The Effectiveness of National Health Insurance (*JKN*) Inpatient Claim using Integrated SIMRS Web-based (Bridging System) with INA-CBG's E-Claim Application Version 5.2 at Ibnu Sina Hospital Indrapuri Aceh Besar

Wachyoe Hadi Saputra, H. Said Husman, Irwan Saputra
Public Health Master Study Program,
Faculty Of Medicine Syiah University Kuala,
Banda Aceh, Indonesia

Abstract:- There are four situations in the use of Hospital Information Technology applications or better known as SIMRS in Indonesian hospitals, first, the hospital has not had SIMRS yet, second, the hospital already has SIMRS but it has not been integrated, third, the hospital has an integrated SIMRS based on non-web service but has not bridged with E-claim application, and fourth, the hospital already has SIMRS based on Web Services and bridged with INA-CBG's E-Claim Application. The purpose of this study was to determine the effectiveness of the National Health Insurance (*JKN*) Inpatient Claim using an integrated SIMRS web-based (Bridging System) with the INA-CBG'S E-Claim application Version 5.2 at IbnuSina Hospital Indrapuri Aceh Besar. This research was a quantitative type with a cross sectional design. The sampling in this study was using the Simple Random Sampling technique with a total sample of 368 medical records inpatient medical records at IbnuSina Hospital. The research instrument used was observation using a checklist and a stopwatch. The data were analyzed using Mann Whithney statistical test and logistic regression. The results of the bivariate analysis showed that there was a significant difference in the effectiveness variable (p=0.001), Data Input Time (p=0.001), Data Accuracy (p=0.001), Completeness of Medical Record Data (p=0.001) and unclear medical record writing (p=0.001). Furthermore, the results of multivariate analysis showed that the variable that most influenced the level of effectiveness of claiming activities was the variable of completeness of medical record data (p-value <0.05). Based on the results of this study, it is hoped that the IbnuSina Hospital should immediately carry out Electronic Medical Record (ERM) so as to reduce the incidence of inaccuracy, incomplete RM, and Unclear Medical Record Writing.

I. INTRODUCTION

Badan Penyelenggara Jaminan Sosial (Social Security Agency), hereinafter abbreviated as *BPJS*, is a legal entity established to administer social security programs. *BPJS Kesehatan* (Health Social Security Agency) is a State-Owned Enterprise (BUMN) specially assigned by the government to provide health care insurance for all Indonesian people (Listiyana, 2017).

BPJS as referred to in Law Number 24 of 2011 is *BPJS Kesehatan* as the organizer of the Health Insurance Program and *BPJSKetenagakerjaan* (Employment Social Security Agency) as the organizer of Work Accident Insurance, Old Age Security, Pension Security, and Health Insurance.

Indonesian Case Base Groups (INA-CBG's) is an application used by hospitals to submit claims to the government, in this case, *BPJS Kesehatan* as the organizer. The hospitals will receive payments based on the average cost incurred for a diagnosis group. INA-CBG's is a continuation of the Indonesian-Diagnosis Related Group (INA-DRG) application, where this system is the first casemix system developed in 2006. The INA-CBG's system consists of several components that are interrelated with each other. The components directly related to service outputs are clinical pathways, coding, and information technology, while separately, there is a costing component that indirectly affects the process of preparing INA-CBG's rates for each group of cases in health financing. (*Kemenkes*, 2016).

Since January 1, 2014 INA-CBG's E-Claim Application has been declared as an application used in the *JaminanKesehatanNasional* (National Health Insurance - *JKN*) program. This application has previously also been used in the health insurance program launched by the government in the Public Health Insurance Program (*Jamkesmas*) in 2010 with version 1.5. (*Kemenkes*, 2017)

The claiming stage in the hospital starts from several stages, it starts in the functional unit, the second stage is when the files are processed by the casemix team and the third stage is carried out by the hospital's internal verifier for

the internal verification, and the fourth stage is to proceed to the claims administration and finance department. The casemix team carried out the claim process using the INA-CBG's E-Claim Application which started by inputting patient administration data, service rates, diagnosis codes based on International Code Diagnosis (ICD) X, International Code Diagnosis (ICD) IX action codes, and final delivery data to the Data Center of the Ministry of Health. This input process requires accuracy, speed, and precision, especially for service rates, which have changed in the INA-CBG's E-Claim application version 5.2, the officer must input 18 items of hospital rates manually, where previously there were only 16 rate items in version 5.1. (*Kemenkes*, 2017)

The problems faced by the officers who are responsible for rates input are time, accuracy, and errors due to manual input. This will result in delays and pending as well as hampering the hospital's financial cash flow.

The main reasons hospitals adopt information technology in their service, in general, include three things, to improve efficiency, effectiveness, and service quality. This goal can be achieved through the implementation of various functional applications such as billing systems, information systems for medical records, pharmacies, and other functional modules. (Sabarguna, 2007).

