Factors Affecting the Quality of Diagnosis Coding and Medical Record at Dr. Moewardi Hospital, Surakarta

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ABSTRACT

Background: Diagnosis coding is atool for identifying and grouping diseases, disorders, symptoms, and other disease-related outcomes, such as poisoning, adverse effect of drugs and chemicals, and injury. Diagnosis code can be used in policy making and costing medical care. Doctors, nurses, coding personnel, and medical record quality, may affect the quality of diagnosis coding. This study aimed to investigate factors that affectsthe quality of diagnosis coding at Dr. Moewardi Hospital, Surakarta.

Subjects and Method: This was an analytic observational using cross sectional design. This study was conducted at Dr. Moewardi Hospital, Surakarta, Indonesia. A total of 250 inpatient medical record document at Dr. Moewardi Hospital were selected for the study bystratified random sampling.The data was analyzed by structural equation modeling (SEM).

Results: Sub-specialistic doctor (b= 1.13; 95%CI= 0.06 to 0.33; p= 0.039), civil servant doctor (b= 0.84; 95% CI= 0.06 to 1.62; p =0.034), nurse tenure ≥5 years (b= 1.77; 95% CI= 1.13 to 2.42; p <0.001), increased the quality of medical record. Health personnel aged ≥40 years (b= 1.70; 95% CI= 0.64 to 2.77; p= 0.002), tenure ≥5 years (b= 1.70; 95%CI= 0.98 to 2.42; p= 0.001), and personnel has ≥ 5 times training (b= 2.62; 95% CI= 1.40 to 3.83; p <0.001), increased the quality of diagnosis coding.

Conclusion: Sub-specialistic doctor, civil servant doctor, tenure ≥5 years, increased the quality of medical record. Health personnel aged ≥40 years, tenure ≥5 years, and personnel has ≥5 times training, increased the quality of diagnosis coding.

Keywords: Quality of diagnosis coding, quality of medical record, doctor, nurse, coding personnel

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BACKGROUND

Diagnosis coding has a very important role for health care providers as a basis for making statistics for trends in disease. Diagnosis coding is also the basis for determining the cost of health services. Diagnosis coding that is not qualified will cause harm to hospitals in financial and policy-making (WHO, 2010).

Factors that can affect the quality of the diagnosis code among doctors, other medical personnel (nurses), and medical record staff (coding personnel). Doctors and nurses are responsible for the quality of the patient's medical record documents and the coding personnelsare responsible for the quality of the diagnosis code based on the medical data (Ministry of Health, 2006).

Individual characteristics are internal (interpersonal) factors that move and influence individual behavior (Hurriyati, 2005). Characteristics of individuals who can influence performance are age, tenure, education, training, and employment status (Suma'mur, 2014).

The diagnosis coding in a public hospital is significantly more appropriate than in special hospital. However, there are more numbers of diagnosis coding with types of major errors in public hospitals (Farzandipouret al., 2010). Dr. Moewardi hospital is a public hospital that has type A Education and has 232 doctors, 721 nurses, and 16 coding personnels of inpatient's medical record documents.

From the results of preliminarystudy, 40% of the 10 medical record documents of inpatients have poor quality diagnostic codes. Sudra and Pujihastuti (2016) also showed that the percentage of the inaccuracy of the diagnosis coding in Dr. Moewardi Hospital as many as 34.2% of 380 medical record documents. Theinaccuracy percentage of the diagnosis coding is higher than the average of other domestic hospitals, which is 31.5% (Arifianto et al., 2011; Rahayu et al., 2011; Rohman et al., 2011; Abiyasa et al., 2012; Ifalahma, 2013; Sarwastutik, 2013; Pujihastuti and Sudra, 2014; Seruni and Sugiarsi, 2015; Karimah et al., 2016) and still very much higher compared to overseas hospitals by 12.71% (Farzandipouret al., 2010; Cheng et al., 2009; Dalal and Roy, 2009; Thigpen et al., 2015; Cummings et al., 2011).

This study aimed to investigate factors that affectsthe quality of diagnosis coding at Dr. Moewardi Hospital, Surakarta.

SUBJECTS AND METHOD

The type of the study was observational analytic study with cross sectional design. The study population was all inpatient medical record documents at Dr. Moewardi hospital, Surakarta in October - November 2016. The number of samples in the study was 250 medical record documents in the Orchid, Melati, Mawar, Cendana and Aster wards which were selected by stratified random sampling with 50 documents for each ward.

Data was collected using observation tables, medical analysis document quality sheet, analysis sheet accuracy, consistency, completeness and timeliness of diagnosis codes, ICD-10, and stopwach. Data were analyzed by univariate, bivariate with chi-square, and multivariate analysis with logistic regression using Structural Equation Modeling in Stata 13.

