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## PROTOTYPE DEVELOPMENT OF MENTAL DISEASE AND BEHAVIOR CODEFICATION APPLICATION FOR EFFECTIVENESS OF MEDICAL RECORDING STUDENT LEARNING

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Submitted: 23-09-2024, Reviewed: 10-10-2024, Accepted: 23-10-2024

DOI: <http://doi.org/10.22216/jen.v9i3.3137>

### ABSTRACT

*The policy regarding the implementation of RME in health services requires developments in the world of education, especially medical records and health information study programs. Developments are carried out in the learning process using technology such as the use of prototypes in the implementation of coding practicums. Manual coding using ICD-10 CM is considered less effective and efficient. Inaccuracies in diagnostic codes often occur, leading to pending claims. The aim of this research is to determine the evaluation of the effectiveness and efficiency of the prototype application for coding mental illness and behavior for the effectiveness of medical records student learning. The research was conducted using the Research and Development method with a population of 15 medical records students. The research results showed that there was development of a coding application prototype using Unified Modeling Language (UML) visual modeling, namely use case diagrams, class diagrams and activity diagrams. The research results showed a significant difference in the average coding time for 10 diagnoses, where using ICD-10 CM took 12 minutes 30 seconds with 80% accuracy and using the coding application prototype took 3 minutes 20 seconds with a code accuracy percentage of 100%. The results of the research concluded that by coding mental illness and behavior using the coding application prototype, it was very effective and efficient in improving student learning of medical records and supporting the implementation of RME in health services.*

**Keywords:** Prototype, Codification, Disease, Mental, Behavior

### INTRODUCTION

Along with the development of information technology in Indonesia, health services have also developed with the use of technology to support medical actions and patient services (Clusen, Lostelius, 2023). One of them is in the field of medical records, starting when the Ministry of Health built an

information system called SIKNAS (National Health Information System). In connection with the issuance of PERMENKES NO 92 Year 2014 as well as the development of science and technology, in 2022 new rules in the health information system in health services, namely in PERMENKES No 24 of

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2022 about Electronic Medical Records (RME) (Wibowo, 2023).

One of the efforts made to strengthen the application of RME is to make changes to the learning process, especially in the implementation of codification in medical record students. Medical record students are required to be proficient in implementing RME, one of the components in medical records is codification (Sun, 2023; Geoger, 2023).

The development of a prototype diagnosis coding application in medical records is a strategic step to improve the efficiency and accuracy of the diagnosis coding process (Satiyadev, 2023; Fauzia, 2023). With the new rules, the coding that was originally done manually will switch to electronic (Amiri, 2023). Previously, the learning of diagnosis coding in medical records was still done manually using the printed ICD-10 and ICD 9-CM (Thieme, 2023).

It is considered less effective and efficient in carrying out diagnosis coding. The importance of in-depth understanding of mental and behavioral illnesses in the context of medical records is growing in the current era of global health. Medical record students as future health professionals need to have comprehensive knowledge related to classification, signs, symptoms and disease management to provide holistic health services (Mardiawati, 2018). This calls for the development of a method of learning about disease classification that is utilized by students.

The significant difference with this prototype application of access database codification lies in the specific features and functionality of each. The development of this prototype application is specifically designed to perform specific tasks such as the implementation of coding in medical records or patient database storage. This application contains a simulation form for coding patient

medical records and can generate a diagnosis coding report. These activities can be stored as a patient database and accessed again when needed.

Satisfaction surveys also indicated that most students responded positively to the learning experience, with over 90% of respondents stating that the application added value to deepen their knowledge and skills in coding, especially in mental and behavioral illnesses (Wibowo, 2023). Based on the explanation above, research with the concept of *Research and Development* (RnD) was conducted and evaluated the effectiveness of learning implementation using the diagnosis codification application prototype.

There are 8 out of 10 stages of RnD carried out in creating a prototype application for the codification of mental and behavioral diseases. Then after this application is presented, an evaluation of the implementation of manual coding using ICD-10 CM and using the prototype coding application is carried out to see the effectiveness and efficiency of the implementation of diagnosis coding (Mardiawati, 2018). The formulation of the problem in this study is whether there is an increase in student skill in codifying clinical diagnoses using the diagnosis codification application prototype and how effective and efficient the use of the diagnosis codification application prototype is compared to manually using ICD-10 CM.

## RESEARCH METHODS

The type of research used is Research and Development (RnD). This study used 8 of the 10 stages of RnD in the development of a prototype application for the codification of mental and behavioral diseases. After the application trial is carried out, the next step is to evaluate the effectiveness and efficiency of using this application prototype by comparing the use of manual coding (ICD-10 CM) and application coding (Mardiawati, 2018).