There are four situations in the use of Hospital Information Technology applications or better known as SIMRS in Indonesian hospitals, first, the hospital has not had SIMRS yet, second, the hospital already has SIMRS but it has not been integrated, third, the hospital has an integrated SIMRS based on non-web service but has not bridged with E-claim application, and fourth, the hospital already has SIMRS based on Web Services and bridged with INA-CBG's E-Claim Application.

A preliminary study conducted by researcher at the IbnuSina Hospital Indrapuri Aceh Besar, based on the results of interviews with 4 casemix team personnel at the IbnuSina Hospital stated that since the implementation of INA-CBG's E-Claim Version 5.2 the officers had difficulties and delays in completing claim status. In response to this, IbnuSina Hospital has used a Web Service-based Hospital Management Information System (*Sistem Informasi Manajemen Rumah Sakit* - SIMRS) which has integrated all service units and has been bridged with the INA-CBG's E-Claim Application Version 5.2 since February 2018. It is in line with Leonard's statement (2016) that the bridging system increases the effectiveness of entering data and efficient use of resources, and this bridging system can increase the speed of the claims management process.

Based on the foregoing discussion, the researcher were interested in conducting further research on the effectiveness of inpatient claims for the National Health Insurance (*JKN*) using an integrated web-based SIMRS (bridging system) with the INA-CBG's E-Claim application Version 5.2 at IbnuSina Hospital Indrapuri Aceh Besar.

II. RESEARCH METHODS

The research method is an attempt to find, develop, and test the truth of knowledge by using scientific methods. Things that must be considered in research are the methods used must be adjusted to the object of research and the objectives to be achieved so that the research will run systematically. The research method used in this research was quasi-experimental research.

The type of research used in this study was a quasi-experimental non-equivalent control design method. This design is almost the same as the pretest-posttest control group design, only in this design the experimental group and the control group are not chosen randomly. In this design, both the experimental group and the control group are compared, although these groups are selected and assigned without going through random selection. The two existing groups were given a pretest, then given treatment, and finally given a posttest.

After obtaining medical record data that had problems in the claim input process, treatment (X) was carried out by Bridging SIMRS with E-Claim for a certain period of time. After the SIMRS bridging treatment with E-Claim was carried out, another test was given to measure the level of effectiveness after being subjected to the experimental variable (X), in the post-test the experimental data were obtained. O1 and O2 were then compared to determine the difference, if any, as a result of the given experimental variable. Then the data were analyzed using t-test (Arikunto; 2002).

A. Research Location and Time
This research wascarried out at the Casemix unit (Claim unit) IbnuSina Hospital, Indrapuri Aceh Besar in February 2022.

B. Research Sample
The sample of this study was inpatient medical records for the month of December 2021 for which the claims were going to be made. The sampling technique was carried out using Simple Random Sampling on medical records, where the claim process was carried out both with bridging and not bridging with E-Claims and web-based SIMRS.

C. Data collection technique
In this study, the data collection method used was through observation of the claim process and interviews withthecasemix officers. The data collection instruments in this study were questionnaires and checklist sheets as measuring tools to measure each research variable.

The procedures carried out by the researcher were: The researcher asked for research permission from the director of Ibnu Sina Indrapuri Hospital chairman, Aceh Besar. There are 2 stages of data collection: the E-Claim data input stage by the coder and the verification stage by the RSIS Internal verifier. The researcher met the Coder officer as a numerator and gave an explanation of the research to be carried out and asked for approval to become a respondent. The qualifications of coders as respondents were as follows: (1)

Have experience as a coder for at least 3 years; (2) A casemix team member as evidenced by a determination decree by the Director; (3) Have an INA-CBGs coding training certificate. On the first day, the Numerator (Coder) carried out the claim process using a SIMRS that was unbridged with the INA-CBG's e-claim application version 5.2. On the second day, the Numerator (Coder) carried out the claim process using SIMRS which was bridged with the INA-CBG's e-claim application version 5.2. The researcher recorded the time duration for each of these activities using a stopwatch. The researcher assessed whether there are errors that occur based on the results of verification by the hospital's internal verifier. The researcher calculated the number of claims that had been completed.

D. Validity test

In measuring the validity the researcher used the product moment formula. The instrument was tested on 10 medical records at Malahayati Hospital, Banda Aceh. Based on the distribution (table r), $\alpha = 0.05$ and df (N-2) = 0.6319, if r count > r table, it is declared valid and vice versa. Based on the calculation results, the correlation coefficient value (r count) is obtained from $0.676 - 0.758$, where the checklist instrument for data collection is valid as indicated by the results of the calculated r count > r table ($0.676 - 0.758 > 0.6319$).

E. Reliability Test

The results of the reliability test on the data collection checklist instrument carried out on 10 MR at Malahayati Hospital Banda Aceh found that the Cronbach's Alpha value was $0.757 >$ the r table value of 0.6319 so the checklist used in this study was concluded as reliable, meaning it can be trusted or relied on.

