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Information System for Calculating Medical Record Personnel in the Industrial Revolution Era 4.0

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ABSTRACT

Medical recorders and health information are some of the health workers who are included in the "medical technical" group where the task of medical recorders and health information is to manage patient data into health information that is useful for decision making. Planning for the needs of health personnel must be following the needs in the field in terms of type, qualification, quantity, and procurement. Excess health personnel will result in unproductive use of work time, while a shortage of health workers will result in excessive workloads so that in planning the needs of health workers an analysis of the workload is required. This study was conducted to obtain information on the ideal number of medical record health personnel using workload calculations. This research method is based on the calculation method of Work Load Indicator Staff Need (WISN) through the implementation of a website-based information system at XYZ Hospital. Based on the results of this study, it shows that the ratio of <1 HR in the unit is not sufficient and not following the workload, namely the number of human resources in the Old Patient TPPRJ with a ratio value of 0.33; RJ coding ratio value 0.41; and Analysis with a ratio value of 0.38. Lack of officers at TPPRJ for Old Patients, RJ Coding, and Analysis resulted in poor service, so it is necessary to add medical personnel to that section when conditions are crowded

INTRODUCTION

The success of health development can be seen from several indicators that are used as a means of monitoring the development of public health status. To achieve the intended indicators, precise and accurate data and information are needed. The need for data and health information from day to day is increasing (Islamy, Astuti, & Wibowo, 2020). The public is increasingly concerned with the health situation and the results of health development that have been carried out by the Government, especially for health problems that are directly related to their health, because health concerns the lives of the wider community, and everyone needs to be healthy. Public concern for health information provides a positive value for health development itself. One of the indicators of monitoring tools for the development of community health status is health personnel.

A health worker is any person who devotes himself to the health sector and possesses the knowledge and/or skills through education in the health sector which for certain types requires the authority to carry out health efforts. Medical recorders and health information are some of the health workers who are included in the group of

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medical technicians where the task of medical recorders and health information is to manage patient data into health information that is useful for decision making. Planning for the needs of health workers must be following the needs in terms of type, qualification, quantity, and procurement. Excess health personnel will result in unproductive use of work time, while a shortage of health workers will result in excessive workload so that in planning the needs of health workers an analysis of workload is required (Govule et al., 2015) (PERMENKES RI No 269/MENKES/PER/III/2008, 2008).

From several studies that have been carried out, among others, the success of inpatient nursing service standards at X Hospital in Yogyakarta is supported by the availability of human resources (human resources), therefore it is necessary to analyze the needs of implementing nurses based on workload. The purpose of this study was to determine the workload and needs of the nurses in X Hospital in Yogyakarta. This type of research uses qualitative and techniques for taking the number of informants with total sampling. Primary data collection methods are through observations and interviews as well as secondary data in the form of document review and personnel data for Hospital X. The results of this study have a WISN ratio of 0.7, this indicates that if the WISN ratio <1 means that the human resources in the unit are insufficient and not by the workload namely the number of human resources currently in Al-Kausar's inpatient room is 15 nurses while they need according to the WISN method is 21 nurses so the total deficiency is 6 nurses (Ekawati, 2018), other studies discuss that services in the registration section are administrative, namely services in identification patient. One of the obstacles in registration is the limited number of personnel. This type of research is descriptive with a cross-sectional approach with a population of outpatient and inpatient visits in March-May 2018 as many as 3149 patients. The results of the study using the WISN method estimated that 1 staff of medical records in the registration section needed one officer, while the queue occurred because the visiting patient came at the same time. The queue also occurred because the DRM that was being sought was not found on the filing shelf and the patient did not bring KIB. There was a shortage of medical record personnel at the registration section of the General Haji Hospital because the calculation results required an additional 1 person and currently only 2 medical record personnel (Gultom & Sihotang, 2019). The next researcher discusses the type of research with descriptive and quantitative and qualitative methods simultaneously to analyze the workload and obtain the number of paramedics, namely nursing and pharmaceutical personnel based on the Workload Indicator Staffing Need (WISN) method. The results of the analysis of the need for paramedics based on the workload of officers using the WISN method at the Ass-Syifah Polyclinic of UIN Alauddin Makassar obtained a total of 0.695 human resources or if rounded to 1 HR. Meanwhile, the ideal number of pharmaceutical personnel is 3.38 HR or 4 HR. The use of the WISN method is to facilitate the fulfillment and distribution of health workers, especially in polyclinics, so it is hoped that research results can be used as a source of input for leaders to evaluate HR needs (Alam, Raodhah, & Surahmawati, 2018). Looking at the various studies above, it can be concluded that the analysis of the workload of medical record personnel is needed, by the health sector to calculate the real workload of officers in the Calculation of Medical Record Personnel Needs in the Era of the Industrial Revolution 4.0 Using the Method Calculation of WISN, but from these studies, no one has implemented it into an information system (Cahyaningrum, Noor, Anggita, & Dewati, 2018; Ekawati, 2018; McQuide, Kolehmainen-Aitken, & Forster, 2013; Sajjad Kayani, Naeem Khalid, & Kanwal, 2016).