RESULT

The subjects of this study included 64 doctors, 276 nurses, and 16 coders in Dr. Moewardi hospital, Surakarta. Table 1 shows the majority of doctors aged ≥40 years by 68.80%, the working period of doctors ≥5 years by 71.90%, doctors who possessed doctoral degree as many as 57.80%, subspecialty doctors as many as 56.30% and civil servant doctors as many as 92.2%.

Table 2 shows that most of the nurses <40 years were 87.70%, nurses' working period <5 years were 56.50%, nurses who possessed associate's degree were 73.90% and civil servant nurses were 60.10%.

Table 3 shows that most coding personnels were <40 years old (87.50%), working period of coding personnels <5 years as many as 62.50%, coding personnels who possessed associate's degree were 93.80%, coding personnels with the number of training <5 times as many as 87.50% and non civil servant coding personnels as many as 56.20%.

Most medical record documents hada good quality, as many as 164 (65.60%), the quality of medical records that was not good as many as 86 (34.40%). The quality of the diagnosis coding was mostly good, as many as 152 (60.80%). While, the diagnosis coding that was not good were 98 (39.20%).

Table 4 shows the results of path analysis with the selection of Generalized

Structural Equity Modeling (GSEM) in Stata 13. Age of the coding personnel ≥40 years had logodds 1.70 better in the quality of diagnosis coding than age <40 years (b= 1.70; 95% CI= 0.64 to 2.77; p= 0.002).

Tenure ≥5 years had logodds 1.70 better in the quality of diagnosis coding than tenure <5 years (b= 1.70; 95% CI= 0.98 to 2.42; p <0.001).

Table 1.The characteristics of doctors

Variable	Category	N	%
Age	< 40 years	20	31.20
	≥ 40 years	44	68.80
Working period	< 5 years	18	28.10
	≥ 5 years	46	71.90
Education	Master degree	27	42.20
	Doctoral degree	37	57.80
Type of expertise	Specialist	28	43.80
	Sub-specialist	36	56.30
Employment status	Non Civil Servant	5	7.80
	Civil Servant	59	92.20

Table 2. The characteristics of nurses

Variable	Category	N	%
Age	< 40 years	242	87.70
	≥ 40 years	34	12.30
Working period	< 5 years	156	56.50
	≥ 5 years	120	43.50
Education	Associate's degree	204	73.90
	Bachelor	72	26.10
Employment status	Non Civil Servant	110	39.90
	Civil Servant	166	60.10

Table 3. The characteristics of coding personnel

Variable	Category	N	%
Age	< 40 years	14	87.50
	≥ 40 years	2	12.50
Working period	< 5 years	10	62.50
	≥ 5 years	6	37.50
Education	Associate's degree	15	93.80
	Bachelor	1	6.20
Training	<5 times	14	87.50
	≥ 5 times	2	12.50
Employment status	Non Civil Servant	9	56.20
	Civil Servant	7	43.80

Bachelor-educated coding personnels had logodds 0.39 worse in the quality of the diagnosis coding than the coding personnel who possessed associate's degree, but not significant (b= -0.39; 95% CI= - 1.91 to 1.14; p= 0.618). Coding personnel with training ≥5 times had logodds 2.62 better in the quality of the diagnosis coding than the coding with training <5 times (b= 2.62; 95% CI= 1.40 to 3.83; p<0.001). Civil servant coding personnel had logodds 0.55 and were better in the quality of diagnosis

coding than non civil servant coding personnel, but not significant (b= 0.55; 95% CI= - 0.18 to 1.29; p= 0.141). The quality of a good medical record document had better logodds 1.54 in the quality of the diagnosis coding than the quality of the medical record document that was not good (b= 1.54; 95% CI= 0.81 to 2.27; p<0.001).

Doctors who were ≥40 years old had better logodds by 0.55 in the quality of medical record documents than who were <40 years, but not significant (b= 0.55; 95% CI= - 0.14 to 1.24; p= 0.116). Doctor tenure ≥5 years had logodds by 0.32 better in the quality of medical record documents than tenure <5 years, but it was statistically non-

significant (b= 0.32; 95% CI= -0.39 to 1.03; p= 0.375).

Doctors who had a doctoral degree education had a worse logodds of 0.05 in the quality of medical record documents than doctors who had magister degree education, but it was statistically non-significant (b= -0.05; 95% CI= - 1.11 to 1.00; p= 0.921). Sub-specialist doctors had better logodds of 1.13 in quality medical record documents than specialist doctors (b= 1.13; 95% CI= 0.06 to 2.21; p= 0.039). Civil servant doctors had better logodds of 0.84 in the quality of medical record documents than doctors of non civil servants (b= 0.84; 95% CI= 0.06 to 1.62; p= 0.034).