F. Data Analysis Method

The data analysis carried out in this research was univariate analysis, bivariate analysis, and multivariate analysis. The multivariate analysis used logistic regression analysis, this test was employed to see the variables that most affect the effectiveness of the claim using the E-Claim 5.2 application. This method selects candidates to be included in the modeling provided that after the bivariate test only variables with p-value < 0.05 entered. Furthermore, in this modeling, the selection was made by removing one variable with p-value ≥ 0.05 or the variable with the highest p-value at each modeling stage until the final modeling no longer found the variable p-value ≥ 0.05 ($\alpha = 0.05$), in the final result the value of exp (B) showed the effect of these variables on the dependent variable, the greater the exp (B) or OR the greater the effect of these variables on the dependent variable.

III. RESEARCH RESULTS AND DISCUSSION

A. Description of Research Location

This research was conducted at the IbnuSina Hospital (RSIS) located in Indrapuri Sub-District, Aceh Besar District, IbnuSina Hospital is one of the class D general hospitals in Aceh Besar District which provides referral services for patients. Established in 2014, this hospital had developed from the SumberSehat Primary Clinic into a general hospital with an initial capacity of 30 beds and has now been able to provide 54 beds for inpatients. The services provided by RSIS are emergency, outpatient, and inpatient services for the community and other referrals. Specialist medical services consist of internal medicine specialists, pediatric specialists, general surgery specialists, eye specialists and other supporting specialists, anesthesiologists, radiology specialists, clinical pathology specialists, anatomical pathology specialists, and clinical nutrition specialists. In order to support the government's Universal Health Coverage (UHC) program, as a private hospital, RSIS participates in serving the Participants of the Health Social Security Agency (*BPJS*) and the Aceh Health Insurance (JaminanKesehatan Aceh - JKA) as well as being the largest service segment that requires referral services, especially Aceh Besar people. RSIS already has a Hospital Management Information System (SIMRS) and is currently transforming into electronic medical records. (RSIS Profile, 2021)

B. Research result

The data collection process in this study was carried out from February 2 to February 4 2022 at the IbnuSina Hospital (RSIS) Aceh Besar using a checklist and a stopwatch.

The sample in this study was the medical record status of inpatients at the Aceh Besar RSIS for December 2021. The data collection stage was carried out in 2 stages, the data input stage by the Coder and the verification stage by the RSIS Internal verifier. The data input process was carried out for 2 (two) days on February 2-4, 2022. Time variables were collected by means of observation using checklists and stopwatch. The coder input E-Claim Version 5.2 with the same duration of 240 minutes (4 Hours) in the condition of the bridged and unbridged with SIMRS E-Claim. It was then followed by data collection on the level of completeness of medical record data and the level of clarity of medical record writing. The verification stage by the RSIS Internal Verifier was carried out to assess the suitability of the input data as it should consist of patient data and claim data.

a) Karakteristik Sampel
The sample in this study was the patient's medical record status with characteristics consisting of gender, length of stay, and categories of surgical and non-surgical cases as described in table 4.1 below:

No	Variable	Category		Frequency (n)	Percentage (%)
1	Sex	a	Female	210	56
		b	Male	168	44
2	Length of stay	a	< 5 days	210	56
		b	≥ 5 days	168	44
3	Case	a	Surgical	15	4
		b	Non-surgical	363	96

Table 1: Table of Frequency Distribution of Patient Characteristics Data

Based on the data on the characteristics of the medical record sample in table 4.1. It can be seen that there were more female patients by 210 patients (56%), the longest length of stay was less than 5 days of hospitalization (56%), and the non-surgical case was the most case with 363 cases (96%).

b) Univariate Analysis

The univariate analysis stage was carried out by displaying table 4.2. on variable frequency distribution of data input time, level of accuracy, completeness of medical record data, clarity of medical record writing, effectiveness, and number of inputted status in conditions of E-Claim Bridging and Non-Bridging on SIMRS.

No	Variable	Category		Frequency (n)	Percentage (%)
1	Data input time	a	Fast	188	49.7
		b	Not Fast	190	50.3
2	Level of accuracy	a	Accurate	327	86.5
		b	Not accurate	51	13.5
3	Completeness of Status	a	Complete	317	83.9
		b	Incomplete	61	16.1
4	Writing Clarity	a	Clear	328	86.8
		c	Unclear	50	13.2
5.	Effectiveness	a	Effective	188	49.7
		b	Ineffective	190	50.3
6	Number of Status Entered	a	Bridging	263	69.6
		b	Non Bridging	115	30.4

Table 2: Research Variable Frequency Distribution Table

Based on Table 4.2. above, it shows that the data input time used by the coder was divided evenly into fast and not fast categories (50%), the level of accuracy of the data inputted in the E-Claim application version 5.2 was more accurate or appropriate, it was shown by 327 medical records (87%), The medical record data was more complete with 317 medical records (84%) compared to incomplete medical records.