MATERIALS AND METHODS

The problem to be discussed in this study is how to calculate the Need for Medical Record Personnel in the Industrial Revolution Era 4.0 Using the WISN Calculation Method at XYZ hospital through the implementation of a website-based information system quickly, precisely, and accurately, and what are the results of the information system that is made (Bastuti, S., & Teddy, 2017; Govule et al., 2015; Ravhengani & Mtshali, 2017; Soesilowati & Ratnasari, 2015). able to calculate the maximum need for medical record personnel or not based on the WISN calculation formula. The reason the researchers used the workload calculation using the WISN method was that the Workload Indicators of Staffin Need was a method of calculating human resource needs based on the actual workload carried out by each category of health human resources in each work unit in a health service facility. This method is often used in hospitals, puskesmas, and health offices. The advantages of the WISN method are easy to operate, use, implement, comprehensive, and realistic 13. Figure 1. Below is the flow of the research.

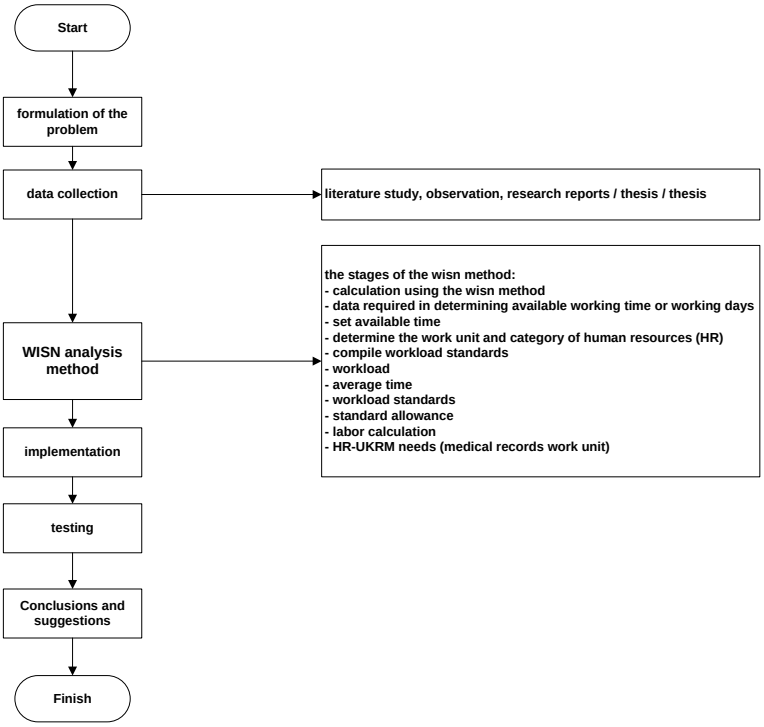

Figure 1
Research Flow

As in the research flow in Figure 1, there are stages of data collection and analysis of the methods used, at this stage data collection is carried out about research related to the Calculation of the Need for Medical Record Personnel in the Industrial Revolution Era 4.0 Using the WISN Calculation Method as a reference, as well as conducting data collection be the object of research at the Hospital X Surakarta area. The data collected here is intended as an effort to calculate the need for medical record personnel in various stages, as well as to analyze the methods, including Determining priority types of health workers and work units in health facilities; Estimating the available working time (AWT); Defines workload components; Set activity standards; Calculating workload / standard workload; Calculating the allowance factor; Determine the number of workers required