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RESEARCH ARTICLE

Pharmaceutical care model for antituberculosis drug therapy in tuberculosis patients at a primary healthcare centre in Surabaya, East Java, Indonesia

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Abstract

Background: Indonesia ranks third in the world for tuberculosis (TB), which remains a public health problem, where the role of health workers, including pharmacists, is needed. The role of pharmacists in primary health care centres is still limited to providing fixed-dose combination antituberculosis drugs (FDC) as a product. The provision of drugs as a means of therapy through pharmaceutical care in TB patients is still not optimal. **Objective:** This study aimed to create a pharmaceutical care model to improve adherence to FDC treatment regimens in TB patients at the primary health care centre. **Methods:** The study consisted of three stages, with the unit of analysis being pharmacist. The first stage was mapping the profile of FDC services in TB patients. The second stage was the creation of pharmaceutical care training modules. The third stage was testing the pharmaceutical care model with module training for pharmacists. The first stage of the study was an observational analytic cross-sectional design, including 63 pharmacists and 249 TB patients from July to September 2018. The third stage of the study was a quasi-experimental design with a pre-test post-test control group in October 2018, enrolling 36 pharmacists divided into 18 pharmacists in the intervention group and 18 pharmacists in the control group. The research was approved by the Health Research Ethics Commission, Faculty of Public Health, Universitas Airlangga. **Results:** The results consisted of a model of pharmaceutical care in TB patients. Pharmacists knowledge affects their abilities, including verification, explanation of indications, effectiveness, safety, and adherence. Pharmacists ability to influence patient response includes belief, understanding, expectation, concern, and adherence to the drug therapy regimen. **Conclusion:** The pharmaceutical care model improved adherence to the FDC therapy regimen in TB patients at the primary healthcare centre.

Introduction

The recovery of TB patients requires collaboration between healthcare providers and patients, which is shown by patient adherence to therapy (WHO, 2003). Chronic disease treatment adherence factors are patient, disease, drug, health service provider, socio-cultural, and health system facilities (Hussar, 2005). Determinants of adherence include the behaviour of healthcare providers, patients, and the health system (WHO, 2003). Based on the TB control strategy with Directly Observed Treatment Shortcourse (DOTS), the patient is given free medication with the fixed-dose combination (FDC) antituberculosis drug at the primary healthcare centre as the first strata health service (Kementerian Kesehatan RI, 2014).

Medicines are characterised by their name, dosage form, packaging, and price as products, and by their active ingredients, efficacy, indications, route, dosage, rules of use, and side effects as therapeutic tools. All therapeutic characteristics are manifested through pharmaceutical care by fulfilling the adequacy of the indication, efficacy, and safety and can be observed by

the patient (Cipolle *et al*., 1998; Athijah, 2007; Cipolle *et al*., 2012).

The current role of pharmacists in the primary healthcare centre is still limited to providing medicines as a product, while the provision of drugs as a means of therapy through pharmaceutical care in TB patients is still carried out by nurses (Yasin *et al*., 2017). Indicators of adherence with drug treatment regimens, namely the right dose, the right frequency, the right interval, the right time to take medication, and the right duration of therapy (Paes *et al*., 1998), have not been implemented at the primary healthcare centre.

Antituberculosis drugs must be delivered by prescription. Pharmaceutical service standards at primary healthcare centres are still generic and not specific to one disease (Kementerian Kesehatan RI, 2016). Pharmaceutical services aimed at one particular disease have been shown to improve quality of life (Pickard & Hung, 2006); thus, pharmaceutical services for TB patients become a need. Currently, there is no pharmaceutical care model for TB patients at the primary healthcare centre. Based on this background, it was deemed necessary to develop a pharmaceutical care model of FDC antituberculosis drug therapy in TB patients at the primary healthcare centre.

Methods

This study enrolled 63 pharmacists and 249 TB patients from July to November 2018. Based on the research population of 63 pharmacists and a quasi-experimental research design, control group pre-test post-test design, the minimum sample size calculated was 32 pharmacists according to the formula (Hulley *et al.,* 2001), 16 per group. The total sample size in the third stage of the study was increased by 10%; then, the obtained sample of 36 pharmacists was divided into 18 pharmacists for the intervention group and 18 pharmacists for the control group. The unit of analysis was pharmacists at the primary healthcare centre in the Surabaya City area providing pharmaceutical care, i.e., explanation of indications, effectiveness, safety, and compliance, which are the competence of pharmacists to meet patient needs related to medications. Pharmaceutical care services from each pharmacist were assessed based on the average rating of four TB patients.