As for the variable of the medical record writing clarity, this study had more than 80% clear medical records, there were still 50 medical records written in unclear writing (13%).

The variable effectiveness of the claim process in the RSIS casemix unit was almost evenly distributed between the effective category with 188 medical records (49.7%) and the ineffective category with 190 medical records (50.3%). This was also supported by the higher data on the number of statuses inputted in SIMRS with bridged E-Claim conditions with 263 (60.9%) medical records than the medical records with unbridged E-Claim conditions of only 115 (30.4%) within 8 hours (240 minutes) of research.

C. Bivariate Analysis

The difference in effectiveness between the inpatient claims on the National Health Insurance (*JKN*) using the integrated SIMRS (bridging system) with the INA-CBG's E-Claim application Version 5.2 and the claims that do not use the bridging system.

No	Effectiveness	BridgingStatus		Total	*P Value*
		Non Bridging n (%)	Bridging n (%)	n (%)	
1.	Effective	0 (0%)	188 (49.7%)	188 (49.7%)	< 0.001
2.	Ineffective	115(30.4%)	75 (19.8%)	190 (50.3%)	
	Total	115 (30%)	263 (70%)	378 (100%)	

Table 3: Effectiveness of E-Claim version 5.2 bridging and non-bridging with SIMRS RS Ibnu Sina 2022

Table 4.3 above shows that the claim process was more effective in the SIMRS with E-Claim bridging (49.7%) and there was 0% effectiveness in Non Bridging conditions, this situation resulted in a larger number of medical records that were inputted ineffectively judging by the time and accuracy of the data, there was -30.4% in the SIMRS without E-Claim bridging. Furthermore, the results of the Mann Whitney test on the effectiveness variable showed that there was a significant difference in effectiveness between the Bridging and Non-Bridging claims with p value <0.05.

No	Claim Input Time	BridgingStatus		Total	P Value
		Non Bridging n (%)	Bridging n (%)	n (%)	
1.	Fast	0 (0%)	188 (50%)	188 (50%)	< 0.001
2.	Not fast	115 (30%)	75 (20%)	190 (50%)	
	Total	115 (30%	263 (70%)	378 00%)	

Table 4: E-Claim version 5.2 Data Input Time bridging and non-bridging with SIMRS IbnuSina Hospital 2022

The results of the Bivariate Test on the data input time variable can be seen in table 4.4 above that shows the claim data input time that was not fast in the Non Bridging condition with 115 medical records Status (30%) and the data input time became fast in the bridging claim condition with 188 (50%) and there was no 1 (one) medical record that could be inputted quickly in the condition of a Non-Bridging Claim. Furthermore, the statistical test results show that there was a significant difference between bridging and non-bridging E-Claims with p-value < 0.05.

No	Level of accuracy	BridgingStatus		Total	P Value
		Non Bridging n (%)	Bridging n (%)	n (%)	
1.	Accurate	64 (17%)	263 (70%)	327(87%)	< 0.001
2.	Not accurate	51 (13%)	0 (0%)	51(13%)	
	Total	115 (30%	263 (70%)	378 (100%)	

Table 5: Level of Data Accuracy of E-Claim version 5.2 bridging and non-bridging with SIMRS RS IbnuSina 2022

Table 5 above shows that all the medical records entered in the bridged E-claim (263) were all filled with data and nothing was inaccurate, but in the unbridged E-claim, the data was almost evenly distributed as accurate (64 medical records) and inaccurate (51 medical records). It is in line with the results of the statistical test that there was a significant difference in the level of data accuracy on bridged and unbridged E-Claims with a p value < 0.05 seen from the suitability of the Claim data inputted by the coder officer and verified by the RSIS internal verifier.

No	Completeness of Data	BridgingStatus		Total	P Value
		Non Bridging n (%)	Bridging n (%)	n (%)	
1.	Complete	85 (22%)	232 (61%)	317(84%)	< 0.001
2.	Incomplete	30 (8%)	31 (8%)	61(16%)	
	Total	115 (30%	263 (70%)	378 (100%)	

Table 6. Level of Completeness of Medical Record Data on E-Claim version 5.2 bridging and non-bridging with SIMRS IbnuSina Hospital 2022

Table 6 above shows that the research results obtained by researchers related to the level of completeness of medical record data in SIMRS bridged with E-Claim, there were more complete medical records with 232 medical records compared to incomplete medical records (61%). In the unbridging condition, there were still incomplete medical records with 30 medical records (8%). The results of the Mann Whitney statistical test were that there was a significant difference between the level of completeness of the data on bridged and non-bridged E-Claims with p value = 0.001 so that this variable greatly affects the effectiveness of the claiming process and adds longer working time.

