Expert System for Detecting Web-Based Respiratory Tract Infections At the Kalideres District Health Center

Rahmat Tullah[1], Fiqih Hana Saputri[2] & Ryan Prasetya[3]

[1,2,3] Institut Teknologi dan Bisnis Bina Sarana Global, Tangerang, Indonesia, 15113
E-mail: [1]kanjeng.ratoe@gmail.com , [2]fiqihhana@gmail.com, [3]ryanprase13@gmail.com

ABSTRACT

The use of technology in the field of health is used to improve better health services. One of the implementations in the field of health is an expert system for diagnosing diseases. In Kalideres District Health Center, Respiratory Infection Disease (ISPA) became the category of 10 most cases of disease. ISPA disease management requires high awareness from both the public and health officials, especially about some factors that affect the degree of health. To overcome this, Kalideres District Health Center needs a system that can provide information in detecting ISPA disease that can provide the results of disease consultation. This is a good choice to solve the problem. In this stage the expert system for detecting ISPA disease based websites is designed using PHP programming language and MySql database. This system has been run in the research place running well and effectively, as evidenced by testing Software Quality Assurance with a score of 84.8. it is expected that this expert system can handle the most cases of disease in Kalideres District Health Center.

1. Introduction

Utilization of technology in the health sector is used to improve better health services [1]. One of the implementations applied by an expert system in the health sector is an expert system to diagnose disease [2]. Expert system (expert system) is one of the fields of computer science that utilizes computers so that they can behave intelligently like humans [3]. Expert System is a knowledge-based program that provides expert quality solutions to problems in a specific domain [4]. Health problems are one of the problems that are often a problem for most people [5] because it is difficult to get information about health, how to take care of health, and how to choose the right action for family members who are sick. One of the implementations applied by an expert system in the health sector is an expert system to diagnose disease [6].

Respiratory tract infection (ARI) is one of the health problems faced by developing and developed countries [7]. This is due to the high morbidity and mortality rates due to ARI, especially pneumonia. ARI has become a common disease for the community [8]. ARI based on the area of infection is divided into upper respiratory tract infections and lower respiratory tract infections [9]. The cause of respiratory tract infections in general is due to the presence of various microorganisms, but most of them are due to viral and bacterial infections [10]. The initial symptoms are usually a cough and runny nose, followed by rapid breathing and shortness of breath. At a more severe level there is difficulty breathing, unable to drink, seizures, decreased consciousness and death if not treated immediately. In Indonesia, ARI ranks first as the cause of death in infants and toddlers. The results of the 2013 Indonesian health demographic survey showed that the percentage of under-five deaths caused by ARI was 26.7–38.5%[7]. Handling ARI requires high awareness from both the community and staff.

The application of computer-based technology in the health sector includes the application of the Expert System application [2]. The facilities provided in this District Health Center are also encouraged by services during patient consultations with doctors. In consultation, patients are asked to register and queue to meet with the doctor [11]. This is intended, in order to help the efficiency of time in the queue of patients so as not to wait long. Patient consultation is provided to give the patient the opportunity to help identify and treat a disease symptom.

2. Research Method

2.1 Data Collection Method

The methods used in this research are:

1. Observation

   The method used by the author to collect data and get things needed for the research process by visiting the object of research directly at the Kalideres District Health Center in the Infectious Diseases program unit to observe and analyze those related to the ARI disease process.

2. Interview

   A method to obtain data by conducting a question and answer process with one or several sources at the place or location where the object of research is carried out. In this case, the question and answer process is carried out directly to the doctor at the Kalideres District Health Center.

3. Literature study

   Conduct literature studies by collecting, reading, and understanding data in various media such as books, papers, research journals or articles related to the issues being discussed.

2.2 Design Method

This model design method uses the UML (Unified Modeling Language) model design which includes Use Case Diagrams, Activity Diagrams, Sequence Diagrams, and Class Diagrams. To create a system, you need tools or support to be able to build a new system. In making this system, it is proposed to use the PHP programming language, Mysql for database creation, Sublime Text 3 for designing or displaying, and Xampp as a server or programming language liaison.

2.3 Problems Faced

Based on the analysis that has been done, the problems encountered in the current system are as follows:

1. How to create an expert-based system that can diagnose Respiratory Tract Infections (ARI).

2. The diagnosis process in this expert system is carried out from the most dominant symptoms of Respiratory Tract Infections (ARI).

