**How to Cite:**
Kosasih, A., Nurudin, A., & Wiweka, I. B. S. (2023). The implementation of pulmonary tuberculosis case with hemoptysis cases and cost control in Goenawan Partowidigdo Pulmonary Hospital Bogor. *International Journal of Health Sciences*, *7*(S1), 155–165.
https://doi.org/10.53730/ijhs.v7nS1.14165

# The implementation of pulmonary tuberculosis case with hemoptysis cases and cost control in Goenawan Partowidigdo Pulmonary Hospital Bogor

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***Abstract***---This study's goal was to evaluate how RSPG implemented pulmonary tuberculosis with hemoptysis CP and cost control. Comparing CP versus non-CP cases in RSPG wards using qualitative methodologies supported by cost and time analyses. To examine CP implementation, information was gathered through in-depth interviews and observation. The 15 informants who were significant RSPG stakeholders made up the research subjects. With the use of bivariate analysis and the Mann-Whitney U test, the methodologies employed content analysis. The research's findings show that pulmonary tuberculosis with hemoptysis has been developed, although socialization has not been entirely and optimally applied in all wards. The hospital staff's noncompliance and lack of managerial commitment were the main barriers to CP implementation. The data helped in making decisions about patient care and produced positive results in terms of cost, length of stay (LOS), and quality control. For grade 3, the ratio of the total cost of CP cases to non-cases was 1:1.88. Lack of management commitment and hospital staff noncompliance were the main causes of poor usage and CP implementation challenges. For grade 3, the ratio of the total cost of


*Manuscript submitted: 9 Dec 2022, Manuscript revised: 18 Feb 2023, Accepted for publication: 27 March 2023*

CP cases to non-cases was 1:1.88, demonstrating both cost and time effectiveness.

***Keywords***---Cost control, Hemoptysis, implementation, Pulmonary TB, quality control.

## Introduction

Improving the health status of the Indonesian people at an optimal level is the spirit of the ideals contained in the Indonesian Health Development Goals (Long et al., 2020). The real hope for development in the health sector is to improve the quality of health, both public health in general and individual health (Mohammed et al., 2022). Indonesia is the second country with the highest number of tuberculosis (TB) patients in the world (Charles et al., 2017). TB treatment is one way to control infection and reduce transmission of tuberculosis (Adebisi et al., 2019). The Bogor District Health Office in 2016 reported that the prevalence of AFB (+) Pulmonary TB patients was 151/100000 inhabitants, with a total of 3,488 pulmonary TB patients and a success rate of 97.46% (Lestari et al., 2020).

Pulmonary TB case with hemoptysis is one of the most common cases of lung infection found in Pulmonary Hospital Dr. M. Goenawan Partowidigdo (RSPG) Bogor. Variants of pulmonary TB cases with hemoptysis are quite large because they involve the length of stay, use of additional investigations (additional hematology examination, bronchoscopy examination), and additional treatment (conservative to thoracic surgery) by complications of the disease. The total cost can vary from Rp. 5,000,000 to Rp. 63,000,000, - (class 3 fee).

Pulmonary TB cases with hemoptysis rank fifth, apart from tuberculosis cases in general (Mac et al., 2020). Pulmonary TB cases with hemoptysis are one of the most common cases of pulmonary infection found in RSPG (Iqbal et al., 2022). As cases of Pulmonary TB with hemoptysis increase, hospital revenue continues to increase even though it is accompanied by substantial expenses for each case of disease (Charya et al., 2021).

The variant of pulmonary TB cases with hemoptysis is quite large because it involves the length of stay, the use of additional supporting examinations (additional hematological examinations, bronchoscopy examinations), and additional management/treatment (conservative to thoracic surgery) according to the complications of the disease (Mbata & Ewelike, 2013).

The implementation of CP Pulmonary TB with hemoptysis in the RSPG has been implemented since 2014 and had been through an audit and revision process to reduce variants and exclude disease complications and costs. The implementation of CP has not been implemented optimally along with various cases of pulmonary TB with increasingly complex hemoptysis. Data for 2017 RSPG received 50 cases out of 168 cases (26.7%) of Pulmonary TB with uncomplicated hemoptysis (severity level 1) using CP and the rest did not use CP for various reasons. The implementation of CP is also only used in class 2 and 3 Lungs in the RSPG. Based on the background, this study aims to find out and analyze the

implementation of CP Pulmonary TB cases with hemoptysis and cost control at Bogor RSPG.

