

Analysis of the Increase in Referrals to Specialists at Yayasan Kesehatan XYZ Regional III

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ABSTRACT

The referral is defined by the World Health Organization (WHO) as the process of giving support or transferring the patient's management to a higher level (Hort *et al.*, 2019). Yayasan Kesehatan (Yakes) XYZ has clinics that provide primary health services and manage advanced health services for its participants. As a non-profit institution, Yakes XYZ focuses on cost efficiency while maintaining service quality. This study was conducted from 2020 to 2021 at Yakes XYZ Regional III. In 2021, the number of referrals to specialists increased by 39% compared to the previous year at the three clinics owned, which increased costs by 13% (y-o-y), thus providing a gap of Rp6,036,364,222 compared to the previous year. This increase was inversely proportional to the decrease in first-level outpatient visits by minus 2% in 2021. Referrals to specialists can occur after the patient has made a first-level outpatient visit to the clinic. According to the literature, it is known that four factors influence referrals to specialists, including the nature of the referral system policy, the nature of health problems, facilities and infrastructure, and then the general practitioner (GP)'s workload. This research used a quantitative approach and was conducted using the official secondary data from Yakes XYZ Regional III. Based on the analysis of the business situation at Yakes XYZ Regional III and the results from the hypothesis testing conducted, the author concluded root cause of the problem arose. The unclear referral policy, lack of offline service capacity, lack of GP competence, and unsupported facilities and infrastructure are the four root causes of increased referrals to specialists in 2021. Furthermore, the author makes several business solutions as recommendations to control the increase in referrals to specialists, aligning with efficiency in costs. The estimated cost that can be streamlined is Rp1,185,792,688.

Keywords: Advanced Outpatient Cost, Offline Service, Referral Policy, Referrals to Specialist, Service Capacity, Telemedicine, Workload.

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I. INTRODUCTION

The referral is defined by the World Health Organization (WHO) as the process of giving support or transferring the patient's management to a higher level (Hort *et al.*, 2019). Yayasan Kesehatan (Yakes) XYZ is an institution established by PT XYZ Tbk to manage health services for employees, retirees, and families of the XYZ Group. Yakes XYZ has clinics that provide primary health services and manages advanced health services for its participants. As a non-profit institution, Yakes XYZ focuses on cost efficiency while maintaining service quality.

Yakes XYZ consists of seven Regional Divisions. Regional III is the Regional Division with the most significant number of participants managed, reaching 83,560 people in 2022, with the portion of participants who are retirees and their families reaching 68% compared to employees.

In January 2022, Yakes XYZ Regional III evaluates what has happened throughout 2021. One of the main focuses is increasing the number of referrals to specialists by 39% in 2021 compared to the previous year at the three clinics

owned. This increase was inversely proportional to the decrease in first-level outpatient visits by minus 2% in 2021 (Fig. 1). Referrals to specialists can occur after the patient has made a first-level outpatient visit to the clinic.

The increase in the number of referrals to specialists impacted an increase in costs of 13% (y-o-y), thus providing a gap of Rp6,036,364,222 compared to the previous year.

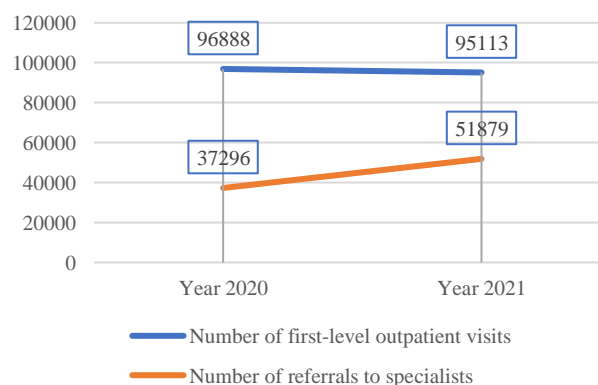


Fig. 1. Patient Visit Data in 2020 - 2021.

TABLE I: REALIZATION OF ADVANCED OUTPATIENT COSTS (AOC) IN 2021

| Referral Type | 2020 | | 2021 | |
|-----------------------------------|-----------------|-------------------------|-----------------|-------------------------|
| | Total Referrals | Total cost (in million) | Total Referrals | Total cost (in million) |
| Referral to specialist | 37,296 | Rp23,771 | 51,879 | Rp29,385 |
| Referral to dentist specialist | 1,493 | Rp1,004 | 1,415 | Rp980 |
| Referral to the laboratory | 10,197 | Rp4,558 | 15,446 | Rp7,731 |
| Referral to radiology and imaging | 4,623 | Rp2,184 | 5,032 | Rp2,532 |
| Referral for physiotherapy | 17,807 | Rp3,769 | 18,426 | Rp3,821 |
| Referral for hemodialysis | 3,572 | Rp6,097 | 2,651 | Rp4,710 |
| Referral for chemotherapy | 262 | Rp4,570 | 218 | Rp2,830 |
| Grand Total | 75,250 | Rp45,956 | 95,067 | Rp51,992 |

Costs for referral to specialists consist of consultation, medical procedures, drug, and administrative costs. This cost was the most significant rising cost component of Advanced Outpatient Costs (AOC) in 2021.

This condition is the main focus for Yakes XYZ Regional III to control the number of referrals to specialists, which impacts increasing AOC. The increase in AOC will adversely affect the performance of Yakes XYZ Regional III in controlling medical costs. Therefore, the author aims to analyze the root cause of the increase in referrals to specialists and provide recommendations to control rising costs.

A. Research Questions and Objectives

This research was conducted to assist Yakes Telkom Regional III in finding the cause of the increase in referrals and controlling the cost of further referrals. In order to achieve that questions that need to be answered are:

1. What led to increased referrals to specialists leading to an increase in AOC in 2021?
2. What recommendations can be given to control the increases in referrals to specialists?

Research questions that have been mentioned should be the main focus of this research. Therefore, the objectives of this research are:

1. Conduct root cause analysis of the increase in referrals to specialists in 2021.
2. Provide recommendations to prevent further increases in referrals to specialists.

B. Writing Structure

This research has five chapters to describe the overall research objectives and results. The first chapter describes the problem raised and the importance of performing this research. The second chapter is the literature review, the third chapter will describe the research methodology, and the fourth chapter will describe the analysis result and conclusion. The last chapter will describe the recommendations.

