 80–90% occupancy rate in 2022, coupled with a negative pressure isolation ward consisting of nine rooms for non-drug resistant and two for drug-resistant TB. The ward had sixteen nurses, one room director, one administrative staff, and two pulmonary specialists. Additionally, there were two nutritionists and two pharmacists serving as the support staff.

Data Collection and Participants

1. Quantitative Data Collection

The TB CP evaluation was carried out using the Integrated Clinical Pathway Assessment Tools (ICPAT)[9] checklist to measure the content and quality. Quantitative data consisted of pulmonary TB CP inpatient medical records (MRs) from July 2022 to January 2023 (total sampling). This included data from four months before implementation (n=53) and three months after (n=39). We assessed compliance with CP implementation and its impact including Length of Stay (LoS), HCWs compliance in completing CP sheets, therapeutic and diagnosis procedures, patient clinical outcomes (readmission and mortality rates), and cost efficiency.

2. Qualitative Data Collection

A qualitative approach was used to gain a deeper understanding of the obstacles and supporting factors that contribute to the implementation of CP in hospital[10]. Qualitative data were collected through seven in-depth interviews (IDIs) and a Focus Group Discussion (FGD) consisting of eight participants. IDIs (n=7) were conducted with medical committee chairs, quality committee chairs, CP team members, pulmonary specialists, inpatient and outpatient nursing sub-coordinators, and case managers. The participants were selected purposively, and ethical guidelines were followed. Furthermore, FGD was conducted with one head of ward, two isolation ward nurses, two emergency room nurses, one pharmacist, and two nutritionists (n=8). These methods examined the application of pulmonary TB CP, alongside the challenges and opportunities for improvement in the Tidar Hospital isolation inpatient unit. All IDIs and FGD were performed at a location and time suitable to the experts. The FGD moderator was a general practitioner from the same hospital who was trained by the study team. All the interviews were audio-recorded and transcribed verbatim.

Data Analysis

Descriptive data analysis was conducted to obtain frequency, percentage, trend, average for ICPAT evaluation, as well as clinical and financial outcomes. ICPAT evaluation results were analyzed descriptively and categorized into three classes including good (> 75%), moderate (50-75%), and poor (<50%)[9].

The Independent Sample T-test was conducted for LoS and cost variables, while Mann-Whitney was carried out on mortality data. The patient outcome data before (July - October 2022) and after TB CP implementation (November 2022 - January 2023) was assessed using the Kolmogorov-Smirnov test for normality, and the Levene test for homogeneity.

The thematic analysis was used for the qualitative data. In the first step, the data transcript was read and reread to discover patterns and obtain open codes. In the second step, axial coding was used to connect these codes. Similar emergent patterns were categorized and grouped into themes. Both authors reviewed and agreed on the coding results, categories, and themes obtained.

Trustworthiness

To ensure trustworthiness, data, and method triangulation were conducted. Before coding, transcripts and field notes were rechecked for data credibility. Double-checking of TB data from medical records was also conducted to ensure credibility. An audit trail was maintained by collecting raw data, field notes, recordings, transcripts, data reduction, and analysis from observations, FGD, and IDIs. The study protocols were thickly described to provide transferable and dependable information.

Ethics

This study received ethical approval (Number: 003/EC-RSUD TIDAR/II/2023) issued by Tidar Hospital, Magelang. Furthermore, written informed consent was obtained from the informants before participation.

RESULTS

Demographic Data of TB Patients

Table 1. Demographic Data on TB Patients

Demographic Characteristics	Variables	Before Implementation		After Implementation	
		Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Gender	Male	30	56,6	25	64,1
	Female	23	43,4	14	35,9
Total		53	100	39	100
Age	17-30	13	24,5	8	20,5
	31-40	13	24,5	10	25,6
	41-50	12	22,6	11	28,2
	>51	15	28,4	10	25,7
Total		53	100	39	100
Length of Stay (days)	<3	5	9,4	2	5,1
	4-7	39	73,6	27	69,2
	>7	9	17	10	25,7
Total		53	100	39	100

As shown in Table 1, demographic data showed details of 92 patients (n=92) consisting of 30 men and 13 women before the implementation of CP and 25 men with 14 women after. The total patient age range was 20-79 years with the majority being > 51 years before the implementation of CP (n=15) and 41-50 years after the implementation of CP (n=11).