**Method**

This was qualitative research with an analysis of the cost and time between CP and non-CP pulmonary TB with hemoptysis in the inpatient unit of RSPG Bogor. The data was obtained through in-depth interviews and observations to explore the implementation of CP. The research subjects consisted of 15 informants as the main stakeholders of the RSPG consisting of the Medical and Nursing Director, Finance Director, Chair of the Medical Committee, Chair of the Quality Team, Case Manager, Lung Specialist, Head of Finance Section, Head of Medical Record Installation, Head of Medical Support Section, Head Inpatient Nursing Section, and Head of Room Class 1, Class 2 and Class 3.

Data analysis was carried out qualitatively, namely data collection was carried out using observation and interviews. The second is by reducing data by combining and grouping similar data into one form of writing according to their respective formats. The third is by concluding the verification stage.

In addition to qualitative analysis, other analyzes were also carried out in the form of bivariate analysis of treatment costs. The analysis was calculated using non-parametric statistical analysis through an independent two-sample difference test using the Mann-Whitney U test approach, which is to calculate the average difference in treatment costs before and after CP implementation. The variables studied were the length of stay and the cost of supporting examinations (diagnostics) and treatment (medication) as well as other treatment costs. To determine whether there is a significant difference between the two independent samples, the p-value is used which is compared with the error rate ($\propto$) used, namely 5% or 0.05 and 1% or 0.01.

**Results and Discussion**

From ten definitions of CP that have been collected, the understanding of informants about CP is a clear and directed health service guideline given to patients by medical standards and nursing care, ranging from planning, implementing it, and monitoring the progress of the disease so that the treatment can be measured and systemized up to repatriation patients are based on efficient quality control of services.

The comprehension of the function of CP according to the RSPG informants selected in this study is as a guide to the provision of planned and accurate health therapy services toward patients, minimizing the risk of over-treatment by paying attention to patient safety, discovering the effectiveness of treatment, quality control, cost efficiency, as an indicator of the successful care rate and facilitate evaluation and audit process.

Initially, 5 CPs were consisting of pulmonary tuberculosis, bronchiectasis, pneumothorax, pleural effusion, and hemoptysis, where all five were for lung cases. Then in 2012 it increased to 10 and increased in number in 2014, and

2015 and currently has reached around 20 CP, which consists of Pulmonary CP, CP Surgery, and CP Children. In-depth interviews with informants, obtained results as expressed by (Jiang et al., 2019) that generally CP is developed for diagnosis or actions that are high volume, high risk, and high cost. The procedure for the preparation of CP follows references as stated by (Rueda et al., 2013), which is integrated and focused on a patient (Patient Focused Care) and continuous (Care of Care), involving all professions (doctors, nurses/midwives, stylists, laboratories and pharmacists), within a specified time limit. Determination of CP for pulmonary TB patients with hemoptysis is by the reference guidelines on the preparation of CP, considering the disease is clinically predictable, (in at least 70% of cases) with multidisciplinary management, by the CP guidelines issued by the Ministry of Health of the Republic of Indonesia (Katoto et al., 2020), its clinical journey is predictable

The steps of formulating the CP format that has been carried out by the RSPG from the results of the in-depth interview are in line with the opinion of which includes a component that includes the definition of CP, utilizing data on the hospital field and local conditions namely data on patient morbidity, processing and presentation of hospital data and daily census for determining the topic of clinical pathways to be made and length of stay, as well as action and medication variables referring to medical service standards, standard operating procedures and a list of standard formularies that have been in the hospital.

The opinion of the informants shows that socialization has not been carried out optimally, because socialization is still given out partially. According to the research's informant, comprehensive and more effective socialization is needed as well as a proposal to make a CP manual. The CP manual can be distributed to their respective rooms and related individuals. In addition to the optimal and effective socialization supported by the CP guidebook, it needs to be accompanied by a consistent and ongoing commitment from all RSPG management according to researchers. The case Manager should be on duty to monitor the compliance process in each case in the room and consult with all PPAs if problems are found in handling cases.