C. Research Limitation

This research focuses only on the three clinics owned by Yakes XYZ Regional III: Clinic A, Clinic B, and Clinic C. Other business units, such as Yakes Headquarters and other Regional, will not be investigated. This research only

analyzes the increase in referrals to specialists. All data were obtained from the official data of Yakes XYZ Regional III. The data period of this research is from January 2020 to December 2021.

II. LITERATURE REVIEWS

A conceptual framework comprises multiple interconnected concepts that explain or provide a broader understanding of a research problem (Imenda, 2014). Fig. 2 shows the conceptual framework used to assist the author in determining the root cause by using several factors that are relevant to the business problem raised.

According to the literature, it is known that four factors influence referrals to specialists, including the nature of the referral system policy, the nature of health problems, facilities and infrastructure, and then the general practitioner (GP)'s workload.

A. The Nature of Referral System Policy

The first factor that has been identified is the referral system policy that exist to regulate referrals (Hort *et al.*, 2019). The gatekeeping function of Primary Health Care (PHC) will not operate effectively if regulations are inadequate (Ang *et al.*, 2014).

B. The Nature of Health Problems

Health problems in primary health care can be divided into two parts: health problems, which are the competence of doctors, and those beyond the competence. Based on the "Standar Kompetensi Dokter Indonesia (SKDI)," 144 diseases are the competence of general practitioners that must be diagnosed and managed independently and thoroughly.

C. Facilities and Infrastructure

The limited facilities, infrastructure, equipment, and personnel at PHC cause health services cannot be provided according to patient needs, thereby increasing referrals (Ramadhani, 2020). Therefore, to provide good quality primary health care, clinics must fulfill every provision according to the Regulation of the Minister of Health of the Republic of Indonesia No. 9 of 2014.

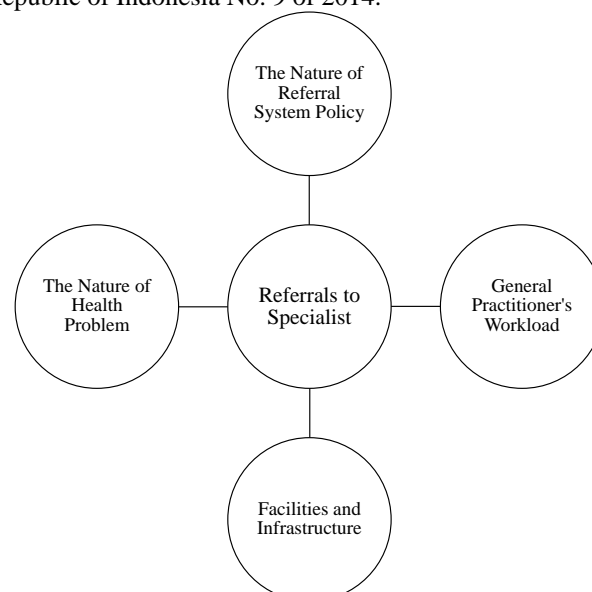


Fig. 2. Conceptual Framework of this Research.

D. General Practitioner's Workload

The last factor is a measurement of the objective workload level, as excessive work is one of the leading causes of occupational stress and distress. According to Kushnir *et al.* (2013), the more the objective overload, the greater the rate of referrals. The workload was defined as the number of patient visits per doctor per hour.

III. RESEARCH METHODOLOGY

This research will use a quantitative approach and was conducted using the official secondary data from Yakes XYZ Regional III. The obtained data will then be analyzed to accomplish the purpose of this research. In order to understand the flow of the research, it will be shown in the Fig. 3.

This research begins by initiating data collection to explore the business problem raised. The data consist of the Annual Claim Cost (CC) and *Beban Pengobatan Pegawai* (BPP) Performance Report, Patient Examination Recapitulation Report, and Patient Visit Report. The data collected will then be processed and analyzed according to the literature used to determine its impact on referrals. Furthermore, to identify the root of the problem, the author will use the Current Reality Tree (CRT) method and establish a business solution to solve the problem.

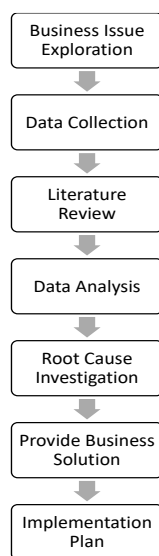


Fig. 3. Research Flow.

IV. RESULT AND DISCUSSION

As previously stated, referrals to specialists can occur after the patient has made a first-level outpatient visit to the clinic. Therefore, the problem raised in this study relates to general practitioners' business processes at the first-level outpatient services, which consist of offline and telemedicine services. Telemedicine services began to be implemented as part of the first-level outpatient services in November 2020. Telemedicine services, as stated in Minister of Health Regulations No. 20 of 2019, is the provision of remote health services by health professionals using information and communication technology for the benefit of improving individual and community health.

The consultation and treatment can be provided by the GPs remotely by utilizing telemedicine services. Patients can also receive these benefits by simply installing the WhatsApp application on their smartphone, registering to Yakes Call Center, and then starting the consultation with the GP. The medicine will be delivered to the patient's home by a courier from Yakes XYZ. In addition, telemedicine services also provide referrals letter to specialists for the patients by the GP if needed.

A. The Nature of Referral System Policy

Referrals letter to specialists can be made through offline services and telemedicine. Telemedicine services began in November 2020 at clinic B and C first. The data below shows the number of first-level outpatient visits through offline and telemedicine services.

Based on Table II, there was a decrease in the number of patient visits using offline services at the three clinics, which was 44% in 2021, due to the increased use of telemedicine services by 45% of patients. On the other hand, there was an increase in the rate of referrals to specialists from offline services in all three clinics by 32% compared to the previous year.

Yakes XYZ Regional III does not have a policy regarding the limit on the number of referrals per patient per day. Then, the referrals can be made to more than one specialist per patient per day by the GPs according to the medical indications. There are no changes to this policy either in 2020 or 2021.