Table 4. Factors that influence the quality of the diagnosis coding

Dependent Variable	Independent Variable	b	SE	CI (95%) Lower limit	CI (95%) Upper limit	p
Direct Effect						
Quality of the diagnosis code	← Age of coding personnel ≥40 years	1.70	0.54	0.64	2.77	0.002
	← Tenure of coding personnel ≥ 5 years	1.70	0.37	0.98	2.42	<0.001
	← Education of coding personnel: Bachelor	-0.39	0.78	-1.91	1.14	0.618
	← Coding personnel's training ≥ 5 times	2.62	0.62	1.40	3.83	<0.001
	← Employment status of the coding personnel:civil servant	0.55	0.37	-0.18	1.29	0.141
	← Quality of medical record documents: good	1.54	0.37	0.81	2.27	<0.001
Indirect Effect						
Quality of the medical record documents	← Age of doctors≥ 40 years	0.55	0.35	-0.14	1.24	0.116
	← Doctor tenure ≥5 years	0.32	0.36	-0.39	1.03	0.375
	← Education of doctor: doctoral degree	-0.05	0.54	-1.11	1.00	0.921
	← Type of expertise of the doctor: Sub-specialist	1.13	0.55	0.06	2.21	0.039
	← Employment status doctor: civil servant	0.84	0.39	0.06	1.62	0.034
	← Age of nurses ≥40 years	0.22	0.35	-0.47	0.91	0.532
	← Nurse tenure ≥ 5 years	1.77	0.33	1.13	2.42	<0.001
	← Education of nurses:bachelor	0.46	0.35	-0.23	1.15	0.189
	← Employment status of nurses: civil servant	-0.47	0.35	-1.16	0.23	0.186
N Observation	250					
Log likelihood	-221.16					

The age of nurses ≥ 40 years had logodds 0.22 units higher in the quality of medical record documents than nurses aged <40 years, but it was statistically non-

significant (b= 0.22; CI95%= - 0.47 to 0.91; p= 0.532). Nurse tenure ≥5 years have logodds 1.77 units higher in the quality of medical record documents than nurse

tenure <5 years (b= 1.77; 95% CI= 1.13 to 2.42; p<0.001). Nurses who have bachelor degree education had logodds 0.46 units higher in the quality of medical record documents than nurses with an associate's degree education, but it was statistically non-significant (b= 0.46; 95% CI= - 0.23 to 1.15; p= 0.189). Civil servant nurses had logodds 0.47 units lower in the quality of medical record documents than non civil servant nurses, but it was statistically non-significant (b= -0.47; 95% CI= -1.16 to 0.23; p= 0.186).

DISCUSSION

The results of this study indicated that the variables such as age, tenure, and medical education were related to the quality of medical record documents but were not statistically significant. This is because age, tenure, and medical education do not have a major influence on the performance of doctors. According to Lihawa et al., (2016), the magnitude of the effect of total work motivation variables through moderating individual characteristics (gender, age, and tenure) on physician performance variables was only 13.7%, while the remaining was 82.3% and was influenced by other variables. This study shows the characteristics of doctors that significantly influence the quality of the diagnosis coding through the quality of medical record documents, namely the type of expertise and employment status.

Sub-specialist doctors have better medical record document quality (80.20%) than specialist doctors (49.60%). A study by Yulianto and Santoso (2015), revealed that the higher the type of expertise possessed by the doctor, the better the doctor's perception of the medical services he receives. General practitioners perceive that the medical services they receive are not enough to meet their needs. Most general practitioners hope that there will be an increase in medical services that they receive in order to be able to finance their children's education to a higher level. In addition, specialists perceive that the medical services provided are in accordance with the workload and sufficient to meet their daily needs.

A study by Djafar et al., (2011), stated that the most influential management factor on specialist job satisfaction is the clarity of medical services. Muljani (2012), concluded that if the incentive program is perceived as fair and competitive by employees, the institution will find it easier to attract potential employees, maintain, and motivate employees to further improve their performance.

The quality of medical record documents from civil servant doctors (72.90%) and non civil servant doctors (63.40%) is not much different. However, it has a statistically significant influence. Other studies also state the same thing that there is a relationship between the type of staffing doctor and the completeness of writing medical record data on the patient's resume sheet (Sugiyanto, 2006). Some non civil servant doctors are doctors who work part time so that the doctor does not have much time in the hospital to complete the medical record document. In addition, giving incentives to doctors is one of the factors that can motivate the performance of doctors in completing medical record documents. Moreover, in the current implementation of JKN (National Health Insurance), the gap in the number of medical services between doctors and civil servants is increasing. The results of the study of the effect of incentives on work motivation are carried out by Ghazanfar et al., (2011), which stated that satisfaction with incentives can be a work motivation factor. Randy et al., (2012), showed

that incentives can increase employee work motivation.

