# CONSTRAINTS IN WAITING TIME OF HOSPITAL PHARMACY SERVICES

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***Abstract***

**Background:** Waiting time in hospital pharmacy service remains to be an issue that needs to be solved. Some constraints need to be analysed to get a better insight about the factors involved in these constraints.

**Objective:** To analyze the factors affecting the waiting time in pharmacy services using the Theory of Constraint (TOC).

**Methods:** This was an observational study which was conducted by following the hospital pharmacy service in 133 drug prescriptions and 19 compounded drug prescription processes.

**Results:** The constraint that caused the preparation time took so long and caused the delay to happen are the man, material, method, machine, and time constraints.

**Conclusion:** Based on the analysis of the pharmacy installation service path, the implications that can be used are to finish the revision of the operational standard procedures, add the procurement of blender machines and sealing machines in the next year's budget plan, prepare a training plan for the pharmacy technicians, and improve the hospital management information system.

**Keywords:** *Theory of constraint, Waiting time of pharmaceutical services*

***Introduction***

Pharmaceutical Care Standard in Hospitals, pharmaceutical care is one of the health services in hospitals that regulate all drugs and medical devices necessities for outpatients and hospitalizations. Pharmaceutical care is inseparable from the hospital health service system oriented towards patient services and the provision of quality and affordable medicines for all people (1).

A few indicators of the quality of pharmaceutical service is the waiting time of finished and personalized medicine services, Quality of hospital pharmacy services is pharmaceutical care that refers to the level of service excellence leading to satisfaction in accordance with an average level of community satisfaction. The implementation must be in accordance with a professional service standard set by and in accordance with the code of ethics of the pharmaceutical profession (2).

the absence of wrong medication, customer satisfaction, and prescription writing in accordance with the formulary (3). The waiting

time of finished and personalized medicine is affected by several factors. In the process, constraints can prolong the waiting time. This study aims to analyse the factors affecting the waiting time of medicine services using the theory of constraints.

***Methods***

This study is an observational research with a cross sectional research design. The samples of this study were 133 prescriptions of finished medicine and 19 prescriptions of personalized medicine. The first step in the Theory of Constraints which was used in this research was constraint identification (4). An ethical approval from the Health Research Ethics Committee (reference number 070/3115/305/2018) was obtained.

***Results***

Based on the observation and analysis results on service flow in the pharmaceutical establishment by comparing the service standard time with the actual service time, the factor causing constraints in the waiting time of finished and personalized medicine were found. The constraint identification process in the system is one of several stages in the Goldratt's theory of constraints (5). The Factors Causing Constraints shown in the Preparation Stage of Finished and Personalised Medicine.

The medicine preparation stage is the primary constraint causing a prolonged waiting time of finished and personalised medicine. The Fishbone analysis result can be seen in Figure 1 and Figure 2.

