

Accuracy Analysis of Sub Categories of Diagnosis Code Based on ICD-10 and Laboratory Test Results in Bacterial Infection Cases

¹Yastori, S.Si, M.Si

¹Department of Medical Record and Health Management, Apikes Iris Padang, Indonesia,

¹Apikes Iris Padang, West Sumatera, Indonesia.

Abstract : The accuracy of the coding is important for medical recorders to pay attention to because it relates to billing, quality of medical record files. A review of the accuracy of the sub-categories in cases of bacterial infection is necessary because there are often inaccuracies in coding the third and fourth sub-categories. The aim of this study was to review the accuracy of the sub-category of diagnosis codes based on ICD-10 and laboratory test results in cases of bacterial infection. The research was conducted in September at the hospital, Padang, West Sumatera in 2020. Descriptive research method with a quantitative approach. The coding data is taken in the patient's medical record file, then the diagnosis code is confirmed with laboratory results notes in the medical record attachment. The data used were all medical record files for the period of January 2019. Based on data analysis, the percentage of accurate diagnosis codes based on the ICD-10 was 76.05%, 23.94% inaccurate codes. The third sub-category was 84.50% accurate, 4.22% inaccurate. The fourth sub-category is 95.77% accurate, 15.49% inaccurate. The percentage of inconsistencies between diagnosis and laboratory test results was 4.22%. Diagnosis codes and laboratory test results are inconsistent because the medical record files are not completely available. The accuracy of writing sub-categories in the diagnosis code, the suitability of the diagnosis with laboratory test results in cases of infection are important as data sources and references in analyzing the accuracy of the diagnosis coding and are important factors for producing quality data.

IndexTerms - Coding, ICD-10, Infection, Bacteria.

I. INTRODUCTION

Infection cases each year kill 3.5 million people, mostly consisting of poor children and children living in low and middle income countries¹. Based on the results of Basic Health Research² the development of infectious diseases in Indonesia can be seen from several data on infectious diseases such as Respiratory Tract Infection (ISPA) which has a prevalence rate of 25%, pneumonia has an incidence of 1.8% and a prevalence of 4.5%, The prevalence rate was twice as high in 2013 compared to 2007, namely 1.2%, while for diarrhea, the incidence and prevalence at all ages in Indonesia are 3.5% and 7.0%.

Infectious disease is a disease that affects many people in developing countries, including Indonesia. One of the causes of infectious disease is bacteria. In Indonesia, infectious diseases are among the top ten causes of disease that occur in society. Infection is a process of invasion and culture of microorganisms that occur in human tissues, which can clinically cause local cellular injury due to metabolic competition, toxins, intracellular replication or antigen-antibody response³.

Conformity between the diagnosis and laboratory test results for cases of infection is important as a source of data and a source of reference in analyzing the accuracy of the diagnosis coding. This is because there are frequent inaccuracies in coding, especially in the third and fourth sub-categories of infection cases. Apart from the clarity of the writing of the diagnosis, the suitability and completeness of the medical record files are important factors in producing quality data.

The purpose of this study was to review the accuracy of the sub-category of diagnosis codes based on ICD-10 and laboratory test results in cases of bacterial infection.

II. RESEARCH METHODOLOGY

Descriptive research method with a quantitative approach. The coding data is taken in the patient's medical record file, then the diagnosis code is confirmed with laboratory results notes in the medical record attachment. The data used were all medical record files for the period of January 2019. The number of samples in this study were 71 medical record files.

III. RESULTS AND DISCUSSION

3.1 Analysis of the accuracy of the diagnostic code in cases of bacterial infection based on ICD-10

In this study, the coding accuracy was observed based on the ICD-10. The International Classification of Diseases (ICD) has become the standard diagnostic classification for epidemiological and health management purposes, and has been subjected to continuous update and revision. The current version, ICD-10, was introduced in 19934.