Characteristics of The Informants

A total of 15 HCW participated in this study, consisting of 8 females and 7 males, with an average age of 40.4 years (min=28, max=53) (Table 2). The average length of work was >5 years (min=2, max=>5), and the dominant education level was Graduate (60%, n=9) with some having a Bachelor's Degree (20%, n=3) and Post Graduate/Specialist (20%, n=3). Based on medical records (MR), 53 cases of pulmonary TB were recorded in July–October 2022 (before CP implementation) and 39 in November–January 2023 (after CP implementation).

Table 2. Characteristics of The Informants

No	Informant Codes	Gender	Age (years)	Education Level	Work period (years)	Profession
1	A	Male	52	Graduate	25	Nurse/Head Of Ward
2	B	Female	52	Graduate	25	Ward Nurse
3	C	Female	43	Graduate	17	Ward Nurse
4	D	Male	29	Bachelor Degree	5	Emergency room nurse
5	E	Male	32	Bachelor Degree	8	Emergency room nurse
6	F	Female	35	Bachelor Degree	10	Nutrition Staff
7	G	Female	53	Graduate	22	Nutrition Staff
8	H	Female	35	Graduate	9	Pharmacy Staff
9	I	Male	36	Post Graduate	3	Pulmonary Specialist
10	J	Female	51	Post Graduate	25	Quality Committee Chairman
11	K	Male	40	Post Graduate	6	Medical Committee Chairman
12	L	Male	45	Graduate	20	Inpatient Nursing Sub Coordinator
13	M	Female	31	Graduate	3	Case Manager
14	N	Male	45	Graduate	20	Outpatient Nursing Sub Coordinator
15	O	Female	28	Graduate	2	CP Team Member

Conformity of Integrated Clinical Pathway Assessment Tools (ICPAT) for Clinical Pathway

ICPAT examination of pulmonary TB CP showed that content and quality varied in each dimension. As shown in Figure 1, dimension 1 (Is it an ICP?) was good, with 100% on both quality and content items, dimension 5 (the maintenance process) was the worst, with less than 50% on both criteria, and other dimensions demonstrated varying results.

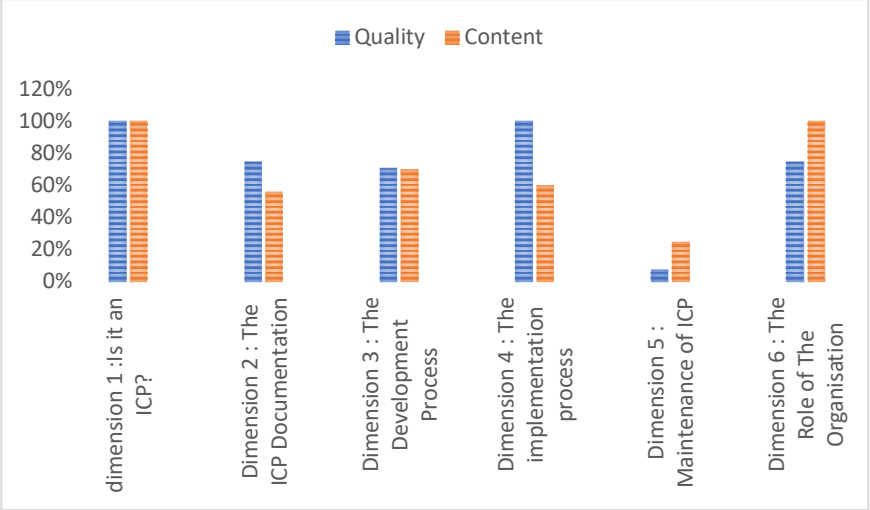

Figure 1. The TB CP Evaluation using Integrated Clinical Pathway Appraisal Tools (ICPAT)

HCW Compliance with the Pulmonary TB CP

Based on the medical records (MR), 53 cases of pulmonary TB were recorded in July–October 2022 (before CP implementation) and 39 in November–January 2023 (after CP implementation). From November 2022 to January 2023, 13 (33%) out of 39 MR complied with CP while 26 (67%) did not. The assessment of adherence in pulmonary TB included three indicators namely LoS, diagnosis investigations, and therapyappropriateness. According to Table 3, the LoS was 5.15 days and 5.23 days before and after CP implementation respectively. The Independent Sample t-test indicated no significant difference in the LoS before and after CP implementation (p= 0.777). The results showed that there was no significant difference in both parameters with p-values of 0.899 respectively, before and after CP implementation.