2.4 Alternative Troubleshooting

From the description of the problems that exist above the authors provide solutions to existing problems, namely:

1. Designing a computerized system so that the problems and constraints that have been hampering all activities, especially in terms of the number of visits by patients suffering from respiratory tract infections (ARI).

2. This expert system will produce information on the results of the Respiratory Tract Infectious Disease consultation in accordance with the symptoms selected by the user in the expert system

3. Result and Discussion

3.1 Proposed New Procedure

The system that will be proposed can change the system into an expert system where the previous system was there from the results of checking manually. In this system there are several menus for detecting Respiratory Tract Infections (ARI) with appropriate results by consulting the proposed system and providing conclusions according to the consultation. To analyze the proposed new procedure in this study using UML diagrams, namely use case diagrams, activity diagrams, sequence diagrams and class diagrams.
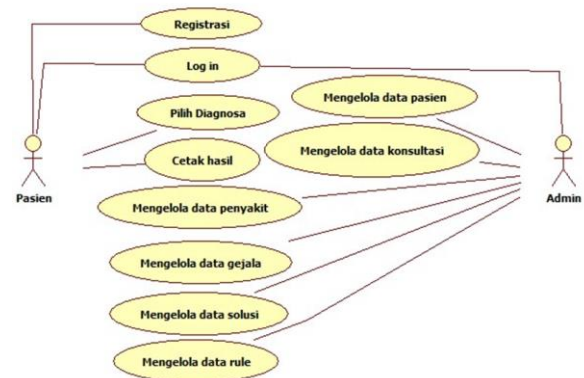
3.2 Use Case Diagram

Figure 1. Propose System Use case diagram

Based on Figure 1 Propose System Use case diagram above, it can be seen that in the image above there are:

1. 1 (actor) Patient conducts disease consultation activities.

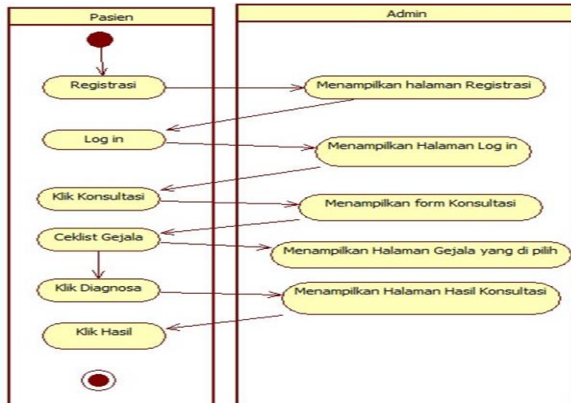2. 1 (actor) Admin manages patient data.

3.3 Activity Diagram

Figure 2. Activity Diagram

Based on the Figure 2 above, it shows the activities of patients who register data before conducting disease consultations. After that the patient enters the username and password in the login form, after that click the login button to submit. The next step the patient can do a consultation by selecting the symptoms experienced and selecting a diagnosis, then the results of the diagnosis the patient gets the results from the consultation of the disease and its therapy.
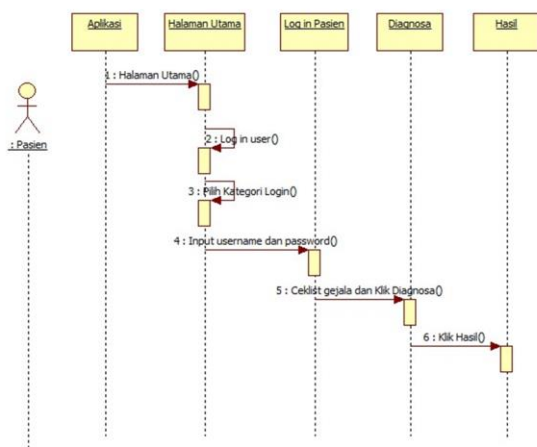
3.4 Sequence Diagram

Figure 3. Sequence Diagram

Sequence diagrams describe the interaction between objects in and around the system in the form of messages against time. Making sequence diagrams aims to make application design easier and more focused.
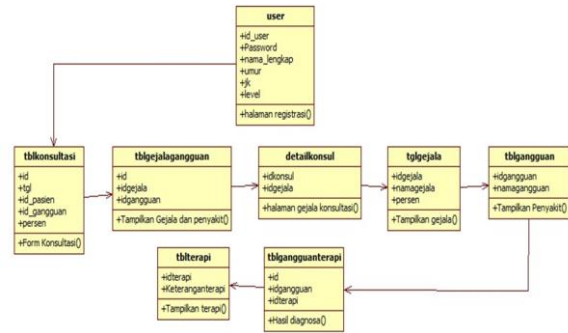
3.5 Class Diagram

Figure 4. Class Diagram

Class Diagram is a diagram that describes the structure of the system in terms of defining the classes that will be created to build the system.