Table 3.1: Analysis of the accuracy of the diagnostic code in cases of bacterial infection based on ICD-10

No	Diagnosis	Code from hospital medical records department	Code based on ICD-10	Accuracy Review	Analysis
1	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
2	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
3	HIV disease resulting in other infectious and parasitic disease	B20.4	B20.8	Not accurate	The code is not accurate in the 4th sub category, for B20.4 is the code for the diagnosis of HIV disease resulting in candidiasis, while B20.8 is HIV disease resulting in other infectious and parasitic disease
4	Toxoplasmosis, unspecified	B58.2	B58.9†G02*	Not accurate	The code is not accurate in the 4th sub category, for B58.2 is Toxoplasma Meningoencephalitis and must be followed by an additional code G0.2 * while B58.9 is Toxoplasmosis, unspecified
5	Tuberculosis of bones and joints	A18.0	A18.0†M49.0*	Not accurate	The code is not accurate because it must be accompanied by an additional vertebral column code M49.0 *
6	HIV disease resulting in multiple infections	B20.7	B20.7	Accurate	According to ICD-10
7	HIV disease resulting in mycobacterial infection	B20.1	B20.0	Not accurate	The code is not accurate in sub category 4, B20.1 is HIV disease resulting in other bacterial infection
8	Toxoplasmosis, unspecified	B58.9	B58.9	Accurate	According to ICD-10
9	HIV disease resulting in mycobacterial infection	B20.7	B20.0	Not accurate	The code is inaccurate in sub category 4 because B20.7 is HIV disease resulting in multiple infection, while the diagnosis explained that the patient was Lung tuberculosis, so a suitable diagnosis was B20.0
10	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
11	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
12	Tb lung without mention of bact or histological confirm	A16.2	A16.2	Accurate	According to ICD-10
13	Tuberculosis of bones and joints	A18.0	A18.0†M01.1*	Not accurate	The code is inaccurate because an additional code is needed because the diagnosis says that the patient has arthritis, so the code becomes A18.0†M01.1 *
14	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
15	Tb lung confirm sputum microscopy with or	A15.0	A15.0	Accurate	According to ICD-10

	without culture				
16	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
17	Tb lung confirm sputum microscopy with or without culture	A15.0	A15.0	Accurate	According to ICD-10
18	Tb pleurisy without mention of bact or histological confirmation	A16.5	A16.5	Accurate	According to ICD-10
19	HIV disease resulting in multiple infections	B20.7	B20.7	Accurate	According to ICD-10
20	Amoebic liver abscess	A06.4	A06.4	Accurate	According to ICD-10
21	HIV disease resulting in multiple infections	B20.7	B20.7	Accurate	According to ICD-10
22	HIV disease resulting in mycobacterial infection	B20.4	B20.0	Not accurate	Inaccurate code in subcategory 4 for B20.4 represents HIV disease resulting in candidiasis, meanwhile the diagnosis described HIV disease resulting in mycobacterial infection so the correct code is B20.0
23	Gastroenteritis and colitis of unspecified origin	A09	A09.9	Not accurate	Code is inaccurate, because a 4th category needs to be added. For A09 is Other gastroenteritis and colitis of infectious and unspecified origin
24	HIV disease resulting in other infectious and parasitic disease	B21.2	B20.8	Not accurate	Inaccurate code in subcategory 3 and 4. For code B21.2 is HIV disease resulting in other types non-Hodgkin lymphoma
25	Unspecified human immunodeficiency virus [hiv] disease	B24	B24	Accurate	According to ICD-10
26	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
27	Tb lung without mention of bact or histological confirm	A16.2	A16.2	Accurate	According to ICD-10
28	Congenital syphilis, unspecified	A50.9	A50.9	Accurate	According to ICD-10
29	Other gastroenteritis and colitis	A09	A09	Accurate	According to ICD-10