The implementation of CP has been going well with evidence of a target length of treatment in patients that is five days, or that can be monitored for more than five days. It was revealed that this issue has been discussed every week in structural meetings. There is some kind of monitoring evaluation of factors that cause patients to be treated for a long time.

Observations made from medical record data in 2014 showed the average use of pulmonary CP TB with hemoptysis ranged from 13-24% as shown in Figure 1.

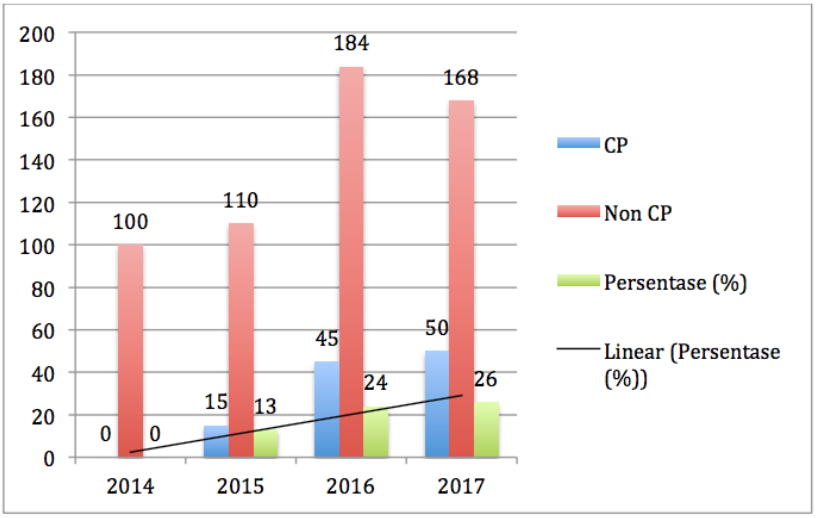


Figure 1. Use of CP pulmonary TB with hemoptysis in 2014-2017
Source: 2014-2017 RSPG Medical Record Data

Observations on CP implementation since 2014 were carried out through medical record data analysis from 2014 to April 2018. Overall, there was an increase in the use of pulmonary TB CP with hemoptysis every year. The implementation of CP Pulmonary TB with hemoptysis has not been carried out optimally in Class I (Orchid room), it happens because there is no commitment among the officers. Nevertheless the management of the RSPG since the beginning of 2018 has begun to implement CP. According to (Dorman et al., 2021) if several certain guidelines such as in strategic management are not followed well, there will be criticism of the process and problems arise for the organization. Therefore one of the inseparable parts is evaluating the quality management process, in this case, is the process of implementing CP Pulmonary TB with Hemoptysis.

The results of the interviews show that there are still obstacles in the implementation of Clinical Pathway, as follows: lack of availability of CP forms on an ongoing basis. Lack of commitment and no supervisory staff. The condition of critical patients. Busy Officers Serve There When Many Patients. Difficulties in determining fares on pharmacy and incorrect diagnoses The socialization that is not optimal

CP implementation barriers found by researchers are DPJP compliance in CP, lack of concentration in filling CP and difficulties when using CP, need for management preparation and commitment to make and implement CP, compliance with Clinical Pathway implementation is still low so evaluation and improvement are needed. In addition, it is necessary to roll models and commitments from both the leaders and all individuals involved.

The obstacle found in the implementation of CP in the RSPG is the lack of organizational commitment. Affirmed by (Magnaye, 2022) that a good tool for evaluating clinical pathways must have characteristics such as organizational commitment, path project management, perceptions of the pathways concept,

document format, pathway content, multidisciplinary involvement of science, variation management, guidelines, maintenance pathway, accountability, involvement patient, pathway development, additional support for the system and documentation, operational arrangements, implementation, outcome management, and security.

By (Patel et al., 2018) statement, clinical pathways are like road maps that guide all professions in providing hospital services, therefore without a "clinical pathway", the hospital can potentially lose efficiency control, resulting in an operational loss.

