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# Guidance And Assistance In Repair Of Centrifuge Laboratory Equipment Based On Standards Of Centrifuge Motor Speed Data In Turi Health Centre, Lamongan Regency, East Java

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**ABSTRACT** One of the equipment in the Turi Health Center laboratory is a Centrifuge. The problem at the Turi Health Center with the centrifuge is that this centrifuge has a large usage load of 8-10 hours per day, without having electromedical personnel. In this Centrifuge, it is often found that the cleanliness of the tools is not good, the placement of the tools is inadequate, the electrical installation network is not standard (Grounding) and the maintenance and maintenance is lacking, there is no regular calibration so there is no certainty of the accuracy of the results obtained. As a result of the impact obtained is a tool that is not suitable for use, the tool is quickly damaged which can harm the diagnosis of patients. Community Service Activities with the implementation team from Poltekkes Kemenkes Surabaya working together as partners in this activity aims to carry out repairs according to Centrifuge standards and provide knowledge and skills about simple maintenance and repairs on Centrifuges Correctly. The first stage in providing solutions to problems faced by the Turi Health Center is to conduct a study through Focus Group Discuss (FGD). The second stage is compiling a user manual. The third stage is the implementation of mentoring and counseling on centrifuge repair using a maintenance and repair manual. And the fourth stage is the implementation of centrifuge repair by providing opportunities for laboratory personnel, Medical and non-medical personnel to be able to independently carry out simple repairs and to know important indicators in the event of damage. The output target of the community service carried out is a simple repair guide book for centrifuge equipment so that later laboratory equipment at the Turi Health Center, especially the Centrifuge, can work according to the Centrifuge Motor Speed Standard.

**INDEX TERMS** Centrifuge, Repair, Medical Laboratory, Skill

## I. INTRODUCTION

The Turi Health Centre laboratory has a Centrifuge. Centrifuge is a tool used to separate organelles based on their density through a deposition process [9]-[15]. In the process, the centrifuge uses the principle of rotation or rotation of the tube containing the solution so that it can be separated based on its density [9], [12]-[16]. Situation analysis at the Turi Health Centre found that the first analysis is the Turi Health Centre doesn't have electromedical personnel, The lack of human resources causes the maintenance of tools cannot be

carried out properly so that it is often found that the cleanliness of the tools is not good and the placement of the tools is inadequate. The second analysis is that there are limited funds at the Turi Health Centre resulting in not all equipment being calibrated periodically, this causes rotation of centrifuge motor is not up to standard. The non- standard electrical installation network (Grounding) causes the centrifuge motor rotation to be inappropriate. The third analysis is that not all paramedics at the Turi Health Centre know how to operate the centrifuge properly and maintain the

equipment in a simple way until it is feasible to use (calibrator : [17]-[23]). Referring to the analysis of the existing situation with partners, the priority issue for partners is the need for a simple repair manual for centrifuge equipment in laboratory services, considering that the use of this centrifuge has a high load of 8-10 hours per day. So that the manual for repairing centrifuge equipment will increase the knowledge and skills of workers Laboratories, medical and non-medical personnel in maintain the centrifuge equipment so that it can work according to existing standards.

By paying attention to the three analyses of the situation, the Surabaya Health Polytechnic Department of Electrical-

medical Technology as a partner of the Turi Health Centre carries out Community Service Activities with the Maintenance and Repair of Centrifuge Laboratory Equipment Based on Standard Centrifuge Motor Speed Data at the Turi Health Centre, Lamongan Regency, East Java.

## II. MATERIALS AND METHODS

### A. OBJECT

The target community members who are considered strategic to be involved in community service are the academic community, namely lecturers and students, Turi Health Center officers who are directly involved in using centrifuge

