

Original Research

SYSTEM FOR DETECTION OF NATIONAL HEALTHCARE INSURANCE FRAUD BASED ON COMPUTER APPLICATION

Budi Santoso*, Julita Hendrartini, Bambang Udji Djoko Rianto,
Laksono Trisnantoro

Medical Faculty of Universitas Gadjah Mada

Accepted: 1 June 2018

*Correspondence:

Budi Santoso

Medical Faculty of Universitas Gadjah Mada

Farmako St. Sekip Utara Yogyakarta 55821

Phone/Fax: (0274) 545458

E-mail: busan_ent@yahoo.com

Copyright: © the author(s), YCAB publisher and Public Health of Indonesia. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: The national healthcare insurance (JKN) has been in deficit since 2014-2016; one of the causes is fraud inpatient hospital service.

Objective: This study aimed to analyze the validity, reliability and effectiveness of detection system of national healthcare insurance fraud based on computer application in hospital.

Methods: Cross-sectional method was used. Fraud data were collected at one episode in the inpatient JKN participant service.

Results: Validity was assessed by Fischer exact test. The interpretation was done by hospital internal verification officer and BPJS Kesehatan verification officer. There were only 2 out of 1.106 services claims were different, resulted in p-value < 0.01. Reliability was assessed using Human Organization Technology Benefit questionnaire filled by admission administrator officer, BPJS Kesehatan officer and hospital internal verification officer; and then analyzed using Stata® software resulting in Cronbach's alpha value of > 0.8. Effectiveness was assessed by reducing potential fraud, conducted by RSUP dr. Soeradji Tirtonegoro from May until July 2017, which on May 2018 there were 8 findings, June 1 finding, and on July 2018 had no finding.

Conclusion: System for detection of national healthcare insurance fraud based on computer application is valid, reliable and effective to be implemented in inpatient service in hospital.

Keywords: fraud detection, national healthcare insurance, computer application

INTRODUCTION

The National Health Insurance Program (JKN) as the embodiment of the National Social Security System (SJSN) has been implemented since January 1, 2014. After implementation of National Health Insurance, there has always been a deficit in the year of 2014, 2015, 2016, and 2017, i.e. there was negative balance between the income of BPJS Kesehatan from patients' premium and the amount of money that BPJS Kesehatan had to pay to first level

health facility and Indonesia Case Base Group (INA-CBG's) claims in advanced referral health facility (FKRTL)/hospital. One of the causes was JKN fraud inpatient JKN participant hospital service ([Cahyono, 2015](#); [Hartati, 2016](#); [Tariden, 2017](#)).

JKN Fraud is intentional dishonest or unfair action to obtain claims that is larger than normal for fraudulent and financial loss for

others in the National Health Insurance Program (JKN) service ([Ariati, 2015](#)). JKN fraud is a white-collar crime, which one of the causes is the difference between INA-CBG's tariff rates based on the severity of diagnosis or procedure. Fraudulent healthcare is contagious if the Ministry of Health, as regulator, or BPJS Kesehatan, as executor of the guarantee, does not act. Healthcare facility that commit undetected JKN fraud and unpenalized would be an example to other healthcare facilities. Without prevention and penalizing action, BPJS Kesehatan financial losses will continue to grow ([Ariati, 2015](#); [Hendartini, 2014](#); [Honer, 2015](#); [Sutoto, 2014](#); [Trisnantoro, 2014](#)). JKN fraud could be conducted by participants of National Health Insurance, BPJS Kesehatan, advanced referral health facilities (FKRTL), drugs and medical devices providers ([Busch, 2012](#); [MOH, 2013](#)).

Fraud prevention in healthcare services had been done by stakeholders of National Health Insurance services as the following: a) The government as regulator has taken precautions by establishing fraud indicator, service standards, therapeutic standards, drug standards and medical devices that can be used in all healthcare services. The Government, together with BPJS Kesehatan, would monitor and evaluate the implementation of the National Health Insurance in relation to the potential fraud; b) Routine investigations by insurance companies on claims filed by healthcare facilities; c) Healthcare providers/hospital facilities filed claims in accordance to services provided to National Health Insurance participants, providing standardized services and benefits such as fulfilling the right of participants, hospitals conduct internal verification by Internal Supervisory Unit (SPI); and d) Insurance participants provide their identity so as not to be abused by unauthorized parties, requesting information pertaining to services provided by healthcare providers ([Jasri, 2016](#)).