The results of the interviews and the opinions of other informants obtained resuts that CP was in the form of a completed form when the patient was treated. CP sheet for patients with pulmonary TB Hemoptysis is placed in a medical record document. Procedure for recording by placing a check mark according to the nursing day. The filled clinical pathway will be stored in the medical record until the patient returns home, then the CP is collected for later auditing. The documentation officers are specialist doctors and responsible physicians who are carried out on the ward.

The results showed that there was no agreement or time provision routinely in the evaluation of clinical pathway pulmonary TB with hemoptysis. Therefore, the implementation of clinical pathway evaluations should be carried out periodically, routinely, and as possible as the RSPG management commitment establishes the appropriate implementation time.

With CP the outcome of quality control and cost control is obtained both from the hospital aspect and from the patient side. Clinical pathways in a large number of cases will reduce costs so that they become more efficient, the service becomes efficient. Thus, effective cost control will be achieved with services that pay attention to patient safety and standards. Based on the document study, it was obtained the results that all pulmonary TB patients with hemoptysis were treated in grade 3 and class 2 in 2018, either using CP or without CP when they were cured.

The outcome obtained from CP implementation in pulmonary TB patients with hemoptysis, based on the results of in-depth interviews and statistical test analysis is known to provide positive results in the control of costs and length of treatment. According to CP informants, it helps in making decisions about patient care. In addition, the outcome of the control or cost efficiency is obtained. With quality control and costs, patients will feel more satisfied and comfortable, considering the treatment time is relatively shorter and the costs charged are also efficient, as well as good and open communication between doctors, nurses, and patients. The results of the interview can also be concluded that. The results of this study are also similar to the opinions of (Vo et al., 2020), that outcomes can indirectly be used as an approach to assess health services.

*Cost Analysis*

In the case of pulmonary TB Hemoptysis, in this study, patient care data obtained from January to February 2018 at the RSPG, were not normally distributed and homogeneous, therefore the bivariate analysis method used was non-parametric statistical analysis. In the case of these non-parametric statistics, examining the differences between two sample groups / free populations or unrelated samples/populations can be done using the Mann-Whitney test (Garg et al., 2021), with the following hypothesis:
Ho: There is no difference between the quality and fare of the average non-CP and CP health services,
H1: There is a difference between the quality and fare of the average non-CP and CP health services.

The analysis of cases of pulmonary TB patients with hemoptysis in class 3 inpatients from January to April 2018, was carried out on 15 variables. The results of the analysis showed that the average length of days of patients in grade 3, length of stay (LOS) using CP was 5.79 days, was more efficient at 2.07 days compared to those without CP, namely LOS for 7.86 days.

The average total RS fare in the case of Pulmonary TB Hemoptysis with the non-CP method is Rp. 8,694,780, - shows that the average value is higher than the total RS rate with the plus CP method of Rp. 5,326,353, -. This means that the average total RS rate can be compensated by Rp. 3,368,427, - per patient. As well as the average RS fare variable, surgical procedure, and radiology, which shows a very significant difference between non-CP and CP.

Table 1. Mann-Whitney Difference Test Results for Patients with Cases of Hemoptysis Pulmonary TB in Inpatient Class 3 RSPG with Non-CP and CP January-April 2018

| Variable | Average Value Method | | Mann-Whitney Difference Test | |
|---|---|---|---|---|
| | Non-CP | Plus CP | Mann-Witney Statistical Values | asymp. Sig. (2-tailed) |
| LOS (Days) | 7.86 | 5.79 | 256.50 | 0.02* |
| Total Tariff/INA CBGs | 8,694,780 | 5,326,353 | 186.00 | 0.00** |
| (Rp) | 4,763,703 | 2,526,902 | 233.00 | 0.01** |
| Hospital Rates (Rp) | 284,714 | 91,948 | 386.00 | 0.71 |
| Non Surgical | 156,619 | 0 | 331.50 | 0.01** |
| Procedures (Rp) | 6.142 | 1,333 | 278.00 | 0.04* |
| Surgical Procedure | 365,476 | 250,128 | 287.00 | 0.06* |
| Experts | 492,952 | 299,269 | 381.50 | 0.25 |
| Nursing | 197,857 | 55,512 | 262.00 | 0.01** |
| Support | 724,190 | 421,820 | 150.50 | 0.00** |
| Radiology | 22,190 | 0 | 351.00 | 0.02* |
| Laboratory | 611,190 | 520,641 | 340.00 | 0.28 |
| Rehabilitation | 1,579,432 | 856,748 | 276.00 | 0.04* |
| Accommodation Room | 142,604 | 28,166 | 341.50 | 0.25 |
| Drug | 3,931,077 | 2,799,451 | 326.00 | 0.20 |