	of infectious and unspecified origin				
30	Scabies	B86	B86	Accurate	According to ICD-10
31	Tb lung confirmed by sputum microscopy with or without culture	A15.0	A15.0	Accurate	According to ICD-10
32	Tb pleurisy without mention of bacteriological or histological confirm	A16.5	A16.5	Accurate	According to ICD-10
33	HIV disease resulting in multiple infections	B20.7	B20.7	Accurate	According to ICD-10
34	Tuberculous pleurisy, confirmed bacteriologically and histologically	A15.6	A15.6	Accurate	According to ICD-10
35	Gastroenteritis and colitis of unspecified origin	A09.9	A09.9	Accurate	According to ICD-10
36	Tuberculosis of bones and joints	A18.0	A18.0†M49.0*	Not accurate	The code is inaccurate because it is necessary to write an additional code M49.0* because it is on the vertebral column, so the code becomes A18.0†M49.0*
37	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
38	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
39	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
40	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
41	HIV disease resulting in multiple infections	B20.4	B20.7	Not accurate	Code not accurate in subcategory 4, for B20.4 represents HIV disease resulting in candidiasis
42	Tuberculous meningitis	A17.0	A17.0†G01*	Not accurate	The code is inaccurate, because the additional code G01 must be written * if the diagnosis explains tuberculous meningitis, the code becomes A17.0†G01*
43	Tuberculous meningitis	A17.0	A17.0†G01*	Not accurate	The code is inaccurate, because the additional code G01 must be written * if the diagnosis explains tuberculous meningitis, the code becomes A17.0†G01*
44	Herpesviral encephalitis	B00.4	B00.4†G05.1*	Not accurate	the code is inaccurate because it is necessary to add an additional code G05.1 * because the diagnosis describes herpetic encephalitis, so the

					code becomes B00.4†G05.1 *
45	Aspergillosis, unspecified	B44.9	B44.9	Accurate	According to ICD-10
46	Plasmodium vivax malaria without complication	B51.9	B51.9	Accurate	According to ICD-10
47	Tb lung without mention of bacteriological or histological confirmation	A16.2	A16.2	Accurate	According to ICD-10
48	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
49	Tb of lung without mention of bacteriological or histological confirmation	B20.1	A16.2	Not accurate	The code is inaccurate in sub category 1, 2,3,4. Code B20.1 is HIV disease resulting in other bacterial infections. The accurate code is A16.2
50	Plasmodium vivax malaria without complication	B51.9	B51.9	Accurate	According to ICD-10
51	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
52	HIV disease resulting in multiple infections	B20.7	B20.7	Accurate	According to ICD-10
53	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
54	Chronic viral hepatitis c	B18.2	B18.2	Accurate	According to ICD-10
55	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
56	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
57	HIV disease resulting in mycobacterial infection	B20.7	B20.0	Not accurate	The code is inaccurate in sub-category 4, because B20.7 is HIV disease resulting in multiple infections
58	Herpesviral encephalitis	B02.0	B00.4†G05.1*	Not accurate	the code is inaccurate because it is necessary to write an additional code G05.1 *. Code not accurate in sub-categories 3 and 4. Code B02.0 is zoster encephalitis, while the diagnosis is herpesviral encephalitis. The correct code is B00.4 + G05.1 *

59	Tb lung without mention of bacteriological or histological confirmation	A16.2	A16.2	Accurate	According to ICD-10
60	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
61	Plasmodium vivax malaria without complication	B51.9	B51.9	Accurate	According to ICD-10
62	Plasmodium falciparum malaria, unspecified	B50.9	B50.9	Accurate	According to ICD-10
63	Plasmodium vivax malaria without complication	B51.9	B51.9	Accurate	According to ICD-10
64	Tb lung without mention of bacteriological or histological confirmation	A16.2	A16.2	Accurate	According to ICD-10
65	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
66	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
67	Tuberculous meningitis	A17.0	A17.0+G01*	Not accurate	The code is inaccurate because an additional code is required, namely G01 *. The correct code is A17.0 + G01 *
68	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
69	Septicaemia, unspecified	A41.9	A41.9	Accurate	According to ICD-10
70	Tb lung without mention of bacteriological or histological confirmation	A16.2	A16.2	Accurate	According to ICD-10
71	HIV disease resulting in candidiasis	B20.4	B20.4	Accurate	According to ICD-10

Based on Table 1, it is known that there are 14 diagnoses that have inaccurate coding in the third and fourth sub categories.

Table 3.2: Analysis of the accuracy of the diagnostic code in cases of bacterial infection based on ICD-10 Review of Code Accuracy Based on ICD-10 in the 3rd sub category

Accuracy	Amount	Percentage
Accurate	68	95.77%
Not Accurate	3	4.22%

Based on Table 2, it is known that the coding accuracy percentage level in the third sub category is 95.77%. While the inaccuracy is 4.22%.