Table 3. The Variables In The Implementation of CP TB

Variables	Before Implementation	After Implementation
Average Length of Stay (days)	5,15	5,23
Therapy Appropriateness (2x24hours)	100%	100%
Supporting Examinations (2x24 hours)	100%	100%

As described in Table 3, the provision of therapy and supporting examinations according to CP TB followed a 2x24 hours course. This was because, in Tidar Hospital, patients must have a laboratory examination and thorax X-ray in the Emergency Room. After the supporting examination, the doctor would consult the results in accordance with the pulmonary specialist. When the thorax X-ray examination shows results consistent with the picture of pulmonary tuberculosis, the patient will be transferred to the isolation ward. Afterward, the nurse would make a

re-assessment on the first day, followed by a nutritionist and pharmacy staff. Therapy given after CP includes antibiotics and anti-emetic drugs adjusted to the results of laboratory and radiology. On the second day, the pulmonary specialist would administer Anti-tuberculosis drugs

Clinical Outcome and Cost Efficiency

The clinical outcome was assessed in terms of patient mortality and readmission. Adult patients aged 16 and above who met the TB CP criteria were used as the variable to calculate the mortality rate (excluding those not following CP). The number of deaths from TB before the implementation of the CP in July – October 2022 was four patients but after the implementation, it was three. The Mann-Whitney analysis yielded a p-value of 0.589, indicating that there was no significant difference in mortality before and after CP implementation (Table 4).

Table 4. Patient Mortality Rate

		Patients Mortality Rate (n=7)	**Comorbid Factors**	**Mann-Whitney Analysis Test**
Before Implementation	July 2022	0	-	0.589
	August 2022	1	-	
	September 2022	2	DM CHF	
After Implementation	August 2022	1	-	
	October 2022	1	-	
	November 2022	1	-	
	December 2022	2	-	
	January 2023	0	-	

DM = Diabetes Mellitus. CHF = Chronic Heart Failure.

Although the results of Mann Whitney's analysis in Table 4 were not statistically significant between before and after CP, there was a nominal increase in the number of deaths after CP implementation (before 4/53=7.5%, after 3/39=7.7%). The possible reasons for death in Table 5 are taken from the MR of patients.

followed by intervention based on the results of the prescription review and drug reconciliation. The analysis results were strengthened by the statements of respondents during the IDIs and FGD, as shown in Table 8.

Table 5. Cause Of Death Based On Medical Records

Patients	Gender	Ages (years old)	X-Ray	Time Of X Ray (hours)	Anti TB Drugs	Time of TB drugs administration (hours)	Cause of Death	LoS
Before Implementation								
01	F	84	*Suspect* Pulmonary TB	24	Yes	48	*Respiratory failure*	12
02	M	17	Suspect Pulmonary TB, pleural effusion	24	Yes	48	*dyspnea*	3
03	F	50	Suspect Pulmonary TB, pleural effusion	24	No	have not received	*Respiratory failure*	3
04	F	59	Duplex pulmonary TB	24	No	have not received	*dyspnea*	2
After Implementation								
05	M	61	*Suspect* pulmonary TB	24	No	have not received	*dyspnea*	1
06	F	80	Pulmonary TB	24	No	have not received	*dyspnea*	5
07	F	48	Pulmonary TB	24	Yes	48	*dyspnea*	7

The patient readmission rate is considered an important indicator of healthcare service quality. The Tidar Magelang Hospital case mix reported 288 pulmonary TB readmissions and further analysis showed that one patient was readmitted before CP implementation and two after (Table 6).