TABLE II: DATA ON FIRST-LEVEL OUTPATIENT VISITS VIA OFFLINE AND TELEMEDICINE SERVICES

| Clinics | 2020 | | 2021 | |
|---------|-----------------|----------------------|-----------------|----------------------|
| | Offline service | Telemedicine service | Offline service | Telemedicine service |
| A | 12,846 | 0 | 8,228 | 5,435 |
| B | 51,836 | 3,523 | 28,752 | 28,576 |
| C | 27,299 | 1,384 | 14,947 | 9,175 |
| Total | 91,981 | 4,907 | 51,927 | 43,186 |

TABLE III: REFERRAL TO SPECIALISTS VIA OFFLINE AND TELEMEDICINE SERVICES

| Clinics | 2020 | | 2021 | |
|---------|-----------------|----------------------|-----------------|----------------------|
| | Offline service | Telemedicine service | Offline service | Telemedicine service |
| A | 12,846 | 0 | 8,228 | 5,435 |
| B | 51,836 | 3,523 | 28,752 | 28,576 |
| C | 27,299 | 1,384 | 14,947 | 9,175 |
| Total | 91,981 | 4,907 | 51,927 | 43,186 |

B. The Nature of Health Problems

Based on "Standar Kompetensi Dokter Indonesia (SKDI)," 144 diseases are the competence of GPs at PHC. There is an increase in patient visits with diseases beyond the competence of GPs in 2021 compared to the previous year as shown in Table IV.

Table IV shows that the ratio of patients who come to the first-level outpatient services with diseases beyond the GPs' competence is more than 50% in 2020 and 2021. Even though there was a decrease in the number of first-level outpatient visits in 2021, the referrals to specialists increased compared to the previous year.

TABLE IV: FIRST-LEVEL OUTPATIENT VISITS DATA BASED ON SKDI

| Clinics | 2020 | | 2021 | |
|---------|---|-------------------------------------|---|-------------------------------------|
| | Diseases according to the GPs' competence | Diseases beyond the GPs' competence | Diseases according to the GPs' competence | Diseases beyond the GPs' competence |
| A | 5,654 | 7,127 | 5,943 | 7,765 |
| B | 22,954 | 31,718 | 21,605 | 34,755 |
| C | 16,258 | 13,177 | 13,583 | 11,462 |
| Total | 44,866 | 52,022 | 41,131 | 53,982 |

TABLE V: REFERRAL TO SPECIALISTS BASED ON SKDI

| Clinics | 2020 | | 2021 | |
|---------|---|-------------------------------------|---|-------------------------------------|
| | Diseases according to the GPs' competence | Diseases beyond the GPs' competence | Diseases according to the GPs' competence | Diseases beyond the GPs' competence |
| A | 1,306 | 3,099 | 2,138 | 4,686 |
| B | 7,637 | 16,829 | 10,583 | 24,841 |
| C | 2,987 | 5,438 | 3,591 | 6,040 |
| Total | 11,930 | 25,366 | 16,312 | 35,567 |

The referrals to specialists in 2021 increased by 17% for diseases beyond the GPs' competence. It was followed by a 13% increase in disease according to the GPs' competence compared to the previous year.

C. Facilities and Infrastructure

Yakes XYZ Regional III has three clinics that provide primary health services. Until this research was conducted, those clinics already had ISO 9001 certification but are still in the process of fulfilling the accreditation requirements stipulated by the Minister of Health Regulation no. 14 of 2021. Some facilities have not been fulfilled, such as the absence of a Snellen chart, trial frames and lenses, an ophthalmoscope for eye examinations, a nasal speculum, and spirometry. This equipment is also needed to establish a diagnosis.

D. General Practitioner's Workload

The workload was defined as the number of patient visits per GP per hour. Yakes XYZ has determined that the consultation time between GP and patients is eight minutes for offline services. Consultation time is the time doctors need to take anamnesis, physical examination, and make prescriptions or even referral letters to patients. Therefore, the number of patients that GPs can serve in one hour is 7.5

(workload), and there are 60 patients per GP in eight working hours.

In November 2020, telemedicine services began to be provided to patients at Clinic B and C, thus changing the capacity of services that can be provided. This change is due to decreased number of GPs who provide offline services and switch to telemedicine services. Meanwhile, the implementation of telemedicine services at Clinic A was carried out in January 2021.

Clinic A only has one GP, so offline and telemedicine services are carried out continuously on the same day, with the duration of each service being four hours. Yakes XYZ has determined that the consultation time between GP and patients is twelve minutes for telemedicine services. Therefore, the number of patients GPs can serve in one hour is 5 (workload). The service capacity provided per working day from all three clinics will be explained in the table below.

TABLE VI: OFFLINE SERVICE CAPACITY

| Clinics | Offline Service | | | |
|---------|-----------------|----------|---------------|------------------|
| | Number of GPs | Workload | Service hours | Service capacity |
| A | 1 | 7.5 | 4 | 30 |
| B | 2 | 7.5 | 8 | 120 |
| C | 1 | 7.5 | 8 | 60 |

TABLE VII: TELEMEDICINE SERVICE CAPACITY

| Clinics | Offline Service | | | |
|---------|-----------------|----------|---------------|------------------|
| | Number of GPs | Workload | Service hours | Service capacity |
| A | 1 | 5 | 4 | 20 |
| B | 3 | 5 | 8 | 120 |
| C | 2 | 5 | 8 | 80 |

The total capacity for offline service is 210 patients per working day, and telemedicine service is 220 patients per working day. Furthermore, the capacity of offline and telemedicine services throughout 2020 and 2021 at Yakes XYZ Regional III can be seen in Table VII and Table VIII respectively.

Furthermore, finding out the workload realization on all services in each clinic is carried out using (1).

$$\frac{\text{Capacity utilized per year}}{(\text{Number of GPs} \times \text{service hours} \times \text{working days in a year})} \quad (1)$$

TABLE VII: THE TOTAL SERVICE CAPACITY PER CLINIC IN 2020

| Clinics | Average number of GPs | | Number of Working days | Service capacity | |
|---------|-----------------------|----------------------|------------------------|------------------|----------------------|
| | Offline Service | Telemedicine Service | | Offline Service | Telemedicine Service |
| A | 1 | 0 | 243 | 14,580 | 0 |
| B | 4.5 | 0.5 | 243 | 65,700 | 4,800 |
| C | 2.7 | 0.3 | 243 | 38,940 | 3,200 |
| Total | 8.2 | 0.8 | 243 | 119,220 | 8,000 |

TABLE VIII: THE TOTAL SERVICE CAPACITY PER CLINIC IN 2021

| Clinics | Average number of GPs | | Number of Working days | Service capacity | |
|---------|-----------------------|----------------------|------------------------|------------------|----------------------|
| | Offline Service | Telemedicine Service | | Offline Service | Telemedicine Service |
| A | 1 | 1 | 248 | 7,440 | 4,960 |
| B | 2 | 3 | 248 | 29,760 | 29,760 |
| C | 1 | 2 | 248 | 14,880 | 19,840 |
| Total | 4 | 6 | 248 | 52,080 | 54,560 |

Table IX shows the percentage of capacity utilized from each clinic, accompanied by the realization of the workload in each clinic. The percentage capacity utilized is calculated based on the number of patients visiting the first-level outpatient service, then divided by the previously calculated capacity.