The amount of potential loss caused by JKN fraud prompted the government to issue Permenkes No. 36 Year 2015 on fraud prevention in National Health Insurance

Program (JKN) within National Social Security System (SJSN), as a legal basis for the development of JKN's anti-fraud system in healthcare services in Indonesia. Since its launch in April 2015, the regulation has been implemented ineffectively, which causes fraudulent impact on healthcare services and potentially increases fraud case, and yet there was no sufficient fraud control system. Healthcare providers are in the spotlight in healthcare fraud prosecution, as worldwide research shows that 60% of healthcare fraudulence comes from healthcare providers ([Fadjriadinur, 2015](#)).

In early 2017, the Corruption Eradication Commission (KPK) reported 1 million claims with potential JKN fraud, hence currently KPK is trying to build a JKN fraud prevention, detection and management system which involve all JKN stakeholder executives such as Ministry of Health, BPJS Kesehatan, healthcare facilities, medicine and medical device providers ([Suparman, 2017](#)). The purpose of this study was to assess the validity, reliability and effectiveness of prevention and early detection system of national healthcare insurance fraud based on computer application that contains fraud indicators based on Permenkes No. 36 Year 2015 on fraud prevention in National Health Insurance Program (JKN). We conducted this study at RSUP dr. Soeradji Tirtonegoro Klaten as the advanced referral health facility (FKRTL).

METHODS

Study Design

The research method used was cross sectional ([Creswell & Creswell, 2017](#)). Potential fraud was conducted by administration officer, BPJS Kesehatan officer and internal hospital verification officer that were taken in one episode in inpatient JKN participant service, which started from registration until claim submission to BPJS Kesehatan.

Population and Sample of this Study

Population is inpatient JNK participants. Sample of this study were as follows: 1)

Inpatient JKN participant, 2) BPJS Kesehatan officer, and 3) hospital internal verification officer.

Research Material

Research materials consisted of: 1) Informed consent, for patient/family approval, admission officer (TURP), BPJS Kesehatan officer and hospital internal verification officer willing to be involved in the research; 2) Computer

application (Figure 1) containing fraud indicators (Table 1); 3) The Kappa test questionnaire to test for the agreement on fraud indicators. TURP officers, BPJS Kesehatan officers and internal verification officers filled questionnaires in two different times, with one week interval; and 4) Hot-fit questionnaire to assess the reliability of prevention and early detection system for potential fraud.

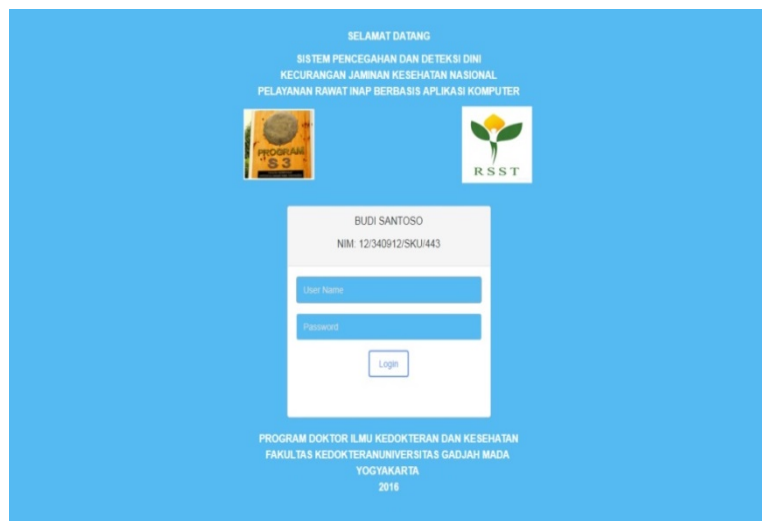


Figure 1 Dashboard of computer application

Table 1 Fraud indicators in this study

No	Perpetrator	No	Fraud Indicators	Yes	No
A	Inpatient JKN Participant	1	Using fake National Health Insurance card		
		2	Using another person's National Health Insurance card		
		3	Using expired National Health Insurance card		
		4	Fake referral letter		
		5	Demanding uninsured service		
B	BPJS Kesehatan	1	Negating the benefits that the participant is entitled to		
		2	Reducing the benefits that the participant is entitled to		
		3	Changing uninsured service into insured service		
		4	Conducting downcoding		
		5	Conducting bundling of service		
C	Hospital	1	Conducting self-referral		
		2	Conducting kickback		
		3	Conducting readmission intentionally		
		4	Conducting unnecessary treatment		
		5	Conducting no medical value		
		6	Conducting no standard of care		
		7	Conducting over-utilization		
		8	Conducting unbundling / fragmentation		
		9	Conducting outpatients service into inpatients		