based on WISN, and Analyze and interpret the results of the WISN calculations. At this stage of the implementation process, modules that have been designed in the design stage will be made into a programming language, the system implementation will be carried out with application specifications as needed using the waterfall method. The design of software can be done with various methods including a waterfall which is part of the SDLC (System Development Life Cycle), prototype, and agile 14,15.

The calculation flow that will be used as a reference for researchers in making digitization/workload calculation in-formation systems is shown in Figure 2.

RESULTS AND DISCUSSION

1. WISN calculations

There are 5 steps to calculate power based on WISN, namely:

a. Determining Available Working Time (WKT)

The goal is to determine the effective working time of one year, for each category of HR that we will calculate. The formula:

Available Working Time = $\{(A-(B+C+D+E))\}xF$ (1)

Information:

A = The number of possible workdays in a year
B = annual leave
C = Education and training
D = National holidays
E = Absent from work (average absence from work for one year due to illness, no come to work with or without reason)
F = working time (working time in one day)

b. Determine the calculated Work Unit and HR category

Aims to determine the work unit and category of HR responsible for providing health services. This information can be obtained from:

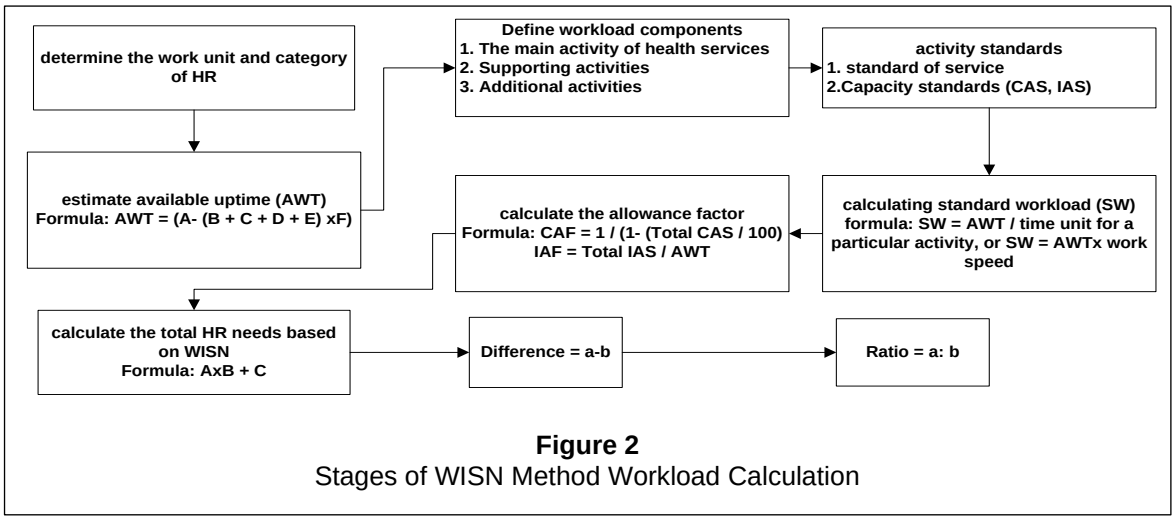

Figure 2
Stages of WISN Method Workload Calculation

- Employee data based on education who work in each work unit
- The laws and regulations relating to the functional positions of health human resources
- Professional standards, service standards, and standard operating procedures for each work unit.

c. Prepare Workload Standards

This is the volume or quantity of workload for 1 year per category of HR. The standard workload for one main activity is calculated based on the average time it takes to complete the activity and the available work time.