The research was conducted at STIKES Dharma Landbouw Padang. The population was third-level medical record students of the Medical Records and Health Information study program at STIKES DharmaLandbouw Padang with a sample of 20 people selected by simple random sampling technique.

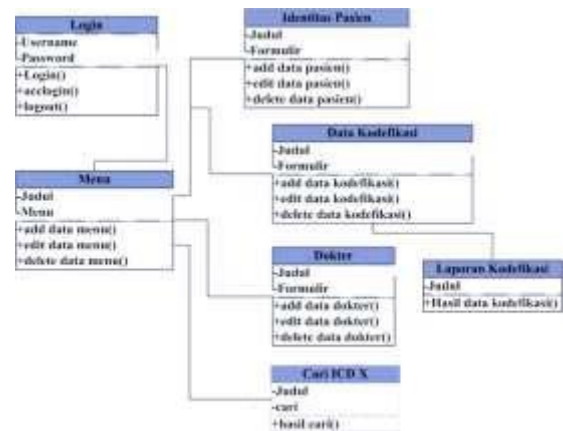
Data collection techniques were carried out by means of interviews and observations. Observations were made to find correlations with the results of interviews. Observations were made using observation tables to obtain an evaluation of the effectiveness and efficiency of the implementation of mental and behavioral disease coding both manually (ICD-10 CM) and by means of prototype coding applications. Data processing in this study was carried out through the stages of the *Research and Development* method in 10 steps, but in this study, it was only carried out until step 8. Dataanalysis used in this research is quantitative with descriptive analysis.

## RESULTS AND DISCUSSION

Design of an *Access Database-Based Coding Application* for Mental and Behavioral Diseases as a Learning Tool for Medical Record Students at STIKES Dharma Landbouw Padang.

### Class Diagram

The following is a *class diagram* of the *Access Database-Based Coding Application* for Mental and Behavioral Diseases as Learning for Medical Record Students of STIKES Dharma Landbouw Padang.



**Diagram 1. Class Diagram of Access Database-Based Coding Application**

### Main Menu Display

The main menu is a page used by *users/students* to select destination *forms*, such as patient identity, doctor data, search *form*, coding data and coding reports.



**Figure 2. Main Menu Display**

### Display of Doctor Form

The doctor *form* is a *form* used to *input* doctor data.



**Figure 3. Display of Doctor Data Menu**

### Display of Codefication Data Form

This form is a *form* for adding codefication data whose results will become a codefication report, patient data for this codefication data is taken from data that has been *inputted* through patient Identity data.



Figure 4. Codefication Data Display

### Display of Patient Identity Form

The identity *form* is a *form* for adding patient data where this form will later be connected to the codification data *form*.



Figure 5. Display of Patient Identity Data

### Effectiveness of using the *access database-based* codification application Mental and behavioral diseases as learning for students of STIKES Dharma Landbouw Padang

The results of research from 20 students of level III of the Medical Records and Health Information Study Program obtained significant differences in the average coding time of 10 diagnoses, where using ICD-10 CM takes 12 minutes 30 seconds with an average search time of 75 seconds and using

the prototype coding application takes 3 minutes 20 seconds. The design of *database access-based* applications is considered effective for use by students, with an average search time of 20 seconds.

The results of this study are in accordance with a study entitled "Coding Operative Actions according to ICD-9-CM in General Surgery Cases in Hospitals". The results of the study obtained an average manual coding of 112.2 minutes. While the specified standard is  $\leq 1.5$  minutes. Comparison of the time to code the diagnosis of general surgery cases manually is 112.19 seconds and using electronic applications is 12.14 seconds. The resulting time difference is 100.05 seconds or 1.6 minutes. The length of time for manual coding is also influenced by the type of surgical case (frequent or rare) in the hospital, or difficulty in determining the lead term or even difficulty in understanding the doctor's writing.

Electronic medical records are one form of evidence of advances in information technology in health services. Forms of positive impact include benefits that can be viewed from an economic aspect, a clinical aspect, and an aspect of access to clinical information. (Tiorentap, 2020). Computer-based medical records or better known as electronic medical records are one of the major challenges in the application of information and communication technology in various health service centers. Electronic medical records are the use of electronic methods for collecting, storing, processing, and accessing patient medical records that have been stored in a multimedia database management that records all data that is very personal in nature and contains information about identity, examination, treatment, actions, medical data, demographics and every service in patient management in hospitals and clinics.

The implementation of clinical codification learning, which usually uses





print-based ICD, has begun to switch to utilizing the digital version of ICD. Intensive introduction and use of digital ICD is needed so that students become more familiar and accustomed to utilizing digital ICD, while still paying attention to applicable coding rules (Pramono, 2022).