	service
10	Manipulating length of stay into longer duration
11	Manipulating date of service
12	Conducting phantom visit
13	Conducting phantom procedure
14	Conducting cancelled service and still claim the service
15	Raising type of room charge
16	Conducting up coding
17	Conducting Diagnostic Related Group (DRG) creep
18	Separating one diagnosis into more than 1
19	Adding symptoms from a diagnosis
20	Conducting keystroke mistake
21	Conducting error in determining main diagnosis
22	Conducting error in determining main procedure
23	Conducting cloning
24	Conducting phantom billing
25	Conducting inflated bills
26	Conducting repeat billing
27	Charging fee to the patients treated according to his class' rights
28	Conducting cream skimming
29	Referring patient when INA-CBG's claim is used up
30	Manipulating ventilator usage into longer duration

Independent variable was the prevention and early detection system of fraud in JKN participant's inpatient services. Dependent variables were validity, reliability, effectiveness of prevention and early detection system of fraud in JKN participant's inpatient services.

Validity is often defined as the extent to which an instrument measures what it purports to measure, the instrument measure what it is intended to measure. Validity requires that an instrument is reliable, but an instrument can be reliable without being valid ([Eldridge, 2007](#); [Kimberlin & Winterstein, 2008](#)). Reliability estimates are used to evaluate: (1) the stability of measures administered at different times to the same individuals or using the same standard (test-retest reliability) or (2) the equivalence of sets of items from the same test (internal consistency) or of different observers scoring a behavior or event using the same instrument (interrater reliability). Reliability coefficients range from 0.00 to 1.00, with higher coefficients indicating higher levels of reliability ([Kimberlin & Winterstein, 2008](#)). The reliability of a product (or system) can be defined as the probability that a product will

perform a required function underspecified conditions for a certain period of time. When a system fails to perform satisfactorily, repair is normally carried out to locate and correct the fault. The system is restored to operational effectiveness by making an adjustment or by replacing a component. Maintainability is defined as the probability that a failed system will be restored to specified conditions within a given period of time when maintenance is performed according to prescribed procedures and resources ([Pham, 2006](#)).

Effectiveness of prevention and early detection system of national healthcare insurance fraud based on computer application depends on: a) Willingness of hospital director to implement anti-fraud system; b) Socialization of fraud indicator to all hospital officers; c) Acceptance of hospital officer to system and computer application that can simplify their task in prevention and early detection of fraud; d) Competence of hospital officers to operate computer application; e) Competence of hospital/BPJS Kesehatan officers to decide whether inpatient JKN participant service is a potential fraud or not.

Data Analyses

Validity was defined as decision whether the inpatient JKN participant service was fraudulent or not. Validity was assessed by Fischer exact test of the interpretation of fraud indicator between hospital internal verifcator and BPJS Kesehatan officer.

Reliability was defined the consistency of system using by user to prevent and detect a potential fraud. Reliability was assessed using

HOT-Fit research questionnaire (Human Organization Technology and Benefit) table 2 filled by TURP officer, BPJS Kesehatan officer and internal hospital verification officer. We used Stata® (Torres-Reyna, 2007), software for HOT-Fit questionnaire test (Yusof, Kuljis, Papazafeiropoulou, & Stergioulas, 2008), and the result was Cronbach's Alpha value (Tavakol & Dennick, 2011).

Table 2 HOT-Fit questionnaire to assess computer application implementation

NO	VARIABLES	CODE	INDICATORS	ANSWER TYPES				
				VD	D	N	A	SA
1	System Quality	KS1	Computer application has usage manual					
		KS2	Computer application is easy to be learned					
		KS3	Computer application is easy to be applied					
		KS4	Computer application has already been integrated					
		KS5	Computer application is reliably operated					
		KS6	Computer application has access rights					
		KS7	Computer application is helpful to detect JKN fraud					
2	Information Quality	KI1	Computer application provides complete information on JKN fraud					
		KI2	Computer application provide true information on JKN fraud					
		KI3	Computer application provide information to understand JKN fraud indicators					
		KI4	Computer application provide timely information to detect JKN fraud					
		KI5	Computer application generate the same information as the data input					
3	Service Quality	KL1	Researchers respond quickly when needed					
		KL2	Researchers give quality and service assurance for users					
		KL3	Researchers have caring characteristic (empathy) when assisting					
		KL4	Researchers work on the problems until completely solved					
4	System Usage	PS1	Users use Computer application to detect JKN fraud					
		PS2	Users believe that computer application simplify detection of fraud					
		PS3	Users could accept Computer application usage manual well					
		PS4	Users used the Computer application easily					
5	User Satisfactions	KP1	Computer application helps to prevent JKN fraud					
		KP2	Computer application helps to detect JKN fraud					
6	Organization System	ST1	Researchers organize Computer application team well					
		ST2	Researchers manage Computer application well					
		ST3	Researchers could resolve conflicts between computer application					
7	Net-Benefit	NB1	Computer application facilitates detection of JKN fraud					
		NB2	Computer application makes JKN fraud detection more effective					
		NB3	Computer application could reduce the level of JKN fraud					
		NB4	Computer application increases communication among working units on JKN fraud detection					
		NB5	Computer application improve organization's performance on preventing JKN fraud					
		NB7	Computer application could improve organization's performance when facing demands if there are JKN frauds					