The formula:

$$\text{Standard Workload} = \frac{\text{available working time}}{\text{average time per main activity}} \quad (2)$$

The data required include:

- Time available
- Organizational structure chart
- Main activities (main activities and description of activities, as well as responsibilities of each category of HR)
- The average time to complete the main types of activities
- Professional standards
- Determining the time based on the agreement

d. Establish allowance standards and allowance factors.

Aiming at obtaining the leeway factors for each category of HR including the type of activity and the time to complete an activity that is not directly related to patient care. His observations include:

- Activities that are not directly related to patient care
- The frequency of each activity is in days, weeks, and months
- The average time it takes to complete the activity

The formula:

$$\text{Standard Allowance} = \frac{\text{average time per allowance factor}}{\text{time available}} \quad (3)$$

e. The Category Allowance Factor (FKK) is used as a multiplier in determining the total number of health workers required for the next WISN Step.

FKK is calculated as follows:

- Change the Category Allowance Standard of each important support activity to a percentage of working time.
- Sum all of the Category Allowance Standards
- Using a mathematical formula to obtain FKK, as follows:

$$\text{FKK} = \frac{1}{\{1-(total\ SKK/100)\}} \quad (4)$$

Take into account the working time used by several Health workers in each category of personnel for additional activities. FKI calculates the number of officers needed to carry out these activities on a “whole time equivalent” (WTE). The FKI is added to the final calculation of the total staff requirements.

The calculation is as follows:

Multiplying each Allowance Standard by the number of people carrying out the activity, Add up all the results obtained above, then divide the results by the Available Working Time (WKT).

If the number of personnel carrying out an activity varies between activities, it is necessary to carry out separate calculations for each group of activities carried out by the same number of personnel, and then add up.

Calculating the need for personnel per work unit Aim to obtain the number and categories of human resources needed to

carry out compulsory health efforts and development efforts within one year.
The formula:

$$\text{Labor Requirements} = \frac{\text{quantity of main activities}}{\text{workload standard}} \quad (5)$$

The results of the calculation of the energy requirements of each main activity are then multiplied by the FKK and added by the FKI, to obtain the total number of personnel required. Required data:

- Time available
- Standard workload
- Allowance standards
- Quantity of main activities per work unit for 1 year.

All formulas and calculation flow above are implemented into an information system with the flow shown in Figure 3, Figure 4, and Figure 5.