No	Writing Clarity	BridgingStatus		Total
		Non Bridging n %	Bridging n (%)	n (%)
1.	Clear	77 (20%)	251 (66%)	328(87%)
2.	Unclear	38 (10%)	12 (3%)	50(16%)
	Total	115 (30%	263 (70%)	378 (100%)

Table 7: Clarity Level of Medical Record Writing on E-Claim version 5.2 bridging and non-bridging with SIMRS IbnuSina Hospital 2022

Table 7 above shows that on the level of clarity variable on medical record writing, there were more medical records with clear medical service history writing by 251 medical records (66%) and there were still unclear writings by 12 medical records (3%). In the non-bridged E-Claim, it can be seen that there were more medical records that were inputted with a good clarity level by 77 medical records compared to the unclear writing by 38 medical records. The statistical test showed that there was a significant difference in the level of clarity of medical record writing on the Bridged and Non Bridged E-Claim treatment with p value < 0.05. The level of clarity of

medical record writing is decided on 4 things, namely SEP, ER Sheet, Resume Sheet, and Support Sheet.

D. Multivariate Analysis

The first step was to analyze all research variables or factors that influence the effectiveness of the National Health Insurance (*JKN*) inpatient claims using the integrated SIMRS (bridging system) with the INA-CBG's E-Claim application Version 5.2. To get an analysis, the first stage was to find the estimated value of the parameter to get a binary logistic regression model. Parameter estimation was searched using the help of software. The results of the assessment for each parameter can be seen in Table 8.

Research variable	Beta Interpretation	Standard error	df	P-Value
Time	0.989	0.103	1	0.918
Completeness of medical record data	86.308	1.015	1	< 0.001*
Writing Clarity	31.437	0.703	1	< 0.001*
Number of entries	31.437	0.730	1	< 0.001*
Accuracy	>100000	5628.139	1	0.997

Table 8: Estimating the Logistics Regression Model Using All Variables

From Table 4.8 above, it is found that the variables of completeness of medical record data, file clarity, and the number of inputs were statistically significant, as seen from the significance number (completeness of medical record data) < 0.05; significance number (clarity of medical records) < 0.05; and the significance number (Number of inputs) < 0.05. While the time variable and the accuracy variable had a significance value above 0.05, with 0.918 and 0.997.

In the second stage, the time and accuracy variables were removed because the values were not significant, the regression model was repeated, and the independent variables that were re-entered consisted of the completeness of the medical record data, writing clarity, and the number of entries. Thus, the results of the assessment for each parameter can be seen in Table 4.9

Research variable	Beta Interpretation	Standard error	df	Nilai p
Completeness of medical record data	0.01	1.034	1	< 0.001*
Writing Clarity	0.216	0.982	1	0.118
Number of entries	<0.001	3355.0	1	0.995

Table 9: Logistic Regression Modeling on the Effectiveness of *BPJS Kesehatan* Claim Activities at IbnuSina Hospital 2022

Table 9 shows that the remaining variables: file completeness, file clarity, and the number of entries had a value, it also can be seen that the medical record data completeness variable had the most significant effect on the effectiveness of the National Health Insurance (*JKN*) inpatient claim using the integrated SIMRS (bridging system) with the E-Claim application INA-CBG's Version 5.2.

IV. DISCUSSION

In line with research conducted by Hakam (2019) that there is a significant difference in service quality of -3.727[a] and Asymp. Sig 0.000 between before and after the bridging system was implemented at Hospital X. Furthermore, Binobaid*et al*. 2016 conducted a survey at the Department of Pharmacy, Price Sultan Military Medical City (PSMMC) Military Hospital Riyadh, Saudi Arabia which evaluated the volume and type of telephone calls before and after implementation impact of the new system. Prior to the implementation of the system during the two-week

measurement, all pharmacies received 4,466 calls and it decreased to 2,630 calls with p value > 0.001 and the nature of calls turned out to be more professional so that workloads and interruptions could be reduced.

The writer gained the results in this study that there was a difference in the time of input claim data carried out by the coder in the Bridged E-Claim and Non-Bridged E-Claim in SIMRS at RSIS with p value < 0.05. Therefore, it can be assumed that the claim data input time will be faster for the bridged E-Claim compared to the unbridged one. This is closely related to the higher number of medical records inputted into bridged E-Claim (263 medical records) compared to non-bridged (115 medical records). This is in line with the research conducted by Diao*et al* (2021) on Computer-assisted Clinical Coding (CAC). CAC is an automatic coding algorithm that is expected to improve the quality and productivity of coding for the International Classification of Diseases, the tenth version (ICD-10) had an accuracy rate of 95.2 % on the data grouping feature model and 80% precision value. CAC is a software that is interoperability with other applications so that it can facilitate diagnosis and selection of actions according to expert experience and algorithms of the clinical team working at Fuwai Hospital, Beijing, China.