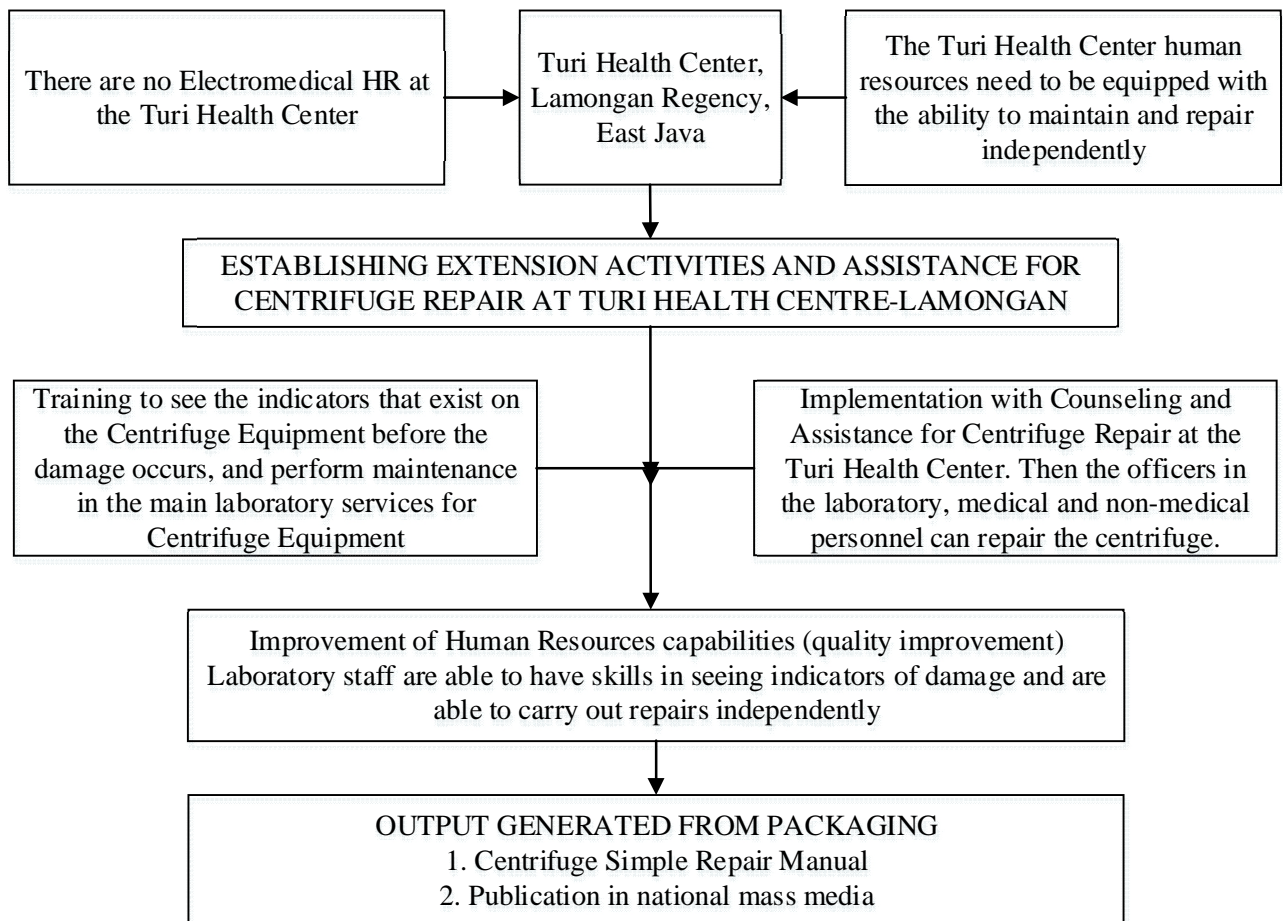


FIGURE 1. Method of community service activities in Turi Health

equipment, and technicians at the Turi Health Centre even though they are not from electromedical personnel.