Table 3.3: Review of Code Accuracy Based on ICD-10 in the 4rd sub category

Accuracy	Amount	Percentage
Accurate	60	84.50%
Not Accurate	11	15.49%

Based on Table 3, it is known that the percentage level of coding accuracy in the third sub category is 84.50% while the inaccuracy is 15.49%.

Table 3.4: Analysis of Laboratory Test Results on Diagnosis of Bacterial Infection Cases

No	Diagnosis	Laboratory Test Results
1	Septicaemia, unspecified	Hematology; Cardiomegaly with pulmonary edema suggestive of infected bronchiectasis
2	Septicaemia, unspecified	Radiology: bronchopneumonia; microbiology; 97% probability: staphylococcus capitis and hematology
3	HIV disease resulting in other infectious and parasitic disease	Laboratory and hematology
4	Toxoplasmosis, unspecified	Hematology, clinical chemistry, immunology-serology and anti-HIV
5	Tuberculosis of bones and joints	Hematology
6	HIV disease resulting in multiple infections	Immunology-serology and clinical chemistry
7	HIV disease resulting in mycobacterial infection	Clinical chemistry, hematology and immunology-serology of HbSAg (Elisa)
8	Toxoplasmosis, unspecified	Hematology and immunology-serology for HBOsAg (Rapid test)
9	HIV disease resulting in mycobacterial infection	Acid Resistant Basil (BTA) in sputum, clinical chemistry and hematology
10	Septicaemia, unspecified	Clinical chemistry and hematology for sepsis
11	Septicaemia, unspecified	Hematology and urine
12	Tb lung without mention of bact or histological confirm	Radiology for Ro thorax PA, immunology-serology for MDR T3 TB and hematology
13	Tuberculosis of bones and joints	Clinical chemistry
14	Septicaemia, unspecified	Central laboratory test for special examination of TB TCM, and hematology
15	Tb lung confirm sputum microscopy with or without culture	TB laboratory tests for examination of sputum, clinical chemistry, acid-resistant bacilli (BTA) on sputum, and hematology
16	Septicaemia, unspecified	Hematology, immunology-clinical chemical serology for AGD, for CBC test
17	Tb lung confirm sputum microscopy with or without culture	BTA I, II TB bacteriology in sputum, clinical chemistry, DED, Immunology - Non-reactive Anti HIV Serology, and Hematology
18	Tb pleurisy without mention of bact or histological confirmation	Bacteriologist, clinical chemistry, anatomical pathology laboratory, total bilirubin, direct bilirubin, indirect bilirubin, microbiology and thorax ultrasound
19	HIV disease resulting in multiple infections	Hematology and Clinical Chemistry
20	Amoebic liver abscess	Clinical chemistry, Hematology, Radiology, and Immunology-Serology
21	HIV disease resulting in multiple infections	Hematology, clinical chemistry, microbiology and radiology
22	HIV disease resulting in mycobacterial infection	Immunology-Serology, clinical chemistry and hematological examination