Table 6. Readmission Data

	Before Implementation	After Implementation
	1 (0,3%)	2 (0,7%)
Indication	dyspepsia and vomiting	dyspepsia, vomiting, and dyspnea

In hospital management, it is essential for expenditures to match patient LoS, the shorter the LoS, the more cost-efficient the provision of patient care. To assess the overall difference between hospital costs before and after CP implementation, a cost efficiency analysis was conducted and the results are presented in Table 7.

The implementation of CP may not be deemed inefficient and one reason for this is the disparity in medical record data before and after the application of CP. This study faced challenges in extracting accurate data from Casemix Tidar Hospital due to the incomplete documentation of treatment actions and therapies.

Table 7. Cost Efficiency

	Before Implementation	After Implementation	P-value
Average Cost of Care	Rp 6.994.508,-	Rp 5.521.091,-	
Kolmogorov-Smirnov Normality Test			0.093
Levene Homogeneity Test			0.069
Independent Sample T-Test Analysis Test			0.083

As shown in Table 7, the Kolmogorov-Smirnov normality test yielded a value of 0.093, indicating that the data were normally distributed. Additionally, the Levene test produced a value of 0.069, demonstrating cost homogeneity. The Independent Sample T-test also yielded 0.083, implying no significant difference in costs before and after CP implementation. The qualitative analysis results (Table 8) strengthen the previous quantitative analysis, showcasing the obstacles and constraints of CP implementation. Based on the FGD and IDI, four themes were established as follows:

Table 8. Obstacles and Supporting Factors for CP Implementation

Theme & category	Quotes From Participants
Theme 1: CP implementation techniques	
- Involvement of professional caregivers in filling out CP forms	"Maybe you're not used to it, this will be filled in by the case manager, right? We have to sit down again to discuss the implementation and technical aspects. If the doctor fills in later with a heavy workload and many patients are afraid of being missed" (I)
- Anti-tuberculosis drugs uptake by patients	"When the patient was admitted, drug reconciliation was carried out from the emergency room, which was then repeated in the ward" (H)
- Applied inclusion and exclusion criteria	"...this hospital practices the usual TB CP, and there is no CP for those excluded or with concomitant TB, sometimes the variant is not written, the results will affect the output, specifically LoS..." (J)
Theme 2: Supportive Factors In Success of CP	**Quotes From Participants**
- Availability of facilities and infrastructure	"Initially, we perform triage for all emergency room patients, followed by an examination. If hospitalization is recommended, we conduct a lab test and chest x-ray per protocol" (D)

- Sufficient number of human resources	"..There is no shortage of staff in the ward, and patients come straight away for assessment and service, according to CP.." (A)
- Similarity with routine procedures	"What is contained in the CP guideline is the same as what we do every day, such as carrying out nutrition care, then monitoring and evaluating nutrition" (F)
Theme 3: Organization Support In CP Implementation	**Quotes From Participants**
- There are no standard operating procedures regarding CP - The unavailability of funds and time for training	"We were formed in preparation for hospital accreditation, and one of the national quality indicators is compliance with CP. There has never been a decision letter from the hospital's director or standard operating procedures. Due to the sudden formation, there was no training whatsoever" (O)
- Socialization has not been carried out	"So far, I, as a senior nurse, have filled in for CP, but I am still confused about who should fill in because it keeps changing. There must be socialization" (B)
Theme 4: TB Patient Outcomes	**Quotes From Participants**
- Comorbidity management	"...the CP in this hospital is the usual TB type, and there is no CP for those excluded or with concomitant TB, sometimes the variant is not written, resulting in the use of the usual procedure. The results will affect the output, specifically LoS..." (J)
- Patient clinical outcome	"..Patients with pulmonary TB are often sent back to the hospital because they are weak, don't want to eat, or get sick and throw up after taking oats. Their death is usually caused by shortness of breath or other conditions..." (I)

In March 2023, one month after concluding the study, the technical triangulation process was completed by conducting IDI with one informant who had attended the FGD. The interview outcomes were as follows,

"Since the last FGD interview, up till now, it remains unchanged; that is, the responsibility of filling out forms still falls on the nurses. Even if the steps for therapy and nutrition are appropriate, doctors and other staff are still reluctant to undertake this task. Similar constraints were faced in other wards. Perhaps it would be beneficial to address this issue during an audit or evaluation meeting with management." (A).