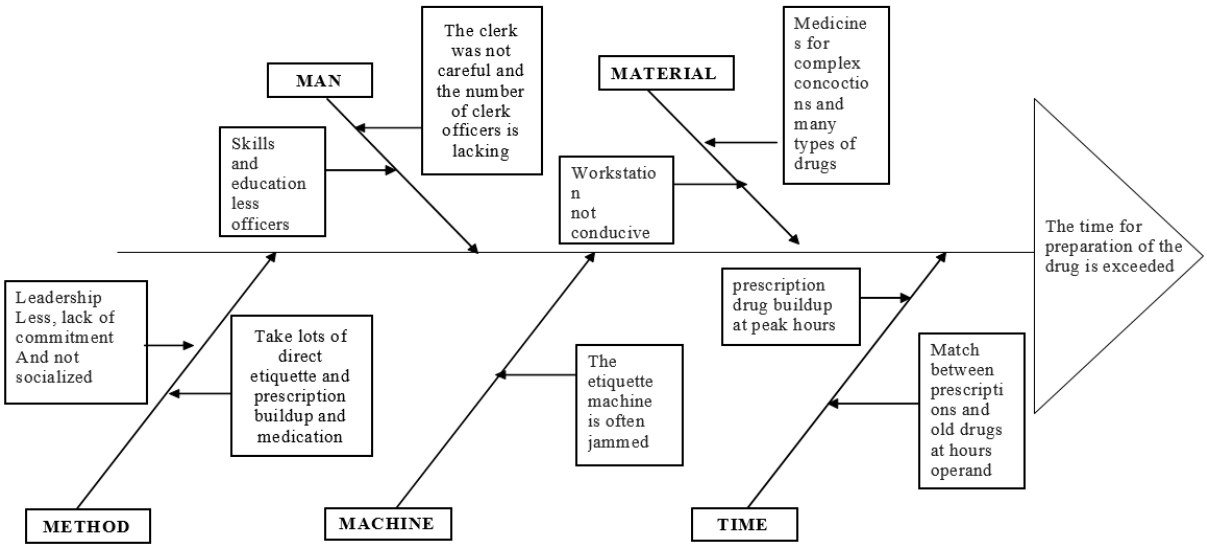


**Figure 1:** Analysis of Causes of Constraints at the Preparation Stage of Prepared Drug

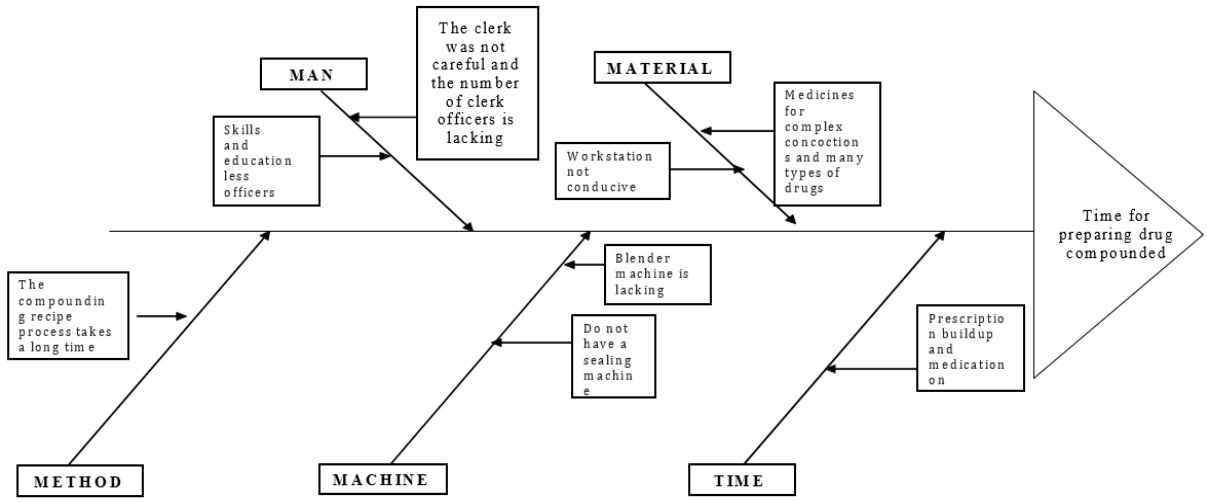


**Figure 2:** Analysis of Causes of Constraints at the Preparation Stage of Concoction Drug

**Factors Causing Delay Constraints**

Delay may happen at the time when patients arrive to the time of the prescription entry, at the time after prescription entry to the drug preparation site, and after drug preparation to the drug delivery site.

The Fishbone analysis result can be seen in Figure 3. After identifying the constraint, an analysis of the constraint cause is done using fishbone and the 5 Whys method. Once the constraint causes are identified, 3 constraint causes are prioritized using the CARL method (Capability, Accessibility, Readiness, Leverage).