23	Gastroenteritis and colitis of unspecified origin	Hematological
24	HIV disease resulting in other infectious and parasitic disease	Immunology-Serology and hematological
25	Unspecified human immunodeficiency virus [hiv] disease	Clinical chemistry
26	Septicaemia, unspecified	Laboratory for blood and hematology
27	Tb lung without mention of bact or histological confirm	Microbiology, clinical chemistry, hematology and immunology-serology
28	Congenital syphilis, unspecified	Immunology-serology
29	Other gastroenteritis and colitis of infectious and unspecified origin	Stool and hematology examination, and clinical chemistry examination
30	Scabies	Hematology, FT4 Immunology and clinical chemistry
31	Tb lung confirmed by sputum microscopy with or without culture	Clinical chemistry and immunology-serology
32	Tb pleurisy without mention of bacteriological or histological confirm	Clinical chemistry and hematology
33	HIV disease resulting in multiple infections	Laboratory, hematology, and immunology-senology,
34	Tuberculous pleurisy, confirmed bacteriologically and histologically	Gen eXpert diagnostic test, CSF body fluid examination, clinical chemistry and hematology
35	Gastroenteritis and colitis of unspecified origin	Clinical chemistry and hematology
36	Tuberculosis of bones and joints	Radiology, hematology, and clinical chemistry
37	Septicaemia, unspecified	There is no
38	Septicaemia, unspecified	Hematology and Clinical Chemistry
39	Septicaemia, unspecified	Hematology, clinical chemistry and macroscopic and microscopic
40	Septicaemia, unspecified	Clinical chemistry, Radiology and Hematology
41	HIV disease resulting in multiple infections	Laboratory tests, clinical chemistry, immunology-senology, anti-HIV and hematology
42	Tuberculous meningitis	TB laboratory tests for blood tests, clinical chemistry, and hematology tests
43	Tuberculous meningitis	Hematology, urine, CSF body fluids and microbiology chart report 98 l staphylococcus aureus
44	Herpesviral encephalitis	Radiology, clinical chemistry and hematology
45	Aspergillosis, unspecified	Anatomical pathology laboratory test, PA projection chest radiograph examination, clinical chemistry and hematology
46	Plasmodium vivax malaria without complication	Hematology and clinical chemistry
47	Tb lung without mention of bacteriological or histological confirmation	Hematology, clinical chemistry and immunology-serology
48	Septicaemia, unspecified	Microbiology, clinical chemistry, urine, radiology and hematology
49	Tb of lung without mention of bacteriological or histological confirmation	Clinical chemistry, hematology and immunology-serology
50	Plasmodium vivax malaria without complication	Hematology
51	Septicaemia, unspecified	Hematology
52	HIV disease resulting in multiple infections	Hematology, clinical chemistry and immunology-serology of fernithin increased
53	Septicaemia, unspecified	Clinical chemistry, urine, hematology and immunology-serology
54	Chronic viral hepatitis c	bone marrow (BMP), hematology, immunology and serology, and radiology
55	Septicaemia, unspecified	hematology, urine and immunology-serology
56	Septicaemia, unspecified	hematology and clinical chemistry examination

57	HIV disease resulting in mycobacterial infection	Immunology-serology negative HBsAg, anti-HCV negative and clinical chemistry
58	Herpesviral encephalitis	Clinical chemistry, hematology and CSF body fluids
59	Tb lung without mention of bacteriological or histological confirmation	Clinical chemistry, hematology and diagnostic tests of GeneXpert
60	Septicaemia, unspecified	Clinical chemistry, hematology, procalcitonin immunology-serology
61	Plasmodium vivax malaria without complication	Hematology, immunology-serology, anti-dengue IgG & IgM and clinical chemistry
62	Plasmodium falciparum malaria, unspecified	Hematology and clinical chemistry
63	Plasmodium vivax malaria without complication	Urine and hematology
64	Tb lung without mention of bacteriological or histological confirmation	Hematology, clinical chemistry and urine
65	Septicaemia, unspecified	Procalcitonin immunology-serology high likelihood of severe sepsis of septic shock, clinical chemistry and hematology
66	Septicaemia, unspecified	Hematology, clinical chemistry and immunology-serology and radiology
67	Tuberculous meningitis	Hematology and clinical chemistry
68	Septicaemia, unspecified	Hematology, clinical chemistry and radiology
69	Septicaemia, unspecified	Clinical chemistry, hematology and immunology-serology
70	Tb lung without mention of bacteriological or histological confirmation	Genexpert diagnostic tests, clinical chemistry, hematology, and radiology
71	HIV disease resulting in candidiasis	Immunology-serology, hematology and clinical chemistry

Based on table 4 above, it can be seen that in cases of bacterial infection there are several laboratory test results such as Immunology-serology, hematology and clinical chemistry, Clinical chemistry, Microbiology, Radiology for Ro thorax. After observing the coding of the diagnosis in cases of bacterial infection, it was followed by observing the results of laboratory tests. Here it is observed whether the laboratory test results are in accordance with the existing diagnosis, then followed by coding analysis based on sub-categories.