3.6 System Prototype

1. Login Page Display

The picture below is the result of the implementation of the log in design, where on this page the user fills in the username and password, if the username and password are correct, they will enter the system and if they are wrong, they will remain on the log in page.

Figure 5. Login Display

2. Consultation Page Display

The image below is the result of the implementation of the consultation form design. In this form, after the patient logs in on the login page menu. Patients can choose symptoms according to the criteria for symptoms experienced. After the symptom is selected, the user can click the diagnostic menu.
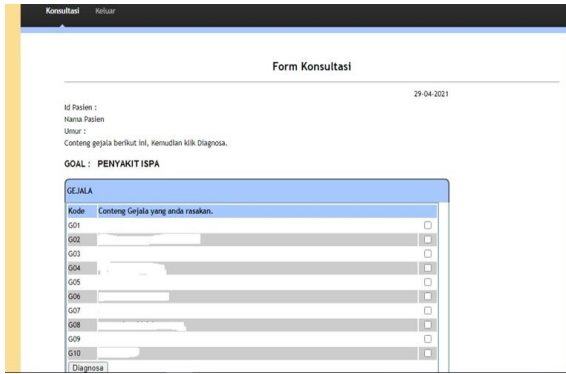
Figure 6. Consultation Page Design

3. Symptom Page Display

On this page, the symptoms selected by the user will appear in the symptom column. After that the user can click the results menu.
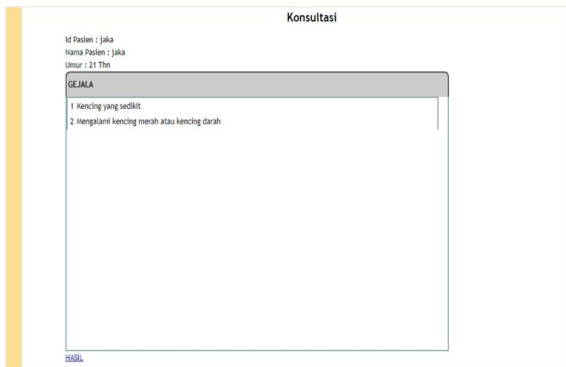

Figure 7. Symptom Page Display

4. Results Page View

On the consultation results page, there is information on symptoms suffered, disorders suffered, therapies, and information on natural alternatives.
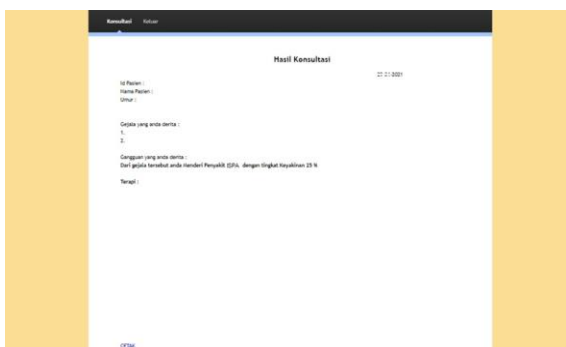

Figure 8. Results Page View

4. Conclusions and Suggestions

4.1 Conclusion

Based on the results of research and discussion, the authors draw the following conclusions:

1. The design of an expert system to detect web-based respiratory tract infections at the

Kalideres District Health Center is expected to assist in the early diagnosis of respiratory tract infections.

2. This expert system is designed and its outputs are in the form of diagnosis and therapy of Respiratory Tract Infections, using the Backward Chaining Method and as a pattern of measuring the level of confidence using Certainty Factor.

3. The expert system that has been implemented at the research site is running well and effectively, as evidenced by testing Software Quality Assurance with a score of 84.8.

4.2 Suggestion

The following are suggestions for this research, namely: The suggestions from researchers to further improve the job search information system are as follows:

1. Develop the existing system to be even better.

2. Provide innovation information that is useful for processing the resulting material.

3. Provide convenience to the User (users) during application use and provide additional facilities to the system so that it becomes a perfect system application.

4. Interface improvement according to the need for further system development and according to the rules of human and computer relations such as improvement of design and completeness of facilities

5. The addition of patient sample images to the diagnosis results can be done so that it becomes an example for end users to determine whether the resulting diagnosis is appropriate or not.

6. Added the facility to check the health BPJS membership card on the patient registration page.

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