TABLE IX: PERCENTAGE CAPACITY UTILIZED AND WORKLOAD REALIZATION PER CLINIC IN 2020

| Clinics | Percentage capacity utilized | | Workload realization | |
|---------|------------------------------|----------------------|----------------------|----------------------|
| | Offline service | Telemedicine service | Offline service | Telemedicine service |
| A | 88% | 0% | 7 | 0 |
| B | 79% | 73% | 6 | 4 |
| C | 70% | 43% | 5 | 2 |
| Total | 77% | 61% | 6 | 2 |

TABLE X: PERCENTAGE CAPACITY UTILIZED AND WORKLOAD REALIZATION PER CLINIC IN 2021

| Clinics | Percentage capacity utilized | | Workload realization | |
|---------|------------------------------|----------------------|----------------------|----------------------|
| | Offline service | Telemedicine service | Offline service | Telemedicine service |
| A | 111% | 110% | 8 | 5 |
| B | 97% | 96% | 7 | 5 |
| C | 100% | 46% | 8 | 2 |
| Total | 100% | 79% | 8 | 4 |

There was an increase in the percentage capacity utilized and workload realization in 2021 compared to the previous year causing full capacity utilized in the offline service. Based on the data obtained from the analysis of the business situation above, the author establishes three hypotheses:

1. The increasing number of patient visits with diseases beyond the GPs' competence in 2021 caused an increase in referrals to specialists with diseases beyond the GPs' competence.
2. The increasing number of patient visits with telemedicine services in 2021 caused an increase in referrals to specialists via telemedicine services.

3. The increasing workload of each service in 2021 has increased the referrals to specialists.

Simple linear regression analysis used to test the established hypothesis. Simple regression is used to evaluate the impact of the predictor/independent variable on the dependent/particular outcome (Zou *et al.*, 2003). This study uses SPSS software. Simple linear regression analysis was formulated with (2).

$$Y = a + bX + e \tag{1}$$

where:
 Y = Dependent variable
 X = Independent variable
 a = Constant
 b = Regression Coefficient

The analysis using SPSS shows that the increase in patient visits with diseases beyond the GPs' competence and the use of telemedicine in 2021 led to an increase in the number of referrals to specialists, but with an insignificant impact (p-value > 0.05). In addition, an analysis of the increase in the GPs' workload was also carried out. The increase in offline service workloads in 2021 led to a significant increase in referrals to specialists at the three clinics (p-value < 0.05).

Based on the analysis of the business situation at Yakes XYZ Regional III and the results from the hypothesis testing conducted the author concluded root cause of the problem arose using the Current Reality Tree (CRT) (Fig. 4). The CRT is used in this study to determine the root causes of business problems by examining the most significant elements (Kim *et al.*, 2008). The unclear referral policy, lack of offline service capacity, lack of GP competence, and unsupported facilities and infrastructure are the four root causes of increased referrals to specialists in the year 2021.

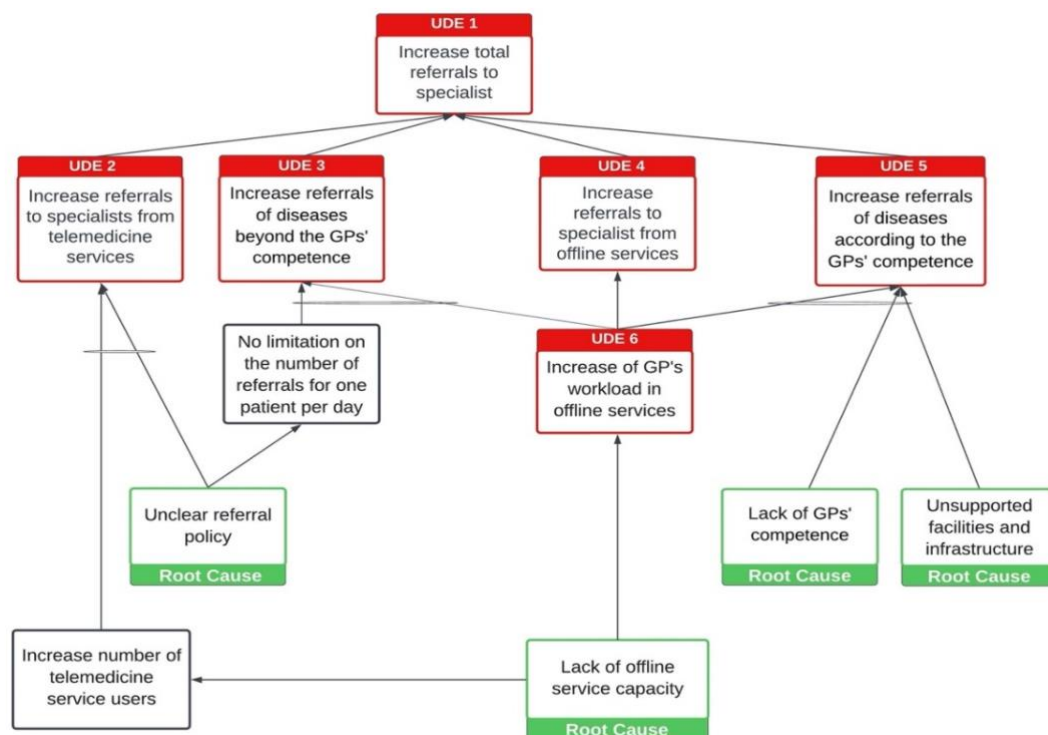


Fig. 4. Current Reality Tree (CRT) of Increase Referrals to Specialists.