Work period is the only characteristic of nurses that significantly influences the quality of medical record documents. Supratti and Ashriady (2016), stated that documentation of good and quality nursing care processes must be accurate, complete, and in accordance with standards. If nursing activities are not accurately and completely documented, it is difficult to prove that nursing interventions have been carried out correctly. The results of thestudy showed that the nursing sheet documents were mostly (94.6%) in the inaccurate category because of a lack of work motivation and nurse experience.

Nurses at Dr. Moewardi hospital with tenure of ≥5 years has a better quality medical record document (8.80%) than nurses with tenure <5 years (36.50%). Farida (2011), argued that the longer a person works, the more skilled and faster they will be in completing their tasks. Likewise the opinion of Fardiansyah (2014), which stated that the less long the working period is, the easier it is for someone to experience stress. A person will not experience stress if he is able to make a healthy response to stress as a form of balance improvement in the environment system from inside and outside or called as the adaptation process. The thing that really influences the stress response is coping mechanism or length of work.

The results of this study also indicate that the characteristics of personnel coding are the most dominant variable and directly influence the quality of the diagnosis code. Variables that were proven to have a significant effect were age, years of service, and training. Accuracy in giving a diagnosis coding is something that must be considered by medical recording personnel, the accuracy of data diagnosis is very important in the

field of clinical data management, cost collection, along with other matters relating to care and health services (Hatta, 2013).

According to Hsia et al. (2009), 61.70% of coding errors that occur in health services are spread to doctors and hospital administration officers in charge of handling coding activities. This error is mostly done by coding personnel who are unable to understand code selection for more complex diseases. Based on the study, it can be seen that the coding of personnel in conducting coding must really understand the disease suffered by the patient and then determine the diagnosis coding to minimize the error of the coding produced. Something similar was also stated by Berger et al., (2015), of the 4 types of error diagnosis coding, all errors were caused by coding personnel and there was only one type of error caused by a doctor.

Most coding personnel who are<40 years of age are 87.50%. This is also in accordance with Rivai (2003), which stated that a person at a young age is more productive than in old age. Dariyo (2003), stated the same thing that productive age is young adulthood, which is 20-40 years.

The results of this study are in accordance with the study of Farzandipour et al., (2010), which stated that lack of experience in personnel coding can cause inaccuracies in diagnosis codes (p<0.001). A study by Rahayu et al. (2011) also showed that one of the factors that caused the inaccuracy of the diagnosis coding is because the new coding personnel had experience working in the codification section just for one year.

Coding personnel who had attended training ≥5 times had better diagnosis coding quality (89.80%) than ≥5 with training <5 times (45.10%). Ivancevich et al., (2008), suggested that training is a systematic process to change the work behavior of a person / group of employees in an

effort to improve organizational performance.

Training is related to the skills and abilities needed for the work done. The results of this study are in accordance with the study of Rahayu et al., (2011), which stated that one of the factors that caused the inaccuracy of the diagnosis coding was because the coding personnel had never attended codification training. In addition, the study of Abiayasa et al. (2012) showed that the accuracy of the diagnosis coding is not only influenced by the writing of specific primary diagnoses but also influenced by the activeness factor of coding in finding specific diagnosis information so that codification training with ICD-10 has very important role.

Most of the quality of the diagnosis coding in Dr. Moewardi hospital is good, as many as 152 (60.80%), while the diagnosis coding that is not good as many as 98 (39.20%). The quality of poor medical record documents is 86 (34.40%), where the most common causative factor is due to incomplete medical record documents. The quality of a good medical record document also has a better quality diagnostic coding (73.80%) compared to the quality of an inadequate medical record document (36-.00%).

Completeness of writing medical information on each medical record form has an important role in determining the right code through a diagnosis set by the doctor. The results of the study by Rohman et al., (2011), stated that one of the factors that influence the accuracy of the diagnosis coding is medical information. Medical information in question is a diagnosis.

A study by Astuti et al. (2007), also discussed that accurate codes are obtained, one of which is by paying attention to supporting information or other information that affects the diagnosis coding. Pujihas-

tuti and Sudra (2014), stated that there is a significant relationship between completeness of document record information medical with the accuracy of disease diagnosis coding in inpatient medical record documents (p <0.001).

The results of this study are also in accordance with the study of Farzandipour et al., (2010), which stated that the medical record documentation is more complete about topography (p= 0.204), subtypes (p= 0.708), and etiology (p<0.001) disease can affect the accuracy of the diagnosis coding. Cheng et al. (2009), also showed that the most significant factor underlying the error of diagnosis coding and changes in DRGs is the low quality of medical record documentation.

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