DISCUSSION

The results indicated that Pulmonary TB CP met most of the standards outlined in the ICPAT

dimensions. Dimension 1 (Is It an ICP?) had both good quality and content items, while dimension 5 (Maintenance of the ICP) had values below 50% or poor. The bulk of unmet requirements include the content and documentation review. This quality item requires routine evaluations, which have been missing in Tidar Hospital. Angeline et al. in 2022[11] used the ICPAT assessment, but the results were different from this study. Based on the results, the overall quality value was categorized as good, found in the 5th and 6th dimensions, while the remaining quality values were less prominent in the 2nd and 6th dimensions. According to Ayu Fitri and Sundari, CP maintenance is the most effective and can be adapted to suit the needs of medical professionals, paramedics, and patients. Periodic evaluation of the content provides the latest references for updates.[12] This study found that CP was implemented in 2019, but in practice, it did not work out.

Since CP was implemented from November 2022 to February 2023, no evaluation has been carried out to determine its pros and cons. From development and performance to evaluation, Tidar Hospital management has no clear role regarding CP implementation, but there is a strategic team to ensure continuity. The formation of this team was sudden, taking less than a month to assemble a group of professional caregivers including medical doctors, nurses, pharmacists, and nutritionists for hospital accreditation. The pilot implementation began in October 2022 followed by full implementation in November 2022. The CP team collects data, which is then evaluated by the quality committee for potential application and development. Management should regularly conduct clinical audits and reviews every three months. Safitri found that the hospital organized a CP drafting team that met periodically with outpatient and inpatient paramedics.[12] The major goal of the organization is to build solid commitments among healthcare professionals, including medical staff.

Based on the results, some healthcare professionals (HCPs) were hesitant to complete the CP form. Senior nurses specifically Clinical Care Managers, often take on the task of filling out this form. This obstacle was caused by the unavailability of an SOP (Standard Operational Procedure), lack of evaluation, as well as insufficient communication and socialization from outpatient (ER and outpatient units) to inpatient rooms. As stated by Kusumah and Sri,[13] one of the factors responsible for increasing compliance with CP filling was that before its invention, doctors were used to administering and standardizing disease services. Therefore, after its implementation, doctors had no trouble filling in the CP form. Before the implementation of the CP for pulmonary tuberculosis at Tidar Hospital, other specialists and caregivers had followed the outlined steps. However, the issue of who should fill the documentation was still debated due to the absence of an SOP for this task. As stated by Riza,[14] SOPs are a set of instructions standardized to satisfy specific requirements. In patient care, standards are crucial, assisting health professionals in providing quality care, particularly in the three evaluation procedures of self-assessment, inspection, and accreditation. Apart from the unavailability of SOP, other factors were found to hinder CP implementation. These included the absence of management response, reward and punishment, regular monitoring as well as evaluation of CP filling, supervision, and audit.

The results showed that LoS, therapy appropriateness, and diagnosis investigations including nutrition, laboratory, and radiology exhibited compliance with CP. However, three months into the implementation, there was a concerning 67% non-compliance with CP guidelines. These results differed from

those of Ambroggio et al. who reported that CP implementation in pneumonia patients led to significant improvements in doctors' prescribing behavior for outpatient and inpatient care.[15] This discrepancy could be attributed to comprehensive evaluation requirements, including laboratory examination and chest X-ray before admission by an ER doctor.

Once admitted to the isolation ward, a multidisciplinary team consisting of a nurse, nutritionist, and pharmacist will reassess the patient on the first day. CP treatment includes antibiotics and anti-emetic medicines regulated by laboratory and radiographic data. On the second day, the pulmonary specialist administers anti-tuberculosis drugs, which can be challenging for some patients due to adverse effects such as nausea, weakness, vomiting, indigestion, joint pain, disorientation, skin itching, drowsiness, and tingling.[16] Therefore, this complex therapy needs collaborative care from multidisciplinary healthcare professionals.