D: Denied N: No Comment A: Agree

Effectiveness was defined as the system is effective to prevent and detect the fraud indicator and then must be avoided by patient,

BPJS Kesehatan or hospital. The effectiveness was assessed by reducing of potential fraud conducted by inpatient JKN participant

hospital, BPJS Kesehatan and hospital during May until July 2017.

RESULTS

Distribution of research subject

As shown in the table 3, research participants were as follows: a) Inpatients JKN participants by purposive sampling 1.106 of 5.548

(19.93%). Only 20% of the population agreed to be enrolled because: they had no time, they were in a hurry, especially emergency patient; not interested in the research, etc; b) 9 of 9 (100%) admission administrator officers were interested in the research; c) 2 of 2 (100%) BPJS Kesehatan officers were interested in the research; d) 20 of 20 (100%) internal hospital verification officers were interested in the research.

Table 3 Distribution of research subject

No	Research subject	Sample	Population	Percentage
1	Inpatient JKN participant	1.106	5.548	19.93
2	Admission administrator officer	9	9	100
3	BPJS Kesehatan officer	2	2	100
4	Internal hospital verification officer	20	20	100
Total		1.137		

Potential fraud based on fraud indicators

Table 4 shows that there were 9 potential fraud cases in RSUP dr. Soeradji Tirtonegoro from May-July 2017 classified as follows: 1) Readmission: 4 (44.44%); 2) Changes from uninsured into insured by JKN: 2 (22.22%); 3) Keystroke mistake: 1 (11.11%); 4) Fragmentation/unbundling: 1 (11.11%); and 5) Cancelled service: 1 (11.11%). Readmission

was the highest case in this study. Because RSUP dr. Soeradji is a regional referral hospital in Klaten and the cases admitted were usually severe, the potential for rehospitalization in one month as limitation for readmission term was high. There was no fraud by inpatient JKN participant or BPJS Kesehatan.

Table 4 Potential fraud based on fraud indicators (May-July 2017) by RSUP dr. Soeradji Tirtonegoro

NO	JKN Fraud Indicators	Total	Percentage
1	Readmission/unbundling	4	44.44
2	Changes from uninsured into insured by JKN	2	22.22
3	Keystroke mistake	1	11.11
4	Fragmentation/unbundling	1	11.11
5	Cancelled service	1	11.11
TOTAL		9	100

Validity of prevention and detection system

Table 5 shows that Fischer exact test shows that only 2 out of 1.106 service claims were interpreted differently between hospital internal verification officer and BPJS Kesehatan officer. P value < 0.001, data show

that system for prevention and early detection of national healthcare insurance fraud based on computer application were valid to be implemented as anti-fraud system in the hospital.

Table 5 Fischer exact test for validity based on service claim

		Hospital internal verification officer		Total
		Potential fraud	No potential fraud	
BPJS Kesehatan Officer	Potential fraud	7	2	9
	No potential fraud	0	1.097	1.097
Total		7	1.099	1.106

Reliability of prevention and detection system

Reliability test as shown in the table 6 for prevention and early detection system of national healthcare insurance fraud based on computer application was done using HOT-Fit questionnaire and Stata® software to obtain Cronbach's Alpha value with the following results: 1) TURP officer score 0.8088-0.8849;

2) BPJS Kesehatan officer score 1.00; 3) Hospital internal verification officer score 0.8329-0.9458. The data shows that prevention and early detection system of national healthcare insurance fraud based on computer application is reliable to be implemented as anti-fraud system in hospital.