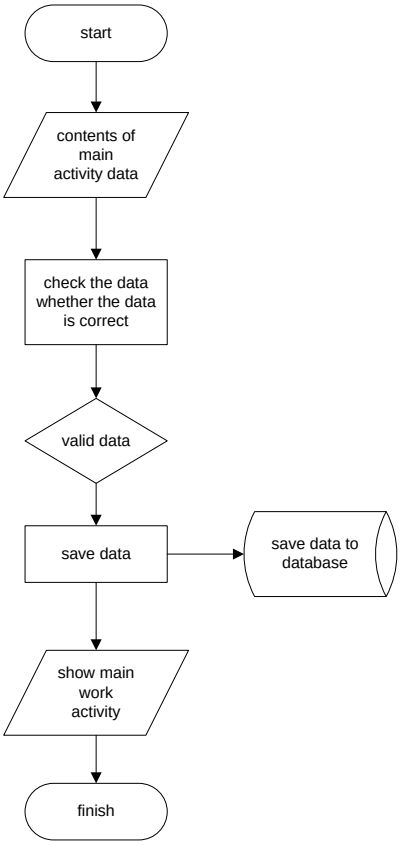

Figure 3
Flow of data input

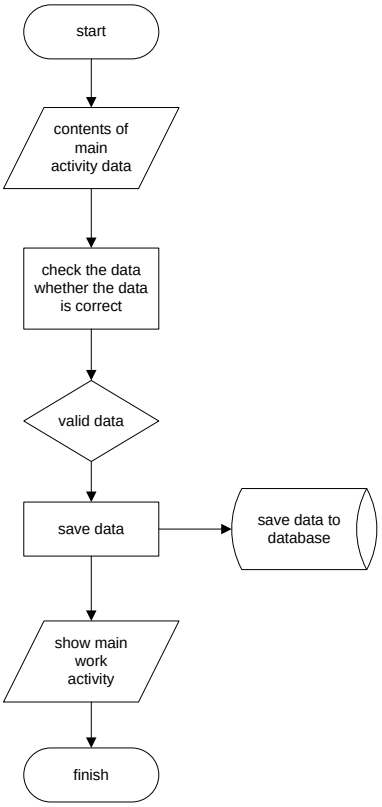

Figure 4
Data Storage Process Flow

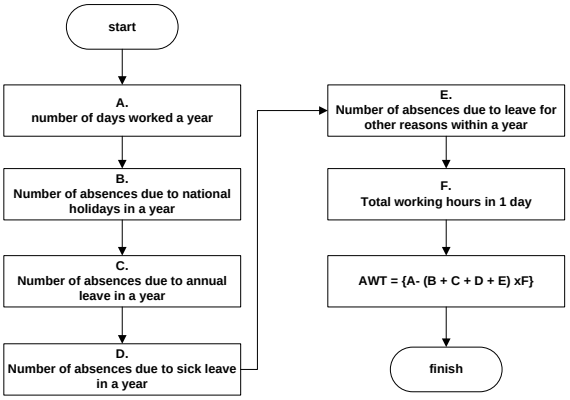

Figure 5
Calculation Process Flow

2. Implementation of the WISN method

The implementation of the WISN method into the system is shown in Figures 6 and 7 based on the main data in table 1 as data entry

Table 1
Basic Data

No	*Name of Activity*	*Average Time/Minute*	*Patient*
1	Analysis	2	51
2	RI coding	7.4	51
3	RJ coding	0.6	181
4	Assembling	3.5	51
5	RI production	2.45	232
6	TPPRJ Old Patient	1	87
7	TPPRJ New Patients	2.2	94

It can be seen in table 1 above regarding the activities carried out in the average running minute and the number of patients present, the contents of the main activities are a reference for the workload calculation process using the WISN method which will be obtained regarding the standard workload calculation for 1 health worker. The values from table 1 entered in the application are shown in figure 6

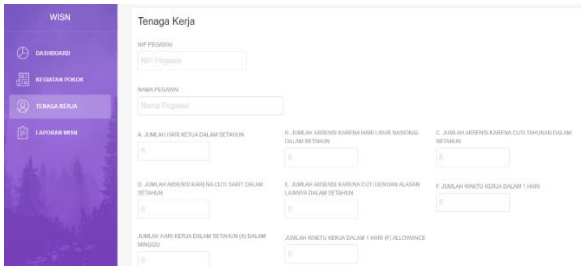

Figure 6
Display of the *Tenaga Kerja* Menu

Based on the WISN Method Kepmenkes N0 81/2004, the following are the steps for implementing the formula that is entered:

a. First Step: Establish Available Work Time
   A: 6 (Weekdays) x 50 (Weeks) = 300 Days
   B: 12 Days
   C: 6 days
   D: 19 days
   E: 10 days
   F: 7 Hours of Work / Day
   : (Allowance 25% x 7 = 1.75)
   : (7 - 1.75 = 5.25 Hours / Day)
   Then you get:
   Available Working Days
   = (A - (B + C + D + E)}
   = {300 - (300 + 19 + 6 + 10)}
   = 253 Working Days / Year
   Available Working Time
   = Available Working Days x F
   = 253 x 5.25
   = 1328.25 Working Hours / Year
   = 79695 (In Minutes)
b. Second step: Establish Work Units and HR (in table 2)