Based on the results, the average LoS decreased after CP implementation, but the difference was insignificant. This result was in contrast with Rahmawati and Pinzon, where no significant difference was observed between the LoS of patients before and after CP implementation.[17] Nur Fadilah also reported a decrease in the average length of stay (AVLoS) for patients with Dengue Fever and Dengue Hemorrhagic Fever before and after the implementation of CP [18]. This study confirmed the results of Hadira et al.,[18] who found a substantial positive correlation between the implementation of CP and reducing clinical risk in the hospital. The CP can decrease patient LoS and hospitalization costs because over-procedure prevention techniques can be implemented to reduce needless inspection actions such as laboratory testing, consultations, and medications.

Evaluation of the MR showed that the TB patients were readmitted due to the adverse effects caused by anti-tuberculosis drugs. Hence, monitoring and evaluation of clinical care processes are crucial. Riza and Nurwahyuni stated that several hospitals implementing CP effectively improved patient care by minimizing complications, reducing delays in providing therapy, minimizing errors in treatment, and avoiding duplication of interventions. However, in some cases, there was no conclusive evidence of significant differences in the occurrence of readmission, disease complications, and patient death both before and after CP implementation.[19]

After CP implementation the number of deaths was increased (4 vs. 3), primarily due to dyspnea which results in respiratory failure. Some patients have not received anti-tuberculosis drugs, but the specific number can not be ascertained. This is due to the absence of clinical audits of patient deaths since November 2022. According to Kusumaningtyas, Utarini, and Pinzon which assessed the quality of Stroke services at Bethesda Hospital Yogyakarta, there was no significant result in patient death outcomes after the implementation of CP. This was because the indicator of endpoint mortality in stroke patients was impacted not only by input and process factors but also by the clinical condition of patients.[20] Furthermore, Darer et al., stated that CP could reduce LoS, enhance clinical and economic outcomes, as well as decrease unnecessary actions. One of the clinical outcomes studied was the improvement in the condition of patients, which led to a reduction in mortality. After the implementation of CP, hospital death rates decreased by 62%.[21] This result was in line with Fadilah & Budi, who found no impact on patient outcomes. Implementing clinical pathways is only expected to decrease the average LoS.[18]

This study found that the average total cost before and after CP implementation was not significantly different. However, this does not necessarily imply that the intervention was inefficient. The challenge faced in this study was difficulty in getting precise data on patient action and therapy rates at Tidar Hospital, Magelang. Furthermore, various factors, such as comorbidities and changes in supporting examinations and therapies, influence the cost. The available case-mix data was retrospective in nature. The direct medical costs for patients treated with CP were higher than those who were not, but this may be due to the small number of compatible patients. Furthermore, the use of retrospective data can lead to various flaws due to the lack of information from health workers who treat these patients.[22] As stated by Djasri,[23] CP is a measurement tool with one goal of saving resources/cost, but this is still being debated. The results were consistent with a study conducted at Sayang Rakyat Makassar Hospital, Indonesia, where CP did not effectively reduce hospital costs for adult typhoid, dengue hemorrhagic fever, and acute gastroenteritis.[24] Several previous studies have explored the CP associated with the decline in charge. For example, Iroth et al. surveyed Stroke patients at Bethesda Hospital Yogyakarta by assessing several variables significantly affecting the cost of care.[25] Iswari et al. analyzed the expenses associated with tuberculosis (TB) treatment in hospitals and primary healthcare facilities in Yogyakarta, Indonesia. The results indicated that direct medical expenditures constituted the highest proportion of total costs compared to other cost components. Additional relevant elements include the range of services available and the duration of hospitalization. However, the situation at Tidar Hospital namely the absence of case-mix data made it challenging to individually distinguish the expenses.[26]

Based on the results, there was no significant impact on clinical or financial outcomes. A possible cause is the availability of national guidelines for TB treatment used as a general reference. Although not specifically guiding the flow of services, at least the resources used are consistent with the standard. All the procedures for TB implementation in Indonesia should follow the National Guidelines of the TB Medical Service issued by the Ministry of Health.[27]

This study had several limitations. First, there was no provision for accommodating patients with co-morbidities other than pulmonary TB. Second, there was no sufficient documented data on supporting treatments/ diagnosis investigations and pharmaceutical rates, except for drugs. There was insufficient data to determine whether patient readmission resulted from side effects of anti-tuberculosis drugs or other reasons.