V. RECOMMENDATION

A. Recommendation for Unclear Referral Policy

The absence of a policy that limits the number of referrals for a patient per day can lead to an increase in referrals. Without a policy limiting the number of referrals, the GPs can provide both referrals for the patient. In addition, the absence of a referral policy in telemedicine services also causes the role of GPs as gatekeepers to be ineffective. It is because referrals are made only based on consultation via an application without conducting a direct examination. Therefore, the recommendations that can be given regarding this problem are:

1. Make a policy of limiting the number of referrals to specialists per patient per day according to medical indications for the patient's main complaint. The role of GPs as gatekeepers will be essential with this policy.
2. Determining panel doctors for each category of specialization. One of the assessment components is based on the cost realization of medical expenses incurred by the doctor in managing patients. This panel doctor will be the referral recommendation by GPs in the first-level outpatient.
3. Make a policy related to telemedicine referrals, where telemedicine is only intended for consultation and routine drug administration to patients with chronic diseases. Then, the patients who need to be referred to specialists are advised to use offline services and can be examined first by a GPs at the clinic. If the patient has an emergency complaint, the patient can be directed to the emergency unit at the hospital.
4. Utilize the referral program provided by Badan Penyelenggara Jaminan Sosial (BPJS) Kesehatan as National Health Insurance for managing chronic diseases and the Refer back Program.

The referral program provided by BPJS Kesehatan will be implemented as a form of efficiency effort for Yakes XYZ Regional III by utilizing cost claims from BPJS Kesehatan in managing patients with chronic diseases. Through this program, medical expenses such as consultation fees to specialists, drug costs, and laboratory tests can be borne by BPJS Kesehatan. DM and Hypertension are listed as the top 6 diseases at Yakes XYZ Regional III in 2021, so the two diseases will be prioritized first. At least 2,960 Yakes XYZ Regional III patients with this disease, with 1,037 registered as active BPJS participants, so they can be directed to enter the program.

TABLE XI: AVERAGE COST OF TREATMENT FOR PATIENTS WITH DIABETES MELLITUS (DM) AND HYPERTENSION IN 2021

| Diagnosis | Number of Referrals to Specialists | Total Cost | Average Cost |
|--------------------------|------------------------------------|------------------|--------------|
| Type 2 Diabetes Mellitus | 6,096 | Rp 4,690,379,076 | Rp 769,419 |
| Essential Hypertension | 1,350 | Rp 684,163,915 | Rp 506,788 |
| Total | 7,446 | Rp 5,374,542,991 | Rp1,276,207 |

The value of cost efficiency can be calculated by knowing the realization of costs that have occurred in 2021 for DM and Hypertension at Yakes XYZ Regional III. Table XI shows the average costs incurred to manage the disease, which includes consultation fees to specialists, drug costs, and hospital administration costs.

Based on Table XI, it is known that the average cost of treatment to a specialist for the two diseases above is Rp1,276,207 per visit. If the initial target is 30 participants for each disease group included in this program, then the amount of value that can be streamlined in one year will be Rp459,434,520. This value is calculated by assuming one visit per month, which the patient usually does to get routine medication.

B. Recommendation for Unsupported Facilities and Infrastructure

In establishing a patient's diagnosis, the doctor will take an anamnesis, physical examination, and supporting examinations if necessary. Several diseases cannot be diagnosed due to insufficient supporting facilities and infrastructure at Yakes XYZ Regional III. For example, diseases such as refractive errors require visual acuity examination tools such as a Snellen chart. Another example is asthma disease, requiring spirometry examination tools to establish a patient's diagnosis.

The absence of the above examination tools causes the referral rate in Disorder of Refraction and Asthma cases to become the top 5 referrals for a category of diseases according to the GPs' competence in 2021 (see Appendix, Table XX). Therefore, procuring examination tools and training for medical personnel is expected to reduce the referral rate in both cases. If the two cases can be handled at the first level of outpatient services, the cost that can be streamlined is Rp639,399,654 per year. Meanwhile, the cost to procure the examination tools is not more than Rp5,000,000.



Fig. 5. Snellen Chart (Left) and Spirometry (Right) (Kim et al., 2018 and Faller II et al., 2005).

C. Recommendation for Lack of GPs' Competence

The referral rate for a category of diseases according to the GPs' competence is fairly high at 40% in 2021 at Yakes XYZ Regional III. In addition, the goal of doctors to handle almost all patients at PHC and refer them to specialists does not exceed 10% (Ekawati et al., 2017). One of the cases the author is concerned about is the high number of referrals in Tuberculosis (TB) cases, with a total of 371 referrals (see Appendix, Table XX). The government has launched

Presidential Decree 67/2021 on TB Control. TB elimination target is expected by 2030.

Doctors at PHC must be able to handle TB cases comprehensively, from establishing a diagnosis to completing treatment. It is necessary to carry out several examinations such as laboratory examinations, sputum, and chest X-rays to diagnose TB. However, almost all TB patients are diagnosed by a hospital specialist and followed up with monthly treatment for six to nine months. This shows that there is a lack of GPs' competence in first-level outpatient services in diagnosing TB disease, as well as in carrying out its treatment.

The TB control program is a national program run by Primary Health Care. Puskesmas as public PHC play an important role in running the program. Yakes XYZ Regional III can take advantage of this by asking for assistance from the Puskesmas in establishing the diagnosis and treatment of TB patients. Yakes XYZ Regional III's benefits include getting training to manage TB patients and efficiency in examination and treatment costs. The Ministry of Health will cover the cost of the examination for diagnosis and the drugs. Meanwhile, the benefit for the Puskesmas is the achievement of the target for detecting and treating TB cases in their coverage area.

The first step is collaborating with the Puskesmas around each clinic. After the collaboration, each clinic will be provided training by the Puskesmas. This training is conducted for GPs to diagnose TB disease independently. Laboratory or supporting examinations can be carried out at the Puskesmas. Furthermore, patients who have been diagnosed with TB will receive medicines that will be provided by the Puskesmas every month. The cost efficiency that can occur if this program runs is Rp86,958,514 per year, according to the realization that occurs in 2021.

D. Recommendation for Lack of Offline Service Capacity

The reduced capacity of offline services causes an increase in the GPs' workload. Yakes Headquarters has determined that the consultation time between GP and patients in offline services is 8 minutes, and the workload per GP will be 7.5. Based on the analysis conducted, it is known that the increase in the GPs' workload in offline services causes a significant increase in referrals to specialists. Therefore, the offline service capacity needs to be increased to keep the workload from exceeding the predetermined target. The recommendation given is to add GPs to offline services. Adding GPs can be done using on-call GPs or recruiting permanent GPs. In terms of determining which option is better, it is necessary to analyze with aggregate planning. An aggregate operations plan is a strategy for labor and

production over the intermediate term that aims to minimize the cost of the resources required to fulfill demand (Jacobs and Chase, 2018). There are two options for this aggregate planning:

1. Maintain the present method by keeping the number of full-time permanent GPs and using part-time employees (on-call GPs) during peak demands.
2. Recruit full-time permanent GPs to replace the use of part-time (on-call GPs).