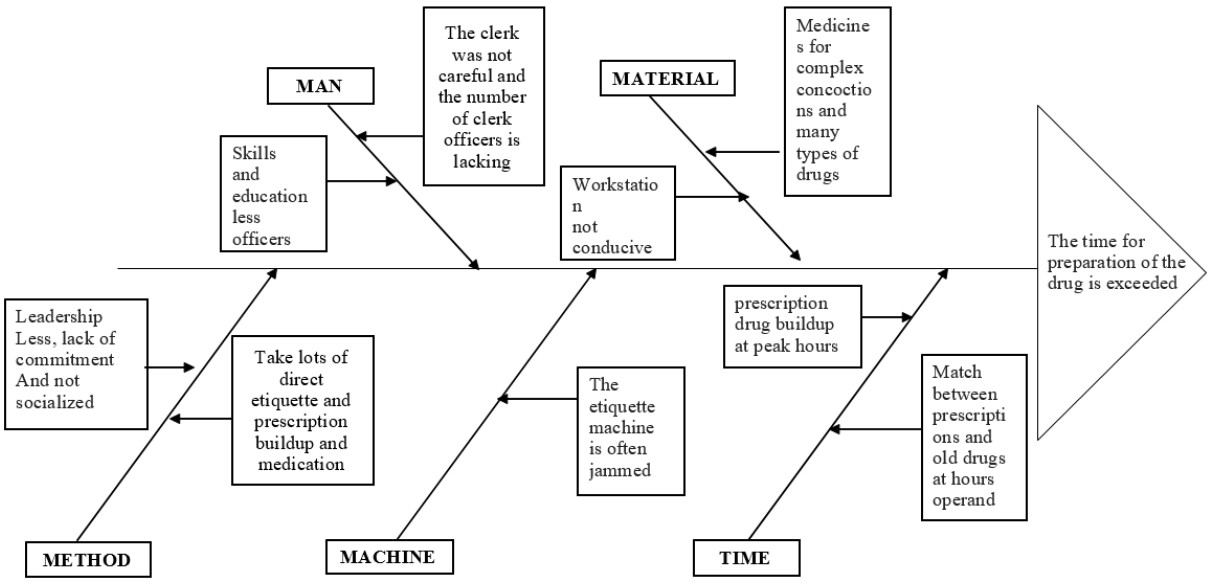


**Figure 3:** Analysis of Causes of Constraints at the Preparation Stage of Prepared Drug

**Causes of Constraints Priority in Finished Medicine Preparation**

The results of the causes of constraint priority using the CARL method conclude that the priority order of causes of constraints in pharmaceutical establishment is standard operating procedures that are not familiarized, taking tickets in bulk at once, and inadequate planning and drug availability (see Table 1).

**Table 1:** Causes of Constraint Priority in Finished Medicine Preparation

| No. | Factors Causing Constraints | C | A | R | L | Total | Ranking |
|---|---|---|---|---|---|---|---|
| 1. | Shortage of pharmacy technical personnel | 1 | 2 | 3 | 4 | 24 | 7 |
| 2. | The drug rack is lined up | 4 | 4 | 1 | 2 | 32 | 5 |
| 3. | LASA drug | 2 | 2 | 2 | 2 | 16 | 10 |
| 4. | The staff was not careful in taking the medicine | 2 | 1 | 2 | 3 | 12 | 13 |
| 5. | Inadequate planning and drug availability | 4 | 3 | 3 | 3 | 108 | 3* |
| 6. | The location of the non-jiwa drug is far apart | 2 | 2 | 2 | 2 | 16 | 11 |
| 7. | Complex and considerable types of medicine | 2 | 2 | 2 | 1 | 8 | 14 |
| 8. | Lack of leadership | 2 | 1 | 1 | 3 | 6 | 15 |
| 9. | SOP is not promoted | 4 | 4 | 4 | 4 | 256 | 1* |
| 10. | SOP is under revision | 3 | 3 | 3 | 3 | 81 | 4 |
| 11. | Service method of inpatient and outpatient prescription is merged | 2 | 2 | 3 | 2 | 24 | 8 |
| 12. | Taking labels in bulk | 4 | 4 | 4 | 4 | 256 | 2* |
| 13. | Jammed label machine | 3 | 3 | 2 | 1 | 18 | 9 |
| 14. | Unconducive workstation or work place | 1 | 2 | 3 | 4 | 24 | 6 |
| 15. | Prescription and medicine buildup at peak or busy hours | 2 | 2 | 2 | 2 | 16 | 12 |

**Causes of Constraints Priority in Personalized Medicine Preparation**

The results of the causes of constraint priority using the CARL method conclude that the priority order of causes of constraints in pharmaceutical establishment is inexpert skills and education of the pharmacist, inadequate blender machines, and unavailability of sealing machines (see Table 2).