CONCLUSION

In conclusion, the TB CP is a CP based on ICPAT evaluation and should improve content and quality in each dimension. The assessment of CP implementation showed varying results across various indicators. There were no significant differences in LoS, diagnosis investigations and therapy appropriateness, mortality rate, and cost efficiency before and after implementation of CP. TB Pulmonary CP compliance was hindered by the absence of hospital guidelines, the lack of time and funding for training, education and staff competence, reluctance among some caregivers to fill out CP forms, the lack of management commitment to conducting regular clinical audits, and insufficient data on cost efficiency.

RECOMMENDATION

Further studies are needed to assess compliance with the CP affecting patient outcomes and cost efficiency, especially in public hospitals. Moreover, additional investigations should consider how to provide separate cost-of-care data from margin to calculate financial outcomes more accurately. It is imperative for hospital services to consistently adopt and enhance clinical guidelines within their facilities. Regular evaluations of patient satisfaction are vital to acquire a comprehensive understanding and valuable feedback pertaining to the services provided by the hospital. The importance of patient satisfaction is crucial in guaranteeing the future quality and sustainability of hospital services.

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REFERENCES

1. World Health Organization. WHO consolidated guidelines on tuberculosis. WHO Press. 2022. p. 98.
2. Kemenkes RI. pedoman SUN. Pedoman Nas Pelayanan Kedokt Tata Laksana Tuberkulosis. 2013;i–100.
3. World Health Organization. Global Tuberculosis Report 2022 [Internet]. 2022. Available from: http://journal.um-surabaya.ac.id/index.php/JKM/article/view/2203
4. Siswanto M, Chalidyanto D. Impact of Clinical Pathways Compliance for Reducing Length of Stay. J Adm Kesehat Indones. 2020;8(1):79.
5. Kemenkes. Peraturan Menteri Kesehatan Republik Indonesia Nomor 12 Tahun 2020 Tentang Akreditasi Rumah Sakit [Internet]. 2020. Available from: https://peraturan.bpk.go.id/Details/152511/permenkes-no-12-tahun-2020
6. Widyanita A, Arini M, Dewi A. Evaluasi Implementasi Clinical Pathway Appendicitis Akut Pada Unit Rawat Inap Bagian Bedah Di RSUD Panembahan Senopati Bantul. Pros Interdiscip Postgrad Student Conf 3 rd. 2016;37–43.
7. Creswell JW, Hirose M. Mixed methods and survey research in family medicine and community health. Fam Med Community Heal. 2019;7(2):1–6.
8. Utarini A. Mixed-method Study Referensi Utama : Mater Penelit kualitatif dan Mix. 2018.
9. Whittle CL, Dunn L, Mcdonald PS, de Luc K. Assessing the content and quality of pathways. Researchgate [Internet]. 2008; Available from: https://www.researchgate.net/publication/237821114_Assessing_the_content_and_quality_of_pathways
10. Hadira, syahrul S, Rachmawaty R. Efektivitas Penerapan Integrated Clinical Pathway (ICP) Terkait Manajemen Risiko Ter-hadap Kualitas Pelayanan Di Rumah Sakit : Literatur Review. J Keperawatan Muhammadiyah. 2020:97–106.
11. Angeline WK, Martina M, Girsang E, Nasution AN. Clinical Pathway Implementation in ACS STEMI Patients. J Aisyah J Ilmu Kesehat. 2022;7(3):901–6.
12. Ayu Fitri D, Sundari S. The Evaluation of Clinical Pathway Implementation on Cerebral Infarction in the Inpatient Care Unit of Bantul X Hospital. J Medicoeticolegal dan Manaj Rumah Sakit. 2018;7(2):152–61.
13. Kusumah B, Sri S LE. Evaluasi