Table 2
Work And HR Unit

No	*HR Category*	*Name of Activity*	*Average Time/Minute*	*Workload Standard*
1		Analysis	2	51
2		RI coding	7.4	51
3		RJ coding	0.6	181
4		Assembling	3.5	51
5		RI production	2.45	232
6		TPPRJ Old Patient	1	87
7		TPPRJ New Patients	2.2	94

c. Third step: Standard Workload
   TPPRJ of New Patients: 79695 /2.2 = 36225
   TPPRJ of Old Patients: 79695/1 = 79695
   PRODUCTION RI: 79695 /2.45 = 32528.571428571
   ASSEMBLLING: 79695 /3.5 = 22770
   RJ CODING: 79695 /0.6 = 132825
   RI CODING: 79695 /7.4 = 10769.594594595
   ANALYSIS: 79695/2 = 39847.5
d. Step four: Establish Allowance Standards
   A. Available working time: 1328.25 Working Hours / Year
   B. Allowance factor: medical audit meeting, i hours / week (1 hour x 52 weeks = 52 hours / year)
   The standard allowance formula: 52 hours / 1328.25 = 0.039149256540561
e. Calculating Labor Needs
   TPPRJ of New Patients: 94 X 300 = 28200
   TPPRJ Old Patient: 87 X 300 = 26100
   PRODUCTION RI: 232 X 300 = 69600
   ASSEMBLLING: 51 X 300 = 15300
   RJ CODING: 181 X 300 = 54300
   RI CODING: 51 X 300 = 15300
   ANALYSIS: 51 X 300 = 15300

   TPPRJ of New Patients: 28200/36225 = 0.77846790890269
   TPPRJ of Old Patients: 26100/79695 = 0.32749858836815
   PRODUCTION RI: 69600 / 32528.571428571 = 2.1396574440053
   ASSEMBLLING: 15300/22770 = 0.67193675889328
   RJ CODING: 54300/132825 = 0.40880858272163
   RI CODING: 15300 / 10769.594594595 = 1.4206662902315
   ANALYSIS: 15300 / 39847.5 = 0.38396386222473

From the calculations above, it can be seen in Figure 7 which is implemented in the system

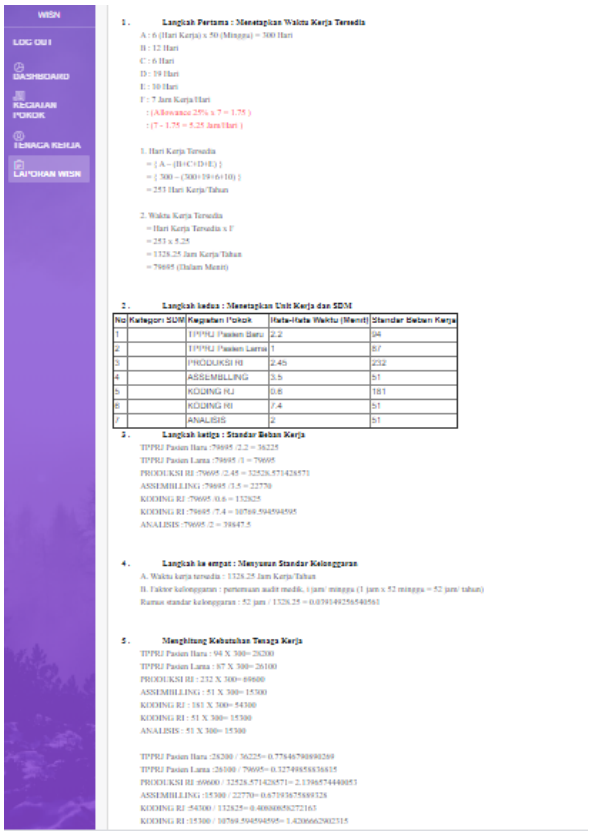

Figure 7
WISN Application Calculation Report

CONCLUSIONS AND SUGGESTION

The ratio is to assess the pressure or workload experienced by health workers in their daily work in health facilities, where Ratio = 1 (balance); Ratio <1 (high workload); Ratio> 1 (low workload). The results of this study indicate if the ratio of <1 HR in the unit is not sufficient and not following the workload, namely the number of human resources who are in Old Patient TPPRJ with a ratio value of 0.33; RJ coding ratio value 0.41; and Analysis with a ratio value of 0.38. Lack of officers at TPPRJ for Old Patients, RJ Coding, and Analysis resulted in poor service, so it is necessary to add medical personnel to that section when conditions are crowded.

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