Based on the analysis conducted, it is known that the actual requirement for FTE part-time employees to keep the workload per month from exceeding the predetermined target at the three clinics is only 0.1 (below 1). Yakes XYZ Regional III uses wage rates for permanent GPs and on-call GPs based on the provisions made by VP Finance and General Affairs of Yakes Headquarters (Table XII). Furthermore, Table XIII shows an alternative comparison analysis conducted to see the costs incurred in increasing the number of GPs at Clinic A, B, and C.

Based on Table XIII, it is known that the use of on-call GPs will be much more efficient than increasing the number of permanent GPs. The next thing to consider is how to ensure the availability of on-call GPs when needed. Therefore, the clinic head needs to be able to determine the on-call GPs' needs for offline services in the following days. It can be done by utilizing the online reservation feature available on the Yakes Mobile application.

Yakes Mobile App is an application provided by Yakes XYZ for patients to make online reservations to the first-level outpatient services. Until now, patients can only use online reservations to register for offline services on the same day. If patients can use online reservations to register for at least the next week, the clinic head can get a more accurate picture of the need for on-call GPs in offline services. However, the stipulation is that the same patient cannot register more than once in the next week, except for rescheduling.

VI. RECOMMENDATION FOR FUTURE RESEARCH

This research focuses on the problem of increasing the number of referrals to specialists, which impacts the increase in the cost of advanced outpatient care. Based on the data obtained, it is known that there is also a significant increase in referrals to laboratories in 2021 compared to the previous year. It can be a consideration for the continuation of this final project to create a study that is expected to help the management of Yakes XYZ Regional III in controlling costs in managing its participants in the future.

TABLE XII: WAGE RATES FOR PERMANENT GP AND ON-CALL GP

| Full-time employees (Permanent GPs) | | Part-time employees (On-call GPs) | |
|-------------------------------------|---------------|-----------------------------------|---------------|
| Average wage rate | Rp71.022/hour | Average wage rate | Rp88.125/hour |
| Salary allowance | Rp14.204/hour | Salary allowance | 0 |

TABLE XIII: COMPARISON OF ALTERNATIVES TO INCREASING THE NUMBER OF GPs AT CLINIC A, B AND CLINIC C

| Alternative options | Cost | Days | Hours (Employees x Days x 8 Hours) | Wages (in million) | Salary Allowance (in million) |
|---------------------|-------------------|------|---------------------------------------|-----------------------|----------------------------------|
| Alternative 1 | 0.1 FTE Part-time | 248 | 198 | Rp17 | Rp 0,0 |
| Alternative 2 | 1 Full-time | 248 | 1984 | Rp140 | Rp28 |

APPENDIX

TABLE XIV: SERVICE CAPACITY, PERCENTAGE CAPACITY UTILIZATION AND WORKLOAD REALIZATION AT CLINIC A IN 2020

| Months | Data at Clinic A in 2020 | | | | | | | | | | |
|-----------|-------------------------------|----------------------|-------------------|----------------------|--------------|------------------|----------------------|---------------------------------|----------------------|----------------------|----------------------|
| | First level outpatient visits | | Number of doctors | | Working Days | Service Capacity | | Percentage Capacity Utilization | | Workload realization | |
| | Offline service | Telemedicine service | Offline service | Telemedicine service | | Offline service | Telemedicine service | Offline service | Telemedicine service | Offline service | Telemedicine service |
| January | 1142 | 0 | 1 | 0 | 22 | 1320 | 0 | 87% | 0% | 6 | 0 |
| February | 989 | 0 | 1 | 0 | 20 | 1200 | 0 | 82% | 0% | 6 | 0 |
| March | 1166 | 0 | 1 | 0 | 21 | 1260 | 0 | 93% | 0% | 7 | 0 |
| April | 1569 | 0 | 1 | 0 | 21 | 1260 | 0 | 125% | 0% | 9 | 0 |
| May | 1331 | 0 | 1 | 0 | 17 | 1020 | 0 | 130% | 0% | 10 | 0 |
| June | 1345 | 0 | 1 | 0 | 21 | 1260 | 0 | 107% | 0% | 8 | 0 |
| July | 871 | 0 | 1 | 0 | 22 | 1320 | 0 | 66% | 0% | 5 | 0 |
| August | 882 | 0 | 1 | 0 | 18 | 1080 | 0 | 82% | 0% | 6 | 0 |
| September | 950 | 0 | 1 | 0 | 22 | 1320 | 0 | 72% | 0% | 5 | 0 |
| October | 776 | 0 | 1 | 0 | 19 | 1140 | 0 | 68% | 0% | 5 | 0 |
| November | 965 | 0 | 1 | 0 | 21 | 1260 | 0 | 77% | 0% | 6 | 0 |
| December | 860 | 0 | 1 | 0 | 19 | 1140 | 0 | 75% | 0% | 6 | 0 |
| Total | 12846 | 0 | 1 | 0 | 243 | 14580 | 0 | 88% | 0% | 7 | 0 |

TABLE XV: SERVICE CAPACITY, PERCENTAGE CAPACITY UTILIZATION AND WORKLOAD REALIZATION AT CLINIC A IN 2021

| Months | Data at Clinic A in 2021 | | | | | | | | | | |
|-----------|-------------------------------|----------------------|-------------------|----------------------|--------------|------------------|----------------------|---------------------------------|----------------------|----------------------|----------------------|
| | First level outpatient visits | | Number of doctors | | Working Days | Service Capacity | | Percentage Capacity Utilization | | Workload realization | |
| | Offline service | Telemedicine service | Offline service | Telemedicine service | | Offline service | Telemedicine service | Offline service | Telemedicine service | Offline service | Telemedicine service |
| January | 675 | 448 | 1 | 1 | 20 | 600 | 400 | 113% | 112% | 8 | 6 |
| February | 521 | 470 | 1 | 1 | 19 | 570 | 380 | 91% | 124% | 7 | 6 |
| March | 650 | 448 | 1 | 1 | 22 | 660 | 440 | 98% | 102% | 7 | 5 |
| April | 640 | 429 | 1 | 1 | 21 | 630 | 420 | 102% | 102% | 8 | 5 |
| May | 515 | 428 | 1 | 1 | 17 | 510 | 340 | 101% | 126% | 8 | 6 |
| June | 634 | 542 | 1 | 1 | 21 | 630 | 420 | 101% | 129% | 8 | 6 |
| July | 254 | 567 | 1 | 1 | 21 | 630 | 420 | 40% | 135% | 3 | 7 |
| August | 580 | 393 | 1 | 1 | 20 | 600 | 400 | 97% | 98% | 7 | 5 |
| September | 814 | 397 | 1 | 1 | 22 | 660 | 440 | 123% | 90% | 9 | 5 |
| October | 758 | 382 | 1 | 1 | 20 | 600 | 400 | 126% | 96% | 9 | 5 |
| November | 895 | 397 | 1 | 1 | 22 | 660 | 440 | 136% | 90% | 10 | 5 |
| December | 1292 | 534 | 1 | 1 | 23 | 690 | 460 | 187% | 116% | 14 | 6 |
| Total | 8228 | 5435 | 1 | 1 | 248 | 7440 | 4960 | 111% | 110% | 8 | 5 |