In this study, it was found that there was a difference between the level of data accuracy in the bridged E-Claim and Non-Bridged E-Claim condition on the SIMRS with p value = 0.001. This shows that the accuracy of the data in the medical record which is inputted on the bridged E-Claim has little effect on the accuracy because the data can be drawn directly from the SIMRS. On the other hand, in Non-Bridged E-Claim, this greatly affects the speed and accuracy of Claim data input in E-Claim version 5.2. The writer assumes that the treatment of bridged E-Claim will further improve the accuracy of claim data compared to non-bridged E-Claim. This improvement can reduce the number of reconfirmations or failed claims so that hospital income is not disturbed. It is in line with the research conducted by Muller *et al* in 2002 in Germany regarding The DRGs Enhanced Electronic Medical Record: "A hospital's economical survival will depend vitally on the accuracy and completeness of the documentation of DRG relevant data like diagnosis and procedure codes".

V. CONCLUSIONS AND RECOMMENDATIONS

- There is a significant difference in the effectiveness of the inpatient claims on the National Health Insurance (*JKN*) using the integrated SIMRS (bridging system) with the INA-CBG's E-Claim application Version 5.2 compared to claims that do not use the bridging system with a P Value < 0.001.
- There is a significant difference in Data Input Time on the inpatient claims on the National Health Insurance (*JKN*) using the integrated SIMRS (bridging system) with the INA-CBG's E-Claim application Version 5.2 compared to claims that do not use the bridging system with a P Value < 0.001.
- There is a significant difference in the level of data accuracy on the inpatient claims on the National Health

Insurance (*JKN*) using the integrated SIMRS (bridging system) with the INA-CBG's E-Claim application Version 5.2 compared to claims that do not use the bridging system with a P Value < 0.001.

- There is a significant difference in the level of data completeness on the inpatient claims on the National Health Insurance (*JKN*) using the integrated SIMRS (bridging system) with the INA-CBG's E-Claim application Version 5.2 compared to claims that do not use the bridging system with a P Value < 0.001.
- There is a significant difference in the level of clarity of medical record writing on the inpatient claims on the National Health Insurance (*JKN*) using the integrated SIMRS (bridging system) with the INA-CBG's E-Claim application Version 5.2 compared to claims that do not use the bridging system with a P Value < 0.001.
- From the input time variable, data accuracy level, data completeness, and clarity of writing medical record data, it was found that the most influential variable on the effectiveness of both bridged and unbridged is the data completeness variable.

REFERENCES

[1.] Ahmad, F. 2014. Efektivitas Kerja Pegawai Dinas Sosial Provinsi Sulawesi Selatan. Skripsi: Universitas Hasanuddin. Makassar.

[2.] Ambarriani, A. S. 2014. *Hospital Financial Performance in The Indonesian National Health Insurance Era. Review of Integrative Business and Economics Research*, 4(1), 121-133.

[3.] Anjaryani, Wike Diah. 2009. KepuasanPasien Rawat InapTerhadapPelayananPerawat di RSU Tugurejo Semarang. Tesis.Semarang: UNDIP. Diakses 14 Maret 2012. Avalilable at: http//eprints.undip.ac.id/23824/1/WIKE_DIAH_ANJA RYANI. Pdf

[4.] Anggraini, Dian. 2008. PerbandinganKepuasanPasienGakindanPasienUmum di Unit Rawat Inap RSUD BudhiAsihTahun 2008. Skripsi. Program StudiFakultasKesehatan Masyarakat Indonesia. Depok

[5.] Ardhitya, T. 2015. Faktor-Faktor Yang MelatarbelakangiPenolakanKlaim BPJS olehVerifikator BPJS di RSJD DR. Amino GondohutomoProvinsiJawa Tengah, (online). (http://eprints.dinus.ac.id/17385/1/ jurnal_15985.pdf) diaksespadatanggal 27 Maret 2017.

[6.] Ariawan I 2005 *Sample Size And Sample Design For Nutritional Research. Course Material for International Course on Applied Epidemiology with Special Reference to Nutrition*. SEAMEO-TROPMED-RCCN, University of Indonesia. Jakarta, 25 April-3 May 2005.

[7.] AzwarAzrul. 2007. SikapManusiaTeoridanPengukurannya, Edisi 2. PustakaPelajar. Yogyakarta.

[8.] Barber, S. L., & Yao, L. 2010. *Health Insurance Systems in China: a Briefing Note. World Health Report*, 37.

[9.] Barry, MDY. 1994. BukuKamusTerlarisKamusIlmiahPopuler. PenerbitArkola. Surabaya

[10.] BPJS. 2014. *BridgingSystem* : Perpendek Antrean Pelayanan. Info BPJS KesehatanEdisi X Tahun 2014.

[11.] BPJS. 2014. Perubahan Tarif INA-CBGs : MembuatBiayaKesehatanLebihEfektif. Info BPJS KesehatanEdisi VIII Tahun 2014.

[12.] Carlzon J. 1987. Moments of Truth. Massachusetts: Ballinger Publishing.

[13.] Christianto, E danSantosa, J. 2018. PerancanganArsitektur RESTful padaIntegrasi Data ReferensiBuku di Perpustakaan Daerah danPerpustakaanUniversitas (StudiKasus: Kota Salatiga). *Journal of Library and Information Service.* 2(1).