Table 6 HOT-Fit test recapitulation

No	Indicator	TURP	BPJS Kesehatan	Hospital internal verifier
1	System Quality	0.8444	1.00	0.8329
2	Information Quality	0.8088	1.00	0.8380
3	Services Quality	0.8611	1.00	0.8372
4	System Utilization	0.8649	1.00	0.8741
5	User Satisfaction	0.8279	1.00	0.8693
6	Organization System	0.8240	1.00	0.9440
7	Net Benefit	0.8849	1.00	0.9458
		0.8451	1.00	0.8733

Effectiveness of prevention and early detection system

Table 7 Potential JKN fraud in May-July 2017

No	Month	Total	Percentage
1	May 2017	8	88.88
2	June 2017	1	11.12
3	July 2017	0	0
TOTAL		9	100

Source: Credit Accomplishment I of RSUP dr. Soeradji Tirtonegoro

Table 7 shows that there were 9 potential fraud findings within May-July 2017: 8 cases in May (88.88%), 1 case in June (11.12%), and 0 (0%) in July. Potential fraud in hospital was significantly reduced, therefore, prevention and early detection system of national healthcare insurance fraud based on computer application is effective to be implemented as anti-fraud system in hospital.

DISCUSSION

Tests or instruments that are valid and reliable to measure such constructs are crucial components of research quality. Key indicators of the quality of a measuring instrument are the

reliability and validity of the measures ([Kimberlin & Winterstein, 2008](#)).

Validity is often defined as the extent to which an instrument measures what it purports to measure, the instrument measure what it is intended to measure. Validity requires that an instrument is reliable, but an instrument can be reliable without being valid ([Eldridge, 2007](#); [Kimberlin & Winterstein, 2008](#)). In this study, the system measured what it was intended to measure such as potential fraud or not, although there were only 2 out of 1.106 claims with different interpretation (disagree) of fraud or not between BPJS Kesehatan and internal hospital verification officer, 1.097 claims had the same interpretation (agree) of no potential

fraud, and 7 claims with the same interpretation (agree) of potential fraud.

Reliability estimates are used to evaluate: (1) the stability of measures administered at different times to the same individuals or using the same standard (test–retest reliability) or (2) the equivalence of sets of items from the same test (internal consistency) or of different observers scoring a behavior or event using the same instrument (interrater reliability). Reliability coefficients range from 0.00 to 1.00, with higher coefficients indicating higher levels of reliability ([Kimberlin & Winterstein, 2008](#)). The reliability of a product (or system) can be defined as the probability that a product will perform a required function underspecified conditions for a certain period of time. When a system fails to perform satisfactorily, repair is normally carried out to locate and correct the fault. The system is restored to operational effectiveness by making an adjustment or by replacing a component. Maintainability is defined as the probability that a failed system will be restored to specified conditions within a given period of time when maintenance is performed according to prescribed procedures and resources ([Pham, 2006](#)).

Effectiveness of system for prevention and early detection of national healthcare insurance fraud based on computer application depends on: a) Willingness of hospital director to implement anti-fraud system; b) Socialization of fraud indicators to all hospital officers; c) Acceptance of hospital officers to apply the system and computer application that can simplify their task in prevention and early detection of fraud; d) Competence of hospital officers to operate computer application; e) Competence of hospital officers to decide whether a health service is potentially fraudulent or not. In this study, there was a significant decrease in potential fraud from 8 findings in May to 1 finding June and no finding in July (effective).

Development of fraud prevention system, as Permenkes No. 36, 2015 stated, must be done through three processes: a) Hospital formulates

internal regulation in the form of good governance of organization and clinical services b) Hospital can develop healthcare facilities oriented in quality and cost control by utilizing effective and efficient management, evidence-based information technology and formation of fraud prevention team in the hospital; c) Hospital can develop a fraud prevention behavior as part of organization management and clinical management oriented to quality control and cost control based on TARIK (Transparency, Accountability, Responsibility, Independency, Fairness) principle ([Hartati, 2016](#); [Jasri, 2016](#)).

Hospitals can prevent any potential fraud by forming fraud prevention team in the hospital that is responsible for: a) Creating director circular letter on fraud prohibition; b) Early detection of fraud based on service claim data; c) Socialization policy, regulations and new customs oriented on quality control and cost control; d) Improving coder, medical doctor and other officers' capability regarding claims; e) Taking precautions, detection and manage fraud; f) Monitoring and evaluation; g) Establishing commitment between hospital and BPJS Kesehatan in case of overpayment, steps on how to cooperate, and in case of fraud suspicions, clarification should be made by the hospital; h) Internal verification by SPI before submitting the claim; i) Developing clinical practice guideline and the clinical pathway for each diagnosis; j) Reporting to hospital chief director every six months ([Hartati, 2016](#); [Sutoto, 2014](#)).