TABLE XVI: SERVICE CAPACITY, PERCENTAGE CAPACITY UTILIZATION AND WORKLOAD REALIZATION AT CLINIC B IN 2020

| Months | Data at Clinic B in 2020 | | | | | | | | | | |
|-----------|-------------------------------|----------------------|-------------------|----------------------|--------------|------------------|----------------------|---------------------------------|----------------------|----------------------|----------------------|
| | First level outpatient visits | | Number of doctors | | Working Days | Service Capacity | | Percentage Capacity Utilization | | Workload realization | |
| | Offline service | Telemedicine service | Offline service | Telemedicine service | | Offline service | Telemedicine service | Offline service | Telemedicine service | Offline service | Telemedicine service |
| January | 4838 | 0 | 5 | 0 | 22 | 6600 | 0 | 73% | 0% | 5 | 0 |
| February | 4268 | 0 | 5 | 0 | 20 | 6000 | 0 | 71% | 0% | 5 | 0 |
| March | 4742 | 0 | 5 | 0 | 21 | 6300 | 0 | 75% | 0% | 6 | 0 |
| April | 6705 | 0 | 5 | 0 | 21 | 6300 | 0 | 106% | 0% | 8 | 0 |
| May | 5944 | 0 | 5 | 0 | 17 | 5100 | 0 | 117% | 0% | 9 | 0 |
| June | 5230 | 0 | 5 | 0 | 21 | 6300 | 0 | 83% | 0% | 6 | 0 |
| July | 3800 | 0 | 5 | 0 | 22 | 6600 | 0 | 58% | 0% | 4 | 0 |
| August | 3714 | 0 | 5 | 0 | 18 | 5400 | 0 | 69% | 0% | 5 | 0 |
| September | 3992 | 0 | 5 | 0 | 22 | 6600 | 0 | 60% | 0% | 5 | 0 |
| October | 3607 | 0 | 5 | 0 | 19 | 5700 | 0 | 63% | 0% | 5 | 0 |
| November | 2556 | 1690 | 2 | 3 | 21 | 2520 | 2520 | 101% | 67% | 8 | 3 |
| December | 2440 | 1833 | 2 | 3 | 19 | 2280 | 2280 | 107% | 80% | 8 | 4 |
| Total | 51836 | 3523 | 4,5 | 0,5 | 243 | 65700 | 4800 | 79% | 73% | 6 | 4 |

TABLE XVII: SERVICE CAPACITY, PERCENTAGE CAPACITY UTILIZATION AND WORKLOAD REALIZATION AT CLINIC B IN 2021

| Data at Clinic B in 2021 | | | | | | | | | | | |
|--------------------------|-------------------------------|----------------------|-------------------|----------------------|--------------|------------------|----------------------|---------------------------------|----------------------|----------------------|----------------------|
| Months | First level outpatient visits | | Number of doctors | | Working Days | Service Capacity | | Percentage Capacity Utilization | | Workload realization | |
| | Offline service | Telemedicine service | Offline service | Telemedicine service | | Offline service | Telemedicine service | Offline service | Telemedicine service | Offline service | Telemedicine service |
| January | 1928 | 2820 | 2 | 3 | 20 | 2400 | 2400 | 80% | 118% | 6 | 6 |
| February | 1916 | 2404 | 2 | 3 | 19 | 2280 | 2280 | 84% | 105% | 6 | 5 |
| March | 2001 | 2620 | 2 | 3 | 22 | 2640 | 2640 | 76% | 99% | 6 | 5 |
| April | 2153 | 2260 | 2 | 3 | 21 | 2520 | 2520 | 85% | 90% | 6 | 4 |
| May | 1863 | 2341 | 2 | 3 | 17 | 2040 | 2040 | 91% | 115% | 7 | 6 |
| June | 1959 | 2827 | 2 | 3 | 21 | 2520 | 2520 | 78% | 112% | 6 | 6 |
| July | 2595 | 2354 | 2 | 3 | 21 | 2520 | 2520 | 103% | 93% | 8 | 5 |
| August | 2492 | 2358 | 2 | 3 | 20 | 2400 | 2400 | 104% | 98% | 8 | 5 |
| September | 2345 | 1892 | 2 | 3 | 22 | 2640 | 2640 | 89% | 72% | 7 | 4 |
| October | 2234 | 1899 | 2 | 3 | 20 | 2400 | 2400 | 93% | 79% | 7 | 4 |
| November | 2916 | 2015 | 2 | 3 | 22 | 2640 | 2640 | 110% | 76% | 8 | 4 |
| December | 4350 | 2786 | 2 | 3 | 23 | 2760 | 2760 | 158% | 101% | 12 | 5 |
| Total | 28752 | 28576 | 2 | 3 | 248 | 29760 | 29760 | 97% | 96% | 7 | 5 |