[14.] Dahlan MS 2009. BesarSampeldan Cara PengambilanSampeldalamPenelitianKedokterandanKesehatan. Edisi. 2. PenerbitSalembaMedika. Jakarta

[15.] Danim, Sudarwan. 2004. MotivasiKepemimpinan&EfektivitasKelompok. PT RinekaCipta. Jakarta.

[16.] Depkes RI. 1997. PedomanPengelolaanRekamMedisRumahSakit di Indonesia. Dirjenyanmed. Jakarta

[17.] EdhySutanta. 2003. SistemInformasiManajemen. GrahaIlmu. Yogyakarta.

[18.] El Azami I, Malki MOC, Tahon C. 2012. *Integrating Hospital Information Systems in Healthcare Institutions: A Mediation Architecture. J Med Syst*.

[19.] Ferrara FM. 1998. *The standard 'healthcare information systems architecture' and the DHE middleware*, *Int J Med Inform*.

[20.] Gaardboe, R., Nyvang, T., &Sandalgaard, N. 2017. *Business intelligence success applied to healthcare information systems. Procedia computer science*, 121, 483-490.

[21.] Gat. 2017. Pemanfaatan Web Service XML UntukMembangunSistemInformasi Nilai Online Berbasis Extension Android. KonferensiNasionalSistem&Informatika STMIK STIKOM. Bali

[22.] Handayani, P. W., Pinem, A. A., Azzahro, F., Hidayanto, A. N., &Ayuningtyas, D. 2019. *The Information System/Information Technology (IS/IT) practices in the Indonesia health referral system. Informatics in Medicine Unlocked*, 17, 100263.

[23.] Hidayat, R danAshari, A. 2013. PenerapanTeknologi*WebService*UntukIntegrasiLayananPuskesmasdanRumahSakit. *Journal of Mathematics and Natural Sciences, Vol 23* (No 1), 64-77.

[24.] Jacobalis,Samsi. 1990. MenjagaMutuPelayananRumahSakit. PT Citra WinduSatria. Jakarta.

[25.] Jogiyanto, H.M., 2005, Analisa danDesainSistemInformasi: Pendekatan. TerstrukturTeoridanPraktikAplikasiBisnis. Penerbit Andi, Yogyakarta.

[26.] Jusuf Eddy. 2019. SistemInformasiManajemenKontemporer di Era Digital. PenerbitGava Media. Yogyakarta

[27.] KamusBesar Bahasa Indonesia. 2016. https://kbbi.kemdikbud.go.id/entri/efektif

[28.] Kementerian DalamNegeri RI. 1996. Keputusan Menteri DalamNegeriNomor 690.900-327 Tahun 1996 tentangPedomanPenilaianKinerjaKeuangan.

[29.] Kementerian Kesehatan RI. 2013. Peraturan Menteri KesehatanNomor 82 Tahun 2013 tentangSistemInformasiManajemenRumahSakit.

[30.] Kementerian Kesehatan RI. 2014. Peraturan Menteri KesehatanNomor 27 Tahun 2014 tentangPetunjukTeknisSistem*Indonesian Case Base Groups* (INA-CBGs).

[31.] Kementerian Kesehatan RI Pusat PembiayaandanJaminanKesehatan National CasemixCenter. 2017. PetunjukTeknis E-Klaim INA-CBG 5.2 Build 5.2.0.201712280710.

[32.] Kertahadi. 2007. SistemInformasiManajemen. PT PustakaBinamanPressindo: Jakarta.

[33.] Lenz, R., & Kuhn, K. A. 2004. *Towards a continuous evolution and adaptation of information systems in healthcare. International journal of medical informatics,* 73(1), 75-89.

[34.] Leonard, D. 2016. PengorganisasianKlaimPelayananPasien JKN di RSUP DR M Djamil Padang. Menara Ilmu, 10(72).

[35.] Listiyana, I., &Rustiana, E. R. 2017. AnalisisKepuasanJaminanKesehatanNasionalpadaPengguna BPJS Kesehatan di Kota Semarang. *Unnes Journal of Public Health*, 6(1), 53-58.

[36.] Mahmudi. 2007. ManajemenKinerjaSektorPublik. Yogyakarta.. UPP STIM YKPN

[37.] Mahsun, Mohammad. 2009. PengukuranKinerjaSektorPublik. BPFE. Yogyakarta.

[38.] Mardiasmo. 2009. AkuntansiSektorPublik. Andi. Yogyakarta

[39.] Medika, S. W. N. A. C. 2017. EvaluasiSistemInformasiRekamMedis di RSUD Kota Surakarta dalamMendukungRekamKesehatanElektronik. IJMS - *Indonesian Journal on Medical Science*, 4(1).Pratama, I.P.A.E (2016). IntegrasidanMigrasiSistem. Bandung: Informatika.