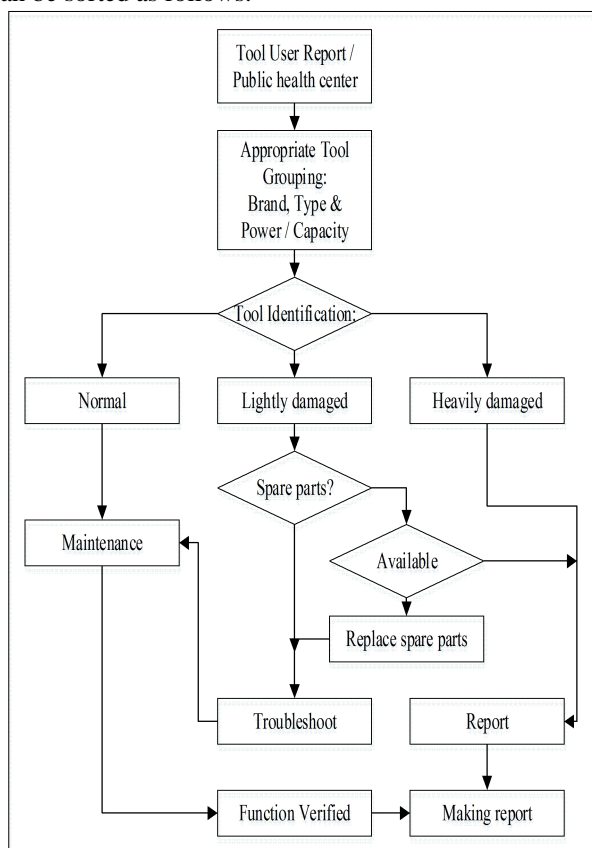
### B. DATA ACQUISITION

The mandatory outputs of Community Service with the Main Partner Village Development Program at the Turi Health Center, Lamongan Regency, East Java are:

- 1) Handbook of simple repair of centrifuge equipment
- 2) Publication in national mass media (print and electronic/PT repocitory).
- 3) Improving the understanding and skills of laboratory staff, medical and non-medical personnel at the turi health center.
- 4) Improvement of public health/education (partners).
- 5) Improvement of value system (increase of product quantity and quality).

### C. DATA PROCESSING

The following **FIGURE 1** is a method of community service activities carried out at the Turi Health Centre. In carrying out community service activities at the Turi Health Center, Lamongan Regency, East Java, to determine the feasibility of the Centrifuge tool until later repairs are carried out, they can be sorted as follows:



**FIGURE 2. Equipment identification flow**

the Centrifuge equipment at the the Turi Health Centre to check the condition of the equipment.

2. After all the tools are collected, then grouped according to brand, type and recorded.
3. Once recorded, then identified according to the level of damage.
4. If the equipment is normal, cleaning and maintenance will be carried out according to operational procedures and immediately verified its function then reporting/recording is made
5. If the Centrifuge at the the Turi Health Centre is slightly damaged, and does not require replacement of spare parts, it will be repaired immediately and after that its function is verified.
6. If the tool is in a state of light damage and require replacement of spare parts, then check the availability of spare parts if available then immediately repaired and if spare parts are not available then immediately reported to the health center.
7. If the equipment is in a state of serious damage so that it cannot be repaired at the location or the repair steps are considered uneconomical, it is immediately reported to the the Turi Health Centre.
8. After the Centrifuge Equipment is declared suitable for use, it is followed by providing knowledge about the correct operating steps according to standard operating procedures (SOP)
9. Provide opportunities for the Turi Health Centre officers to demonstrate and simulate skills that have been described, as material for evaluating the success of the activity
10. Make activity reports.

### D. DATA COLLECTION

Steps which will all done in the Community service for counseling and Assistance in Repairing Centrifuge equipment at the Turi Health Center are as follows:

1. Provide information about what a Centrifuge tool is, Operation and components of a Centrifuge tool
2. Provide counseling services about the importance of a good and proper Centrifuge tool
3. Provide an explanation of the Centrifuge SOP correctly according to the standard
4. Explaining common problems experienced during the operation of the tool and the maintenance of the centrifuge after its use.
5. Explain the procedure steps for know that there is a problem with the centrifuge, how to solve it and evaluate the work,
6. Explain about the correct storage of Centrifuge tools to extend the life of use (life time).
7. Demonstrating the correct procedure steps or SOP for Centrifuge operation.
8. Provide opportunities for officer partners laboratories, medical and non-medical personnel for demonstrate what we have learned together,

1. The institution / community service officer reports to the puskesmas in the field of equipment inventory to collect

9. Evaluate learning understanding after completion of the activity.
10. Provide input to the Leadership and Management of the Turi Health Center regarding the results obtained.

### E.DATA ANALYSIS

In Repairing Centrifuge equipment at the Turi Health Center through several stages.

1. The first stage in providing solutions of problem faced by the Turi Health Center is to conduct a study through Focus Group Discuss (FGD) which is carried out on the management team of medical personnel, laboratories and doctors, and then FGD with non-medical personnel to see what factors can influence, problem and the efforts that have been made in keeping the Centrifuge working properly according to standards.
2. The second stage is compiling a manual for improving the skills of medical and non-medical personnel in the simple maintenance and repair of centrifuge equipment.
3. The third stage is the implementation of mentoring and counseling on centrifuge repair by using use the maintenance manual and simple repair of pre-arranged centrifuge equipment for laboratory, medical and non-medical personnel. The fourth stage is the implementation of centrifuge repair by providing opportunities for laboratory personnel, medical and non-medical personnel to be able to independently carry out simple repairs and know important indicators in the event of damage.