TABLE XVIII: SERVICE CAPACITY, PERCENTAGE CAPACITY UTILIZATION AND WORKLOAD REALIZATION AT CLINIC C IN 2020

| Data at Clinic C in 2020 | | | | | | | | | | | |
|--------------------------|-------------------------------|----------------------|-------------------|----------------------|--------------|------------------|----------------------|---------------------------------|----------------------|----------------------|----------------------|
| Months | First level outpatient visits | | Number of doctors | | Working Days | Service Capacity | | Percentage Capacity Utilization | | Workload realization | |
| | Offline service | Telemedicine service | Offline service | Telemedicine service | | Offline service | Telemedicine service | Offline service | Telemedicine service | Offline service | Telemedicine service |
| January | 2402 | 0 | 3 | 0 | 22 | 3960 | 0 | 61% | 0% | 5 | 0 |
| February | 2093 | 0 | 3 | 0 | 20 | 3600 | 0 | 58% | 0% | 4 | 0 |
| March | 2443 | 0 | 3 | 0 | 21 | 3780 | 0 | 65% | 0% | 5 | 0 |
| April | 3950 | 0 | 3 | 0 | 21 | 3780 | 0 | 104% | 0% | 8 | 0 |
| May | 3312 | 0 | 3 | 0 | 17 | 3060 | 0 | 108% | 0% | 8 | 0 |
| June | 3050 | 0 | 3 | 0 | 21 | 3780 | 0 | 81% | 0% | 6 | 0 |
| July | 2034 | 0 | 3 | 0 | 22 | 3960 | 0 | 51% | 0% | 4 | 0 |
| August | 1913 | 0 | 3 | 0 | 18 | 3240 | 0 | 59% | 0% | 4 | 0 |
| September | 1936 | 0 | 3 | 0 | 22 | 3960 | 0 | 49% | 0% | 4 | 0 |
| October | 1789 | 0 | 3 | 0 | 19 | 3420 | 0 | 52% | 0% | 4 | 0 |
| November | 1330 | 688 | 1 | 2 | 21 | 1260 | 1680 | 106% | 41% | 8 | 2 |
| December | 1047 | 696 | 1 | 2 | 19 | 1140 | 1520 | 92% | 46% | 7 | 2 |
| Total | 27299 | 1384 | 2,7 | 0,3 | 243 | 38940 | 3200 | 70% | 43% | 5 | 2 |

TABLE XIX: SERVICE CAPACITY, PERCENTAGE CAPACITY UTILIZATION AND WORKLOAD REALIZATION AT CLINIC C IN 2021

| Data at Clinic C in 2021 | | | | | | | | | | | |
|--------------------------|-------------------------------|----------------------|-------------------|----------------------|--------------|------------------|----------------------|---------------------------------|----------------------|----------------------|----------------------|
| Months | First level outpatient visits | | Number of doctors | | Working Days | Service Capacity | | Percentage Capacity Utilization | | Workload realization | |
| | Offline service | Telemedicine service | Offline service | Telemedicine service | | Offline service | Telemedicine service | Offline service | Telemedicine service | Offline service | Telemedicine service |
| January | 1296 | 843 | 1 | 2 | 20 | 1200 | 1600 | 108% | 53% | 8 | 3 |
| February | 1159 | 739 | 1 | 2 | 19 | 1140 | 1520 | 102% | 49% | 8 | 2 |
| March | 1355 | 727 | 1 | 2 | 22 | 1320 | 1760 | 103% | 41% | 8 | 2 |
| April | 1328 | 688 | 1 | 2 | 21 | 1260 | 1680 | 105% | 41% | 8 | 2 |
| May | 889 | 839 | 1 | 2 | 17 | 1020 | 1360 | 87% | 62% | 7 | 3 |
| June | 1139 | 862 | 1 | 2 | 21 | 1260 | 1680 | 90% | 51% | 7 | 3 |
| July | 464 | 1021 | 1 | 2 | 21 | 1260 | 1680 | 37% | 61% | 3 | 3 |
| August | 1128 | 668 | 1 | 2 | 20 | 1200 | 1600 | 94% | 42% | 7 | 2 |
| September | 1327 | 609 | 1 | 2 | 22 | 1320 | 1760 | 101% | 35% | 8 | 2 |
| October | 1304 | 575 | 1 | 2 | 20 | 1200 | 1600 | 109% | 36% | 8 | 2 |
| November | 1466 | 669 | 1 | 2 | 22 | 1320 | 1760 | 111% | 38% | 8 | 2 |
| December | 2092 | 935 | 1 | 2 | 23 | 1380 | 1840 | 152% | 51% | 11 | 3 |
| Total | 14947 | 9175 | 1 | 2 | 248 | 14880 | 19840 | 100% | 46% | 8 | 2 |

TABLE XX: THE HIGHEST REFERRAL RATES FOR A CATEGORY OF DISEASES ACCORDING TO THE GPs' COMPETENCE IN 2021

| No | Diagnosis | Referrals to Specialists | Total Cost* (In million) | Average Cost |
|----|---|--------------------------|--------------------------|--------------|
| 1 | Non-Insulin-Dependent Diabetes Mellitus | 6,096 | Rp4,690 | Rp769,419 |
| 2 | Disorder of Refraction & Accommodation | 1,836 | Rp311 | Rp169,644 |
| 3 | Essential (Primary) Hypertension | 1,350 | Rp684 | Rp506,788 |
| 4 | Other Dermatitis | 719 | Rp179 | Rp248,993 |
| 5 | Asthma | 714 | Rp327 | Rp459,289 |
| 6 | Gastritis & Duodenitis | 503 | Rp200 | Rp397,668 |
| 7 | Gastro-Esophageal Reflux Disease | 500 | Rp240 | Rp480,644 |
| 8 | Insulin-Dependent Diabetes Mellitus | 426 | Rp482 | Rp1,133,401 |
| 9 | Hemorrhoids | 364 | Rp60 | Rp166,559 |
| 10 | Disorders of Lacrimal System | 334 | Rp66 | Rp199,146 |
| 11 | Supervision of Normal Pregnancy | 285 | Rp67 | Rp237,043 |
| 12 | Other Disorders of External Ear | 214 | Rp69 | Rp324,604 |
| 13 | Tuberculosis of Other Organs | 211 | Rp54 | Rp256,643 |
| 14 | Impetigo | 191 | Rp94 | Rp495,092 |
| 15 | Conjunctivitis | 182 | Rp28 | Rp155,409 |
| 16 | Pneumonia | 179 | Rp51 | Rp290,236 |
| 17 | Respiratory Tuberculosis | 160 | Rp32 | Rp205,043 |
| 18 | Otitis Externa | 102 | Rp29 | Rp290,741 |
| 19 | Other Disorders of Conjunctiva | 90 | Rp33 | Rp367,914 |
| 20 | Facial Nerve Disorders | 89 | Rp20 | Rp231,926 |

*The above data shows the average costs incurred to manage the disease, which include consultation fees to specialists, drug costs, and hospital administration costs.

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CONFLICT OF INTEREST

Authors declare that author does not have any conflict of interest in doing analysis of the increase in referrals to specialists at Yayasan Kesehatan (Yakes) XYZ Regional III.

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