[40.] Milla, I. Audit SistemInformasiManajemenRumahSakitMenggunakan Framework Cobit Dan *IT BALANCED SCORECARD* (StudiKasus RSUD Balung) (*Doctoral dissertation*).

[41.] Mykkänen, J., Riekkinen, A., Sormunen, M., Karhunen, H., &Laitinen, P. 2007. *Designing web services in health information systems: From process to application level. International journal of medical informatics,* 76(2-3), 89-95.

[42.] Noviatri, L. W., &Sugeng, S. 2016. AnalisisFaktorPenyebabKeterlambatanPenyerahanKlaim BPJS di RS PantiNugroho. JurnalKesehatanVokasional, 1(1), 22-26.Lemeshow S, Hosmer D, Klar J, Lwanga S (1990) *Adequacy of sample size in health studies*. John Wiley & Sons.

[43.] Park, Y. T., Yoon, J. S., Speedie, S. M., Yoon, H., & Lee, J. 2012. *Health insurance claim review using information technologies. Healthcare informatics research*, 18(3), 215-224.

[44.] Pasalong, Harbani. 2013. TeoriAdministrasiPublik. Alfabeta. Bandung

[45.] Pratiknyo AW. 2007 Dasar-Dasar MetodologiPenelitianKedokterandanKesehatan. PT Raja GrafindoPersada. Jakarta

[46.] *Productivity Commission. 2013 On efficiency and effectiveness: some definitions*, *Staff Research Note*. Canberra.

[47.] Rodrigues, J. M., Paviot, B. T., & Martin, C. 2002. DRG Information system, healthcare reforms and innovation of management in the western countries during the 90s: Where are the key success factors?. Case Mix, 4(1), 16-21.

[48.] Saltman, R., Rico, A., &Boerma, W. 2004. *Social health insurance systems in western Europe. McGraw-Hill Education* (UK).

[49.] *Schemerhin Jr John R.* 2011. *Introduction to Management,* 11th *edition*. John Wiley & Sons (Asia) Pte Ltd.

[50.] Sabarguna, MARS, Dr. dr. H. Boy S. 2005. SistemInformasiRumahSakit, PenerbitKonsorsiumRumahSakitJateng. Yogyakarta.

[51.] Siagian, Sondang. P. 2006. SistemInformasiManajemen. PT. BumiAksara. Jakarta.

[52.] Sibagariang, S. (2016). Penerapan Web Service PadaPerpustakaanBerbasis Android. JurnalMahajanaInforamasi, 1 (1).

[53.] Suhanda, R. 2015. Jaminan Kesehatandan *Managed Care*. Jurnal Kedokteran Syiah Kuala, 15 (2): 104-113.

[54.] Suryanti. 2002. Faktor-faktor yang Berhubungandengan Lamanya Waktu Proses Pendaftaran Pasien Rawat Inap di RS Pondok Indah. Tesis. FKM UI. Jakarta,

[55.] Susan, F. O. 2016. Analisis Administrasi Klaim Jaminan Kesehatan Nasional Rawat Jalan RSUD Kota Semarang. Jurnal Kesehatan Masyarakat, (online), Volume 4, Nomor 4, Oktober 2016 (ISSN: 2356-3346), (http://ejournals1.undip.ac.id/index.php/jkm/artic le/download/13898/13447) diaksespadatanggal 31 Maret 2017.

[56.] SutabriTuta,S. 2014. SistemInformasiManajemen. Penerbit Andi. Yogyakarta

[57.] Tika, Moh. Pabundu. 2005. Budaya Organisasidan Peningkatan Kinerja Perusahaan. BumiAksara. Jakarta.

[58.] Undang-Undang Nomor 40 Tahun 2004 tentang Sistem Jaminan Sosial Nasional, 10 Oktober 2004 Lembaran Negara Republik Indonesia Tahun 2014 Nomor 150.

[59.] Undang-Undang Nomor 14 Tahun 2008 tentang Keterbukaan Informasi Publik.

[60.] Undang-Undang Nomor 44 Tahun 2009 tentang Rumah Sakit (Lembaran Negara Republik Indonesia Tahun 2009 Nomor 153, TambahanLembaran Negara Republik Indonesia Nomor 5072).

[61.] Wreder K, Deng Y. 1999. *Architecture-centered enterprise system development and integration based on distributed object technology standard*. Computer Software and Applications 350. Conference.

[62.] *World Health Organization* (WHO). 2004. *Developing Health Management Information Systems: A Practical Guide for Developing Countries*.

[63.] Wuri, Putu dkk 2018. Pengantar Sistem Informasi Manajemen Rumah Sakit (SIMRS). PT Raja GrafindoPersada. Depok.

[64.] Zuliyanti Sri. 2005. PengaruhPengembangandanPengawasanTerhadapEfekt ivitasKerjaBagianProduksi PT. Tri Cahya Purnama. UNS. Semarang.