Hospitals should optimize fraud prevention team who would spearhead the development and implementation of fraud prevention and detection system. Ministry of Health Regulation (Permenkes) No 36/2015 stated that this team should at least consist of internal examination unit element, medical committee, medical recorder, coder, and other related elements. The team's task is conducting prevention and early detection for fraud based on claim data to BPJS Kesehatan, socializing regulations orienting on quality and cost control to support implementation of good organizational and clinical governance. Fraud

prevention team's competence on fraud prevention and detection should also be improved ([Hartati, 2016](#); [Jasri, 2016](#)).

In this study, most potential fraud event in National Health Insurance by hospital was readmission caused by: 1) RSUP dr. Soeradji Tirtonegoro as referral hospital in Klaten district, handled severe referral cases with a potency to relapse within less than one month after discharge; 2) Hospital staffs were not careful in detecting patients who were readmitted in less than 30 days after being discharged by the doctor, where the claim should be in the same episode as the previous admission. Hospitals should pay more attention for potential fraud in readmission so that the same mistake would not be repeated again.

Studies on readmission event conducted in hospitals from various locations generate several data as follows: 1) Readmission was the most frequent event in potential fraud, such as upcoding ([Ardyanto, 2015](#)); 2) Medicare penalizes hospitals with higher than expected readmission rates by up to 3% of annual inpatient payments ([Barnett, Hsu, & McWilliams, 2015](#)); 3) Readmission event was 19.6% ([Jencks, Williams, & Coleman, 2009](#); [Toomey et al., 2016](#)); nearly 30% of 30-day readmissions to a children's hospital may be potentially preventable ([Toomey et al., 2016](#)). High risk of readmission could occur in: low education level, depression, physical inactivity, hypertension, diabetes, and ≥ 3 risky behaviors ([Dupre et al., 2017](#)).

Readmission reduction program could be achieved by: 1) Hospital staffs manage patients according to standard of quality; 2) Home visit service conducted soon after discharge; 3) Disease management: (a) support the physician or practitioner/patient relationship and care plan; (b) prevent exacerbations and complications utilizing evidence-based practice guidelines and patient empowerment strategies; and (c) evaluate outcomes in an ongoing basis; 4) Post-acute care: many patients are not discharged directly from the hospital to the home, but instead go to long-term acute care hospitals, inpatient

rehabilitation hospitals or skilled nursing facilities where, in addition to rehabilitative services, they can receive around-the-clock medication management ([Hubbard & McNeil, 2012](#); [Wier, Barrett, Steiner, & Jiang, 2006](#)).

Barriers to implementation and successful outcomes: 1) Incomplete and inaccurate patient medication lists: Hospital staff report many of the same difficulties faced by office-based physicians in assembling an accurate list of each patient's prescription medications on a timely and cost-effective basis; 2) Limitations of family caregiver or other sources of patient support: For patients experiencing a decline in cognitive function, a family caregiver can be the de facto medication manager; 3) Difficulty scheduling timely follow-up visits for primary care physicians or community-based specialists; 4) Funding challenges: The new discharge planning and transitional care models represent intensive, high-touch patient care approaches that can be difficult to fund in the long term ([Hubbard & McNeil, 2012](#)).

Potential fraud event in National Health Insurance which uninsured patients were changed into insured in this study occurred in: a) healthy newborns who should be claimed together with the mothers' claim, but were claimed separately; b) administration error such as incomplete admission requirement after 3 days but was still submitted for claim ([BPJS Kesehatan, 2014](#)). Stroke mistake could occur due to hospital staffs' carelessness when inputting patients' entry data; however potential fraud cases in this study did not increase the hospital's claim amount and hence was not detrimental to BPJS Kesehatan's finance ([Mardha, 2014](#)).

Fragmentation/unbundling were caused by submission of inpatient JKN participant claim together with outpatient claim; there should only be one inpatient JKN participant claim submitted to BPJS Kesehatan ([Dodaro, 2015](#)). Canceled service happened because hospitals have treated patients in the emergency room and had spent resources during temporary treatment before referring patients to other hospitals because the hospital was unable to

provide comprehensive patient care (Thorpe, Deslich, Sr, & Coustasse, 2012).

Limitation of this study include: 1) the success of prevention and early detection system implementation depend on capability of admission administrator, internal hospital vericator, BPJS Kesehatan to decide whether there is fraud or not; 2) computer application was not bridging yet with information system of hospital or INA-CBG's software to simplify implementation, the officer only need to input patient's medical record number, not the entire patient identities were put into the fraud information system; 3) Fraud indicator in this study was still incomplete, further studies are needed to add new fraud indicators to complete fraud indicator.