**Table 2:** Causes of Constraints Priority in Personalized Medicine Preparation

| No. | Factors Causing Constraints | C | A | R | L | Total | Ranking |
|---|---|---|---|---|---|---|---|
| 1. | inexpert skills and education of the pharmacist | 3 | 3 | 4 | 4 | 144 | 1* |
| 2. | Shortage of pharmacists | 1 | 2 | 3 | 4 | 24 | 6 |
| 3. | The staff was not careful in counting the medicine | 2 | 1 | 2 | 4 | 16 | 8 |
| 4. | The staff was not careful in estimating capsule size | 2 | 1 | 2 | 3 | 12 | 10 |
| 5. | Considerable amount of capsules | 3 | 2 | 1 | 3 | 18 | 7 |
| 6. | Considerable amount of medicine types | 2 | 1 | 1 | 3 | 6 | 11 |
| 7. | Long concoction time | 2 | 2 | 2 | 4 | 32 | 5 |
| 8. | Distant distance between rooms (from entry location to preparation site, from preparation site to compounding site, from compounding site to delivery site) | 2 | 2 | 4 | 3 | 48 | 4 |
| 9. | Unconducive workstation or work place | 2 | 1 | 2 | 1 | 4 | 12 |
| 10. | Shortage of blender machine | 3 | 4 | 4 | 3 | 144 | 2* |
| 11. | No sealing machine available | 2 | 3 | 4 | 3 | 72 | 3* |

**Causes of Constraints Priority in Delay**

The results of the causes of constraint priority using the CARL method conclude that the priority order of causes of constraints in pharmaceutical establishment is slow hospital management information system as well as an unstable network, drug stock in the hospital management information system that does not match with the stock-taking and distant spacing between rooms (see Table 3).

**Table 3:** Causes of Constraints Priority in Delay

| No. | Factors Causing Constraints | C | A | R | L | Total | Ranking |
|---|---|---|---|---|---|---|---|
| 1. | Shortage of staff | 1 | 2 | 3 | 4 | 24 | 5 |
| 2. | Distant distance between rooms (from entry location to preparation site, from preparation site to compounding site, from compounding site to delivery site) | 2 | 2 | 4 | 4 | 64 | 3* |
| 3. | Slow hospital MIS and unstable network | 4 | 4 | 4 | 4 | 256 | 1* |
| 4. | Different stock status between hospital MIS and stock-taking | 4 | 4 | 4 | 4 | 256 | 2* |
| 5. | Prescription and medicine buildup at peak or busy hours | 2 | 3 | 3 | 3 | 54 | 4 |

***Discussion***

***Man Constraints and Factors Causing Man Constraints***

Man constraints are constraints found in human resources or employees working in a pharmaceutical establishment. Below are the factors causing constraints in human resource:

Staff shortage; according to Hospital Classification for psychiatric hospitals, there must be three pharmacists and 5 SMFs, amounting to 8 in total (6). This study is in line with Purwandari, the study that showed that human resource is one of the factors influencing the prescription service waiting time. Staff shortage will lead to non-optimal service because the staffs tend to work hastily due to the sheer amount of prescriptions (7).

The staffs retrieve wrong drugs; this may happen due to many drugs being LASA medications (Look Alike Sound Alike). This mistake may increase the probability of medication errors in hospitals. Patient safety is also an important part in hospital service risks besides financial risks, property risks, professional risks, and environment risks (8).
Inexpert skills and education of the staff; a study showed that knowledge and skills play a significant role in quality services (9).