### III. RESULT

The result of this Community Service activity is that 4 units of Centrifuge have been repaired as shown as **FIGURE 3**.



**FIGURE 3.** Centrifuge that have been repaired

The Centrifuge repairs process at the Turi Health Centre Lamongan, shown on **FIGURE 4**.



**FIGURE 4.** The Centrifuge repairing process

The list of Centrifuge problems that occur and repairs that have been made are as shown in table 3.1 below:

Table 3.1 Classification results	
No	Model/Merk Centrifuge
1.	<b>PLC 05 / Gemmy Industrial Cor</b>
Problem	Just need maintenance only
Troubleshoot	formed maintenance and Centrifuge Function Monitoring (Centrifuge Body Cleaning)
Result	Worth using
2.	<b>DSC 200T / Digisystem Laboratory Instruments INC</b>
Problem	Broken Timer
Troubleshoot	<ul style="list-style-type: none"> <li>↳ Replace the timer on Centrifuge.</li> <li>↳ Performed maintenance and monitoring of Centrifuge</li> </ul>
Result	Worth using
3.	<b>0508-1 / Onemed</b>
Problem	Broken Timer , Charcoal Brush Wear
Troubleshoot	<ul style="list-style-type: none"> <li>↳ Replace the timer and charcoal brush on the centrifuge.</li> <li>↳ Performed maintenance and monitoring of Centrifuge</li> </ul>
Result	Worth using
4.	<b>800 SMIC</b>
Problem	Transformer not working
Troubleshoot	Performed Cleaning onTransformer
Result	Suitable for use and need a transformer replacement

**FIGURE 5** shown the problem of broken timer and it troubleshoot by replace the timer on centrifuge, then the result was worth to use.



**FIGURE 5.** Broken Timer

**FIGURE 6** shown the problem of charcoal brush wear and it troubleshoot by replace the charcoal brush wear on



centrifuge, then the result was also worth to use.



FIGURE 6. Charcoal brush wear

The output achieved from the community service carried out is in the form of a simple repair manual for centrifuge equipment as shown as FIGURE 7. So that later the laboratory equipment at the Turi Health Center, especially the Centrifuge, can work according to the Centrifuge Motor Speed Standard.



FIGURE 7. Present of simple repair manual for centrifuge equipment

#### IV. DISCUSSION

From the results of Community Service Activities at the Turi Health Center, it can be seen that the most common problems encountered when maintaining and monitoring the function of the Centrifuge are the mechanics of the Timer which is not functioning so that it requires repair and replacement, Charcoal brushes that are worn and need to be replaced, Dirty transformers that interfere with the performance of the Centrifuge when used and dirt attached to the Centrifuge body casing so it needs to be cleaned. After maintenance, monitoring the function and repair of the Centrifuge unit can be declared eligible for use.

#### V. CONCLUSION

Community Service by Lecturers and Students of the Department of Electrical-Medical Technology, Health Polytechnic of the Ministry of Health, Surabaya, for counseling and Assistance in Repairing Centrifuge equipment at the Turi Health Center which will be a solution to systematically solve problems faced by partners according to priority problems regarding Centrifuge laboratory equipment.

Some of the electromedical equipment that has been carried out are as follows (as the results of the activities in Chapter IV) that 4 centrifuges have problems or factors that affect

damage or are not suitable for use, namely mechanics on the timer that do not work so that they require repair and replacement, charcoal brushes that are worn and need to be replaced, dirty transformers that interfere with the performance of the centrifuge when used, and dirt attached to the Centrifuge body casing so it needs to be cleaned. After maintenance, monitoring the function and repair of the Centrifuge unit can be declared eligible for use.

From these activities, suggestions were made to make SOP for the maintenance of electromedical equipment at the Turi Health Center on a regular basis, use of electromedical devices correctly and properly, budget planning for the cost of maintenance and repair of electromedical devices. The need for knowledge for health workers as users of medical devices.

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