CONCLUSION

Prevention and early detection system of national healthcare insurance fraud based on computer application used in this study is valid, reliable, and effective to use as prevention and early detection system for potential fraud in inpatient JKN participant service in the hospital.

The system in this study can be adopted by other hospitals with several conditions, such as: 1) hospital should have an information technology system or server with local area network, 2) hospital has a willingness for anti-fraud system, 3) hospital has a hospital internal verification staff as well as workshop and techincal support and good understanding of fraud indicators that are needed for all staffs to operate properly.

It is suggested that further study is needed for automatization of computer application to minimize or simplify the activity of officers to prevent and early detect potential fraud, and need to be implemented in other hospitals. The computer application containing JKN fraud indicators can be used as a claim requirement for hospitals that collaborate with BPJS Kesehatan in Verification digital claim (Vedika) system to minimize BPJS Kesehatan financial deficit; and Fraud indicators in this

study could be used as an addition to the existing fraud indicators stated in the Ministry of Health Regulation (Permenkes) No 36/2015.

Acknowledgment

Prof. dr. Laksono Trisnantoro, M.Sc, Ph.D as Promotor, Dr. drg. Julita Hendrartini, M.Kes as Co-Promotor, Dr. dr. Bambang Udji Djoko R, SpTHT-KL(K), M.Kes as Advisor, President Director of RSUP dr. Soeradji Tirtonegoro Klaten along with his staff for the study permission, patient and their family who approved to be enrolled in this study, Admission Administrator staff (TURP) as research subject, BPJS Kesehatan officer as research subject, Internal Verification Officer of RSUP dr. Soeradji Tirtonegoro as research subject, Prof. dr. Mochammad Jufri, Ph.D as Chairman of S3 Study Program and his staffs, and all parties who have participated in this research.

REFERENCES

- Ardyanto, T. D. (2015). RS dan fraud dalam JKN: profesional, moral dan maslahat.
- Ariati, N. (2015). Pencegahan Korupsi dalam Sistem Jaminan Sosial Nasional. Retrieved from http://mds.marshall.edu/cgi/viewcontent.cgi?article=1044&context=mgmt_faculty
- Barnett, M. L., Hsu, J., & McWilliams, J. M. (2015). Patient characteristics and differences in hospital readmission rates. *JAMA internal medicine*, 175(11), 1803-1812.
- BPJS Kesehatan. (2014). Info BPJS Kesehatan edisi XIII tahun 2014. Retrieved from <http://bpjs-kesehatan.go.id/Bpjs/dmdocuments/1d3b0c3210d00cb6af835b0f8f34a8da.pdf>
- Busch, R. S. (2012). *Healthcare fraud: auditing and detection guide*: John Wiley & Sons.
- Cahyono, A. E. (2015). Setahun Berlaku BPJS Kesehatan Rugi. Retrieved from <http://www.teropongsenayan.com/6446-setahun-berlaku-bpjs-kesehatan-rugi>
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*: Sage publications.
- Dodaro, G. L. (2015). *Government Efficiency and Effectiveness: Opportunities to Reduce Fragmentation, Overlap, and Duplication and Achieve Other Financial Benefits*. Retrieved from
- Dupre, M. E., Nelson, A., Lynch, S. M., Granger, B. B., Xu, H., Willis, J. M., . . . Peterson, E. D. (2017). Identifying nonclinical factors associated with 30-day readmission in patients with cardiovascular disease: protocol for an observational study. *JMIR research protocols*, 6(6).
- Eldridge, J. (2007). Reliability, validity and trustworthiness. *Introduction to Nursing*