The staffs wrongly count the capsules and estimate the capsule size; errors in counting capsules can prolong personalized medicine prescription service process. These mistakes correlate with the skills of the pharmacists. Pharmacists are required to improve and update their knowledge and skills by constantly learning in a formal or in an informal fashion (10).

***Material Constraints and Factors Causing Material Constraint***

Material constraints are constraints found in the materials related to health service logistics such as drugs, syringes, medical objects, etc. The following are the factors causing material constraints:

Unavailable drugs; drug availability affects the waiting time of medicine service in pharmaceutical establishments. If BPJS or Universal Health Coverage medicine is unavailable, the patient may wait for it to be available or the medicine may be replaced with other brands; however, this must be first discussed with the pharmacist which in turn prolongs the waiting time (11). Therefore, availability planning is important. The purpose of drug planning is to determine the type and quantity of the drugs needed, to avoid unavailability, to increase drug usage reasonably, and to improve medicine usage efficiency (12).

More complex medicine; medicines are dosages or a mix of substances that are used to influence the physiological and pathological systems for the purpose of diagnosis, prevention, healing, recovery, and health improvement (3). Complex personalized medicine; personalized medicines are medicines produced by mixing active ingredients. In Indonesia, personalized medicine prescription is commonly done to adjust the dosage with the children's weight (13). More complex medicines need a longer time to be prescribed.

Unconducive workstation or work place; an unconducive workstation may prolong medicine service process because the staff feel uncomfortable in preparing the medicines.

***Method Constraints and Factors Causing Method Constraints***

Method constraints can be standard operating procedures, etc. Below are the factors causing method constraints.

The standard operating procedure is not performed; some operational standard procedures in medicine preparation is not performed. This can happen when an operational standard procedure is never introduced properly to the staff. Moreover, the operational standard procedures are still under revision until June 2018.

Prescription and medicine aggregation; prescription aggregation usually happens on Mondays and Thursdays because on these days, the prescription for hospitalization from all rooms are sent to the pharmaceutical establishment. The study above is in line with the study by Fitriah and Wiyanto in 2016 showing that prescription aggregation is the primary cause of a long waiting time in the Outpatient Pharmaceutical Establishment of Hospital X (14).

***Machine Constraints and Factors Causing Machine Constraints***

Machine constraints come from equipment like computers, label machines, etc. Below are the factors causing machine constraints.

Jammed label machine; frequently jammed label machines can prolong the medicine preparation process requiring the staff to disassemble and fix the machines.

Blender machine shortage; there is only one blender machine against hundreds of prescriptions. This study is in line with the study by Megawati et al. in 2015 showing that out of order blender machines and calculator shortages can prolong the waiting time in Hospital Baptis Batu (11).

No sealing machine available; without a sealing machine, the powder medicine concoction is packaged manually. This requires the staff to fold the parchment paper manually, which in turn prolongs the service time. According to Law Number 44 of 2009 on Hospitals, Hospitals must meet the location, building, infrastructure, human resources, pharmacy and equipment requirements (15).

***Time Constraints and Factors Causing Time Constraints***

Time constraints are constraints found in the time used for service. Below are the factors causing machine constraints.

Prescription build up at peak hours; peak hours occurs at 09.00 am to 12.00 pm. At those hours, patient volume keeps increasing leading to a prescription build up. This study is in line with Nurjanah's study in 2016 showing that patient visiting hours correlate with the prescription service waiting time (16).

Long prescription-medicine matching at shift change; at shift change from morning staff to afternoon staff between 14.00 to 15.00, the patient volume starts decreasing. The study by Purwandari in 2017 support these results showing that room layout that complicates service flow encourages the staff to pile up labelled medicines before they were sent to the front counter (7).

***Conclusion***

Constraints causing a long waiting time of finished and personalized medicine service can be classified into man constraints, material constraints, method constraints, machine constraints, and time constraints.

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