According to the researcher's analysis, the length of coding time is since manual coding requires several steps to get the right code. Starting with looking for a lead term by following the instructions for condition notes and other conditions related to the lead term being sought. So that it takes a little longer to determine the code, where later the coder must confirm the code found in vol. 3 back to ICD vol. 1. Sometimes there are differences in medical terms found in ICD X vol. 3 with Vol. 1, so there are difficulties when looking for lead terms, and diagnoses found according to lead terms and their derivatives are sometimes found in the diagnostic description section in ICD X Vol. 1, therefore students need to be careful when coding by reading the available diagnostic descriptions. Manual use of ICD X time for 2.24 minutes can slow down the coding process. If this is the case in a hospital with high visits, it can slow down the reporting process.

The application used by cutting the time from 2.24 minutes to 22.2 seconds can support the RME program in health services, so that the coding process carried out becomes faster to be forwarded into reporting. And the input data will be stored in a database that is private in accordance with the nature of medical records, which is confidential. With centralized storage, it will be easier for officers to find the data needed.

Based on the analysis of the researcher, the design of the *database access-based* codification application for mental and behavioral diseases as learning for students of STIKES Dharma Landbouw Padang in 2023, it can be said to be effective in terms of time, when used by third year medical record

students 6 times faster than the use of manual ICD X. This *access database-based* coding application can also search for ICD X diagnoses with Indonesian translation.

### **Efficient use of Access Database-Based Coding Application Mental and Behavioral Diseases as Learning for Students of STIKES Dharma Landbouw Padang.**

The results of initial observations using manual ICD X obtained a percentage of code accuracy of 80% and using applications with a percentage of accuracy of 100%. The design of *access database-based* applications is considered efficient for use by students, in terms of code accuracy.

Efficient implies the desired results at the lowest cost. According to Mahmudi in, it is a process carried out to measure and compare outputs and inputs. Or measuring the comparison between the outputs produced against the inputs used.

The accuracy and precision of coding is critical in data management, payment and more. The quality of coding data must be accountable, valid, complete, and timely. Accountably means that the results of coding with medical records by several coding officers produce the same results. Inaccuracy of diagnosis codes will affect the cost of health services. Related to this, if the coder is not precise and accurate in codifying the disease, it will have an impact on the quality of claim payments. Low health service rates will certainly disrupt the hospital's cash flow, on the other hand, high hospital rates seem to benefit the hospital, so that it can harm the BPJS or the patient.

The results of this study are in accordance with the study entitled "Coding Operative Actions according to ICD-9-CM in General Surgery Cases in Hospitals". The percentage level of accuracy of manual coding is in accordance with the stipulated provisions, which reaches 100%; likewise for the level of accuracy using electronic



applications is also 100%. Both manual and electronic coding accuracy rates showed the same level of accuracy and reached the expected standard. This is because general surgery cases have been performed frequently so that the coding has been memorized by the staff.

On "Designing Interactive Multimedia Learning Disease Coding Based on ICD-10" revealed that the results of the design of interactive multimedia disease coding can be used by medical record students as a learning tool with the addition of ICD-10 links and the need for multimedia design or multimedia applications for learning disease coding related to other chapters in ICD-10 and ICD 9 CM. Interactive multimedia has been tested on D3 Medical Record students of SV UGM with the response that multimedia disease coding based on ICD-10 is suitable in helping the practice course of disease coding.

The inaccuracy of the code is due to the lack of vocabulary of medical terminology and English owned by students, causing students to have difficulty finding *lead terms* in ICD X vol. 3, sometimes making mistakes in coding due to errors in translating diagnoses in English and medical terminology. In addition, the inaccuracy of the code is also caused by students incorrectly analyzing the patient's clinical condition so that students choose the wrong code. For example, when coding a patient with an ulcer due to a late meal or a patient with an ulcer due to nervousness (psychologically disturbed), these 2 diagnoses will have different codes. This can also occur due to lack of attention and rechecking the derivatives in the lead term.

Code accuracy is closely related to pending claims, because one aspect of submitting a claim is the synchronization of the diagnosis in the medical record file with the code given by the medical record officer, where the code must be in accordance with the diagnosis / history of the patient's illness that has been determined by the DPJP, and in

accordance with the actions given to the patient. 100% code accuracy in the use of electronic ICD can reduce or even eliminate pending claims. This can improve the quality of medical record services, especially coding.

## CONCLUSION

The development of a *prototype* application for the codification of mental and behavioral diseases is very effective and efficient for codification which can improve the learning of medical record students and support the application of RME in health services.

## ACKNOWLEDGMENTS

Thank you, all related parties, LLDIKTI Region X for facilitating to be able to receive grants from Kemenristekdikti Year 2024, STIKES Dharma Landbouw Padang and students as respondents in this study and all parties who have helped in the process of this research so that researchers are able to finish until the end. Hopefully the results of the study are useful for the readers.

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