The study consisted of three stages. The first stage was the FDC antituberculosis drug service profiles mapping in TB patients. The second stage was the preparation of the pharmaceutical care training module. The third stage was the pharmaceutical care model testing with module training for a pharmacist with a quasi-experimental control group pre-test post-test design. Only the intervention group received module training.

The research instrument was a questionnaire for pharmacists as providers of pharmaceutical care and a questionnaire for TB patients as recipients of pharmaceutical care. Inclusion criteria for pharmacist respondents are pharmacists who work permanently in the primary healthcare centre. Inclusion criteria for TB patient respondents were new pulmonary TB patients at the primary healthcare centre who took the intensive or advanced stage FDC antituberculosis drug, were at least 13 years old, and communicated well with the researchers who accompanied them when filling out the questionnaire. Patient adherence to treatment was measured using five indicators, i.e., the dose, the frequency, the interval, the time to take medication, and the duration of drug therapy. Data were analysed using Partial Least Square analysis techniques, independent sample t-tests to assess differences between the treatment and control groups, and paired sample t-tests to examine differences before and after training.

Results

The research finding consisted of a model of pharmaceutical care applied in TB patients using indicators of adherence. Pharmacists' knowledge influences their ability, including verification, explanation of indications, effectiveness, safety, and adherence. Pharmacists' ability to influence patient response includes belief, understanding, expectations, concerns, and adherence to the therapeutic regimen. Pharmacist knowledge comprises knowledge of tuberculosis disease characteristics, antituberculosis drug characteristics, and patient characteristics, which form a unit of knowledge. The application of the pharmaceutical care model through the intervention group increased patient response effectively. It also improved adherence to FDC therapeutic regimens at the primary healthcare centre. This study showed that the training intervention module increased pharmacist knowledge and their ability to treat (Table I) and gave a better response to TB at the primary healthcare centre (Table II).

Table I: Pharmacist knowledge and ability in intervention and control group after training

Variable	The value of pharmacist knowledge and ability in intervention group after module training		The value of pharmacist knowledge and ability in control group without module training		$p^{(1)}$	Information
	Mean	SD	Mean	SD		
Pharmacist knowledge	29.00	4.67	24.28	3.12	0.001	Difference
Pharmacist ability						
Verification	8.71	1.65	6.22	2.64	0.002	Difference
Indication	8.89	1.38	4.78	3.17	0.0001	Difference
Effectiveness	9.13	1.51	5.17	3.17	0.0001	Difference
Safety	8.75	1.91	4.89	3.16	0.0001	Difference
Adherence	6.50	0.60	4.50	2.93	0.008	Difference

Information: (1) Independent sample *t*-test, there is a difference if $p<0.05$

Tabel II: Patient responses in intervention and control group after training

Variable	The value of patients' responses in intervention group after module training		The value of patients' responses in control group without module training		$p^{(1)}$	Information
	Mean	SD	Mean	SD		
Belief	9,50.	1.04	4.59	1.81	0.0001	Difference
Understanding	9.67	1.41	4.26	1.46	0.0001	Difference
Expectations	9.56	1.14	3.97	1.78	0.0001	Difference
Concerns	9.56	1.04	4.78	1.32	0.0001	Difference
Behaviour	9.83	0.70	8.78	0.96	0.001	Difference

Information: (1) Independent sample *t*-test, there is a difference if $p<0.05$

Discussion

Based on these results, it is suggested to increase the number of pharmacists at the health centre to implement pharmaceutical care and improve pharmacist competence by increasing their knowledge through the training module, carrying out health education activities, explaining compliance with drug therapy to patients, and increasing collaboration with other healthcare workers in the verification process ensures the identity of the disease. The suggestion for patients is to adhere to antituberculosis treatment. The suggestion for primary healthcare centres is to implement the five appropriate indicators for compliance with drug therapy. Future studies should include tuberculosis patients with more homogeneous treatment stages, namely intensive/advanced stages, to differentiate adherence at each stage and assess therapeutic outcomes.

Conclusion

The pharmaceutical care model increased pharmacist knowledge and improved adherence to the FDC therapy regimen in TB patients at the primary healthcare centre.

Conflict of interest

The authors state that there were no conflicts of interest in this study and the article.

Author's declaration

The authors hereby state that the data and all contents presented in this article were original research results produced by the authors. Any liability for claims relating to the content of this article will be borne by the authors.

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