3.2 Discussion

In the coding process, there are several possibilities that can affect the coding results of the coder, namely that the determination of the patient's diagnosis is the right, obligation and responsibility of the doctor who provides care to the patient, and the coder in the medical record unit may not change (increase or decrease) the existing diagnosis. . Medical recorders are responsible for the accuracy of the code of a diagnosis that has been determined by the doctor. If anything is unclear, the medical recorder has the right and the obligation to inquire or communicate with the doctor concerned⁵.

From the results of the research above, it can be seen that there are inaccuracies in the code in sub-categories 3 and 4. The use of characters 3 and 4 is important to determine the accuracy of the code of a diagnosis. In the case of bacterial infection of characters 3 and 4 it is important to know whether there is an additional code in the encoding. To produce the right code, it is necessary to hold a coding audit and the formation of an anti-fraud team, especially in Indonesia, where the government currently has a health insurance program for the public. According to Naga 2013 in Ernawati, 2017⁶ a coding audit is needed so that the code produced can be precise, accurate, relevant, with high precision.

Based on the results of research conducted by Pinyo Rattanaumpawan 2016⁷, it was found that sensitivity of ICD-10 codes for identifying comorbidities and infectious conditions was quite low. Only ICD-10 codes for diabetes mellitus and HIV-infection provided both acceptable sensitivity and specificity (90.0% or higher). None of the ICD-10 codes for any infectious conditions provided acceptable level of both sensitivity and specificity. By combining ICD-10 codes with microbiological results, sensitivity of ICD-10 codes for diagnosis of UTI and BSI were moderately improved.

IV. CONCLUSION

The accuracy of writing sub-categories in the diagnosis code, the suitability of the diagnosis with laboratory test results in cases of infection are important as data sources and references in analyzing the accuracy of the diagnosis coding and are important factors for producing quality data.

Acknowledgment

1. The author would like to thank Apikes Iris for funding this research in the 2020 Apikes Iris Lecturer Research Grant program (Hibah Penelitian Dosen Apikes Iris);
2. The author would like to thank LPPM Apikes Iris for facilitating and assisting the implementation process of this research;

3. The author would like to thank Fairuz Tridania Anum and Sayati Mandia, M.Sc who helped in data retrieval and processing and the team of this research;
4. Special thanks to dr. Erkadius, M.Sc., Yurianti Mardian, A.Md.RM., dr. Ressa Oashttamadea SM, MARS who provided knowledge, motivation and enthusiasm for the author in completing this research.

REFERENCES

- [1] World Health Organization. Global Tuberculosis Report 2014. WHO Rep. 2014.
- [2] Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan Republik Indonesia. Riset kesehatan dasar. Jakarta: Balitbang Kemenkes RI; 2013.
- [3] Grace, Pierce A, neil R. Borley. 2007. At a Glance Ilmu Bedah. Edisi ketiga. Jakarta: Erlangga.
- [4] World Health Organization (WHO). ICD Implementation by Countries. World Health Organization (WHO), 2007.
- [5] Rinda Nurul Karimah, Dony Setiawan, Puput Septining Nurmalia. 2016. Analisis Ketepatan Kode Diagnosis Penyakit Gastroenteritis Acute Berdasarkan Dokumen Rekam Medis diRumah Sakit Balung Jember, Vol. 2 No. 2 (2016) Journal of Agromedicine and Medical Sciences.
- [6] Ernawati, Yati Maryati. 2017. Tinjauan Ketepatan Kode Diagnosis Kasus NIDDM (Non Insulin Dependent Diabetes Mellitus) Pasien Rawat Inap di Rumah Sakit Pertamina Jaya Tahun 2016, Jurnal INOHIM, Volume 5 Nomor 1, Juni 2017.
- [7] Pinyo Rattanaumpawan MD, MSCE, PhD*,**, Thanyarak Wongkamhla MD**, Visanu Thamlikitkul MD*,**, 2016, Accuracy of ICD-10 Coding System for Identifying Comorbidities and Infectious Conditions Using Data from a Thai University Hospital Administrative Database, J Med Assoc Thai Vol. 99 No. 4 2016.