| | | | | |
|---|---|---|---|---|
| BMHP Tariff Difference | | | | |

Description: N Non-CP=21
N Plus CP = 39; Total N = 60

The average reduction in costs by using CP on the total RS rate was 38.74%, at the RS rate of 46.96%, in surgical procedures by 100%; in radiology at 71.94%, in the laboratory at 41.75%, in experts at 78.30%, in rehabilitation at 100%, and medicine at 45.76%.

Table 2. Time Efficiency and Maintenance Cost per Patient with Pulmonary TB Hemoptysis with the implementation of Clinical Pathway in RSPG Class-3 Inpatient Rooms in 2015-2018

| Variable | 2015 | 2016 | 2017 | 2018* |
|---|---|---|---|---|
| LOS | 4.6 days | 2.05 days | 0.97 days | 2.07 days |
| Total Tariff/INA CBGS | 278,524 | 278,524 | 527,489 | 3,368,427 |
| Hospital Rates | 1,033,884 | 816,137 | 527,489 | 2,236,801 |

From the analysis above, obtained positive results in the form of Autcome by using CP there is a time efficiency of 0.97-4.6 days. While the total efficiency of the Ina-CBGs fare can be obtained around Rp.278,524 - Rp. 3,368,427. Efficiency at hospital rates was obtained at Rp. 527,489 to reach Rp. 2,236,801.

The results of this study are in line with the results of (Loddenkemper et al., 2016), where the Clinical Pathway can provide a decrease in treatment costs. This research is also supported by the opinion of (Bhalla et al., 2015), where CP is used as a case management tool to reduce variations in medical services and predict the length of stay in the hospital and the number of examinations. Improve patient satisfaction by providing education about patient care plans in addition to financing transparency (Essa et al., 2017).

*Research Limitations*

This research has been attempted and carried out by scientific procedures, however, it still has limitations:

1. Clinical pathway analysis is conducted only in cases of hemoptysis of pulmonary TB, there is still CP in other pulmonary TB cases in the RSPG that have been prepared and analysis is needed to improve the implementation.
2. In this study, there was no survey on the perception of quality and service satisfaction from the perspective of pulmonary TB patients with hemoptysis against the implementation of CP and non-CP.

**Conclusion**

The causes of low CP use in pulmonary tuberculosis cases with hemoptysis in RSPG are not yet optimal socialization to all implementers, lack of management commitment and implementing officers, the attitude of non-compliance of officers,

and no uniform agreement in the implementation and evaluation of CP. Obstacles found in the implementation of pulmonary TB clinical pathway with hemoptysis in RSPG are CP forms that are less available, lack of commitment, no supervisory staff, busy work because of many patients, difficulty in determining fares in pharmacy, and in some cases some patients have already critical. While CP is recommended because it provides positive results in quality control, cost, and length of care, as well as helping in decision-making on patient care. The comparison of the cost of pulmonary tuberculosis with hemoptysis between CP and non-CP users is 1: 1.88 for class 3. Hospital fare cost efficiency of Rp. 2,236,801, - or 38.78% per patient and time efficiency (LOS) 2.07 days.Bogor at least per semester.

The RSPG management needs to discuss and refines the operational definition of compliance with CP (in the form of compliance with the old elements of care, clinical assessment, support, and management) so that it can be implemented clearly by the implementer. The management of the RSPG needs to re-implement the socialization of the implementation of intensive and integrated clinical pathways, Management of the RSPG needs to define the evaluation time with the aim of continuous improvement clearly.

*Conflict of interest statement*
The authors declared that they have no competing interests.

*Statement of authorship*
The authors have a responsibility for the conception and design of the study. The authors have approved the final article.

*Acknowledgements*
We are grateful to two anonymous reviewers for their valuable comments on the earlier version of this paper.

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