terhadap implementasi dan kepatuhan clinical cathway dengue fever di rumah sakit PKU muhammadiyah gamping yogyakarta. E Clin. 2014;24(3):26–9.
14. Rizal AA. Hubungan tingkat Pendidikan Perawat InstalasI Gawat Darurat dengan Kepatuhan Pelaksanaan Standar Prosedur Operasional Penerimaan Pasien Baru di RSUD AM Parikesit Tenggarong. J Ilmu Kesehat. 2017;5(1):1–10.
15. Ambroggio L, Thomson J, Murtagh Kurowski E, Courter J, Statile A, Graham C, et al. Quality improvement methods increase appropriate antibiotic prescribing for childhood pneumonia. Pediatrics. 2013;131(5):e1623-31. doi: 10.1542/peds.2012-2635.
16. Farhanisa F. Kejadian Efek Samping Obat Anti Tuberkulosis (Oat) Kategori 1 pada Pasien Tb Paru di Unit Pengobatan Penyakit Paru-paru (Up4) Provinsi Kalimantan Barat. J Mhs Farm Fak Kedokt UNTAN. 2015;3(1).
17. Rachmawati C, Pinzon RT, Lestari T. Evaluasi Implementasi Clinical Pathway Appendicitis Evaluation of Implementation of Clinical Pathway for. Berk Ilm Kedokt Duta Wacana. 2017;2(3):437–44.
18. Fadilah NFN, Budi SC. Efektifitas Implementasi Clinical Pathway Terhadap Average Length Of Stay dan Outcomes Pasien DF-DHF Anak di RSUD Kota Yogyakarta. J Kesehat Vokasional. 2018;2(2):175.
19. Riza RC, Nurwahyuni A. The Implementation and Outcome of Clinical Pathway: A Systematic Review. 2019;677–86.
20. Kusumaningtyas T, Utarini A, Pinzon RT. Dampak Pemberlakuan Clinical Pathway Terhadap Impact of Clinical Pathway Implementation on Quality of. Berk Ilm Kedokt Duta Wacana. 2017;2(2):349–60.
21. Darer J, Pronovost P, Bass EB. Use and evaluation of critical pathways in hospitals. Eff Clin Pract. 2002;5(3): 114–9.
22. Perwitasari, Handayani Gurning S, Aryani Perwitasari D. Analisis Biaya Penerapan Clinical Pathway Pada Pasien Sectio Caesarea Di Rsud Sele Be Solu Kota Sorong Cost Analysis of Clinical Pathways in Sectio Caesarea Patients At Sele Be Solu Hospital, Sorong City. Media Farm. 2021;18(1): 13.
23. Djasri H. Clinical Pathways : Perkenalan Hanevi Djasri dan Clinical Pathways Sistematika Pembahasan. 2022;19(sejak 2009):1–20.
24. Azisah A. Efektifitas Integrated Clinical Pathway Terhadap Patient Health Outcomes, Length of Stay, Dan Hospital Cost Di Rsud Sayang Rakyat Makassar. Univ Hasanuddin [Internet]. 2019. Available from: http://repository.unhas.ac.id:443/id/eprint/563
25. Iroth JS, Ahmad RA, Pinzon R et. Dampak Penerapan Clinical Pathway Terhadap Biaya Perawatan Pasien Stroke Iskemik Akut Di Rs Bethesda the Influence of Clinical Pathway Implementation and Cost of Care in Stroke Patients in Bethesda Hospital. Berk Ilm Kedokt Duta Wacana. 2016;02:267–77. doi: https://doi.org/10.21460/bikdw.v2i1.38
26. Iswari A, Endarti D, Trijayanti C, Haris RNH, Imansari ANR. Analisis Biaya Penyakit Tuberkulosis: Studi Kasus di Salah Satu Puskesmas dan Rumah Sakit di Yogyakarta. Maj Farm. 2020; 16(2):211.
27. KemenKes RI. Pedoman Nasional Pelayanan Kedokteran Tata Laksana Tuberkulosis [Internet]. 2019. Available from: https://yankes.kemkes.go.id/unduhan/fileunduhan_1610422577_801904.pdf