- Research. Incorporating Evidence-Based Practice.* Jones and Bartlett Publishers, Sudbury, Massachusetts, 213-233.
- Fadjriadinur. (2015). Peran BPJS Kesehatan Dalam Pencegahan Fraud Dan Abuse Dalam Sistem Jaminan Kesehatan Nasional. Retrieved from <http://diskes.jabarprov.go.id/dmdocuments/9b1cfb6797c4408531082425ae3c60c6.pdf>
- Hartati, T. S. (2016). Pencegahan Kecurangan (Fraud) dalam Pelaksanaan Program Jaminan Kesehatan pada Sistem Jaminan Sosial Kesehatan (Studi di Rumah Sakit Umum Daerah Menggala Tulang Bawang). *Fiat Justisia*, 10(4).
- Hendrartini, Y. (2014). *Deteksi dan Investigasi Fraud dalam Asuransi Kesehatan: Bagaimana di Indonesia?* Paper presented at the Universitas Gadjah Mada Anniversary Symposium.
- Honer, P. M. (2015). *Combating white-collar crime in US healthcare programs* Business Information Technology, Faculty of Electrical Engineering, Math and Comp Science.
- Hubbard, T., & McNeil, N. (2012). Improving medication adherence and reducing readmissions. *NEHI Issue Brief*, 1-12.
- Jasri, H. (2016). Blended Learning Optimalisasi Peran Tim Pencegahan Kecurangan JKN di Rumah Sakit. Mutu Pelayanan Kesehatan. Retrieved from <https://www.mutupelayanankesehatan.net/41-cop-fraud/2434-bimbingan-teknis-tim-pencegahan-kecurangan-jkn-di-rumah-sakit>
- Jencks, S. F., Williams, M. V., & Coleman, E. A. (2009). Rehospitalizations among patients in the Medicare fee-for-service program. *New England Journal of Medicine*, 360(14), 1418-1428.
- Kimberlin, C. L., & Winterstein, A. G. (2008). Validity and reliability of measurement instruments used in research. *American Journal of Health-System Pharmacy*, 65(23), 2276-2284.
- Mardha, B. (2014). Tindakan Fraud dalam Pelayanan Kesehatan di Era JKN-BPJS. Retrieved from <http://www.kesehatanpro.com/10-tindakan-fraud-dalam-pelayanan-kesehatan-di-era-jkn-bpjs/>
- MOH. (2013). *Buku Pegangan Sosialisasi Jaminan Kesehatan Nasional (JKN) dalam Sistem Jaminan Sosial Nasional*. Pusat Pembiayaan dan Jaminan Kesehatan Kementerian Kesehatan Republik Indonesia.
- Pham, H. (2006). System Reliability Concepts *System Software Reliability* (pp. 9-75): Springer.
- Suparman. (2017). Cegah penyimpangan kpk dan kemkes bentuk satgas jkn. Retrieved from <http://www.beritasatu.com/hukum/415855-cegah-penyimpangan-kpk-dan-kemkes-bentuk-satgas-jkn.html>
- Sutoto. (2014). Peran direktur rumah sakit dalam mencegah fraud di rumah sakit. Retrieved from <http://manajemenrumahsakit.net/wp-content/uploads/2014/03/PERAN-IREKTUR-RUMAH-SAKIT-DALAM-MENCEGAH-FRAUD-DR-SUTOTO.pdf>
- Tariden, T. (2017). BPJS Dibobol, KPK Temukan Indikasi 1 Juta Klaim Fiktif. Retrieved from <http://medan.tribunnews.com/2017/03/30/bpjs-dibobol-kpk-temukan-indikasi-1-juta-klaim-fiktif>
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International journal of medical education*, 2, 53.
- Thorpe, N., Deslich, S., Sr, A. S., & Coustasse, A. (2012). Combating medicare fraud: a struggling work in progress. *Franklin Business & Law Journal*, 4, 95-107.
- Toomey, S. L., Peltz, A., Loren, S., Tracy, M., Williams, K., Pengeroth, L., . . . Schuster, M. A. (2016). Potentially preventable 30-day hospital readmissions at a children's hospital. *Pediatrics*, e20154182.
- Torres-Reyna, O. (2007). *Getting Started in Data Analysis using Stata*: Princeton: Princeton University.
- Trisnantoro, L., Rahma, P.A., Jasri, H. (2014). Sistem Pencegahan, Deteksi, dan Penindakan Fraud Layanan Kesehatan dalam Era Jaminan Kesehatan Nasional Retrieved from <https://www.mutupelayanankesehatan.net/14-agenda/1716-policy-brief-sistem-pencegahan-deteksi-dan-penindakan-fraud-layanan-kesehatan-dalam-era-jaminan-kesehatan-nasional-jkn>
- Wier, L., Barrett, M., Steiner, C., & Jiang, H. (2006). All-cause readmissions by payer and age. *Healthcare Cost and Utilization Project (HCUP) Statistical Briefs*, Rockville, MD, Agency for Health Care Policy and Research (US), 2011.
- Yusof, M. M., Kuljis, J., Papazafeiropoulou, A., & Stergioulas, L. K. (2008). An evaluation framework for Health Information Systems: human, organization and technology-fit factors (HOT-fit). *International Journal of Medical Informatics*, 77(6), 386-398.

Cite this article as: Santoso, B., Hendrartini, J., Rianto, B.U.D., Trisnantoro, L. (2018). System for detection of national healthcare insurance fraud based on computer application. *Public Health of Indonesia*, 4(2):46-56.