ORIGINAL ARTICLE

UDC: 614.254::616-071.1
DOI: 10.2298/VSP150427057M

Agreement between admission and discharge diagnoses: analysis by the groups of International Classification of Diseases, 10th revision

Slaganja uputne i otpusne dijagnoze: analiza po grupama Međunarodne klasifikacije bolesti, X revizija

Nataša Mihailović*, Goran Trajković†, Ivana Simić-Vukomanović*, Svetlana Ristić‡, Sanja Kocić§

***Institute of Public Health Kragujevac, Kragujevac, Serbia; †Institute for Medical Statistics and Informatics, Faculty of Medicine, University of Belgrade, Serbia; ‡Institute for Oncology and Radiology of Serbia, Belgrade, Serbia; §Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia**

Abstract

Background/Aim. Admission diagnosis represents the diagnosis of an illness, injury or condition due to which a patient is referred to hospital to be admitted. Discharge diagnosis represents the main reason of illness or condition due to which a patient is admitted. The aim of this study was to analyze the agreement between admission diagnostic groups and discharge diagnostic groups of patients in the Clinical Center Kragujevac in the period from January 1, 2006 to December 31, 2013 on the basis of the hospitalization report. **Methods.** From the basic set of reports, 5% of random samples were singled out and they contained 20,422 reports. Out of the given number of reports, 18,173 hospitalization reports were complete and then further analyzed in the paper. Admission diagnostic groups given by the primary care doctor were compared with discharge diagnostic groups filled out by the practicing physician in the hospital ward from which a patient was discharged. The agreement of these two diagnostic groups was an indication of the high-quality performance of the primary care doctor. Agreement analysis was conducted using Cohen's Kappa statistics. **Results.** Agreement analysis showed that the values of the Kappa coefficient for the five leading admission diagnostic groups were in the range of $\kappa = 0.61$ to $\kappa = 0.94$. The values of the Kappa coefficient for the five most common discharge diagnostic groups were in the range of $\kappa = 0.55$ to $\kappa = 0.81$. **Conclusion.** Hospitalization report is a reliable individual report on inpatient care, so it could be used in determining the degree of agreement between admission diagnostic groups and discharge diagnostic groups.

Key words:
patient admission; patient discharge; diagnosis; international classification of diseases.

Apstrakt

Uvod/Cilj. Uputna dijagnoza ukazuje na oboljenje, povredu ili stanje zbog kojeg je bolesnik upućen na prijem u bolnicu. Otpusna dijagoza pokazuje glavni uzrok bolesti ili stanja zbog kojeg je bolesnik primljen u bolnicu. Cilj ovog rada bio je analiza slaganja uputne dijagnoze i osnovnog uzroka hospitalizacije bolesnika u Kliničkom centru Kragujevac u periodu od 1. 1. 2006 do 31. 12. 2013. godine na osnovu izveštaja o hospitalizaciji. **Metode.** Iz osnovnog skupa izdvojen je slučajni uzorak koji je sadržao 20 422 izveštaja (5%). Od datog broja 18 173 izveštaja o hospitalizaciji bilo je potpuno i oni su u daljem radu analizirani. Poređena je uputna dijagnoza koju propisuje lekar u primarnoj zdravstvenoj zaštiti sa osnovnim uzrokom hospitalizacije koji popunjava ordinirajući lekar odeljenja sa kojeg se bolesnik otpušta. Slaganje dveju dijagnoza predstavlja indikator kvaliteta rada lekara u primarnoj zdravstvenoj zaštiti. Analiza slaganja urađena je pomoću kapa statistike. **Rezultati.** Analiza slaganja pokazala je da se vrednosti kapa koeficijenta za pet vodećih uputnih dijagnoza kreću u rasponu od $\kappa = 0,61$ do $\kappa = 0,94$. Vrednosti kapa koeficijenta za pet najčešćih osnovnih uzroka hospitalizacije bile su u rasopnu od $\kappa = 0,55$ do $\kappa = 0,81$. **Zaključak.** Izveštaj o hospitalizaciji je pouzdani individualni izveštaj o stacionarnom lečenju i može se koristiti u određivanju stepena slaganja uputne dijagnoze i osnovnog uzroka hospitalizacije.

Ključne reči:
bolesnik, prijem; bolesnik, otpust; dijagnoza; međunarodna klasifikacija bolesti.

Correspondence to: Nataša Mihailović, Institute of Public Health Kragujevac, Nikole Pasica 1, 34 000, Kragujevac, Serbia. Phone: +381 34 50 45 33. Fax: +381 34 331 344. E-mail: natalimihailovic@gmail.com

Introduction

Admission diagnosis represents the diagnosis of an illness, injury or condition due to which a patient is referred to hospital to be admitted. Discharge diagnosis represents the main reason of illness or condition due to which a patient is admitted. They are established after the period of treatment and diagnostic procedures which are recorded in the medical documentation. Discharge diagnoses are filled out by the practicing physician in the hospital ward from which a patient is discharged and they can, if they want, confirm the diagnosis given at the time of admission by the primary health care doctor.

The reliability of diagnoses indicates a high-quality work of the primary care physician. Analysis of sensitivity, positive predictive value and accuracy of the hospitalization report in which discharge diagnostic group is referred to as a health disorder for which it is necessary to keep a register (for example, a stroke register) which is considered a "gold standard", shows that there is an agreement and that hospital discharge data are reliable and that it can be used [1]. In contrast to this, and the fact that these data are available to researchers in the Institute of Public Health in Serbia and hospital management, this kind of research is not often conducted in Serbia. The reason could be that the use of large databases for assessment of people's health condition, evaluation of the performance and planning further activities are not just a routine. Namely, despite the fact that data are reliable [2] and that they exist for years [3], there are problems such as: discrepancy between defining and coding of diagnoses and practical procedures, underestimation of comorbidity [4], as well as a partial coverage of health institutions [5].

Although the quality of the available data varies [6] every doctor-researcher must possess a skill for perceiving and understanding the variability of the data [7].

The aim of the paper was to analyze the agreement between admission diagnostic groups and discharge diagnostic groups on the basis of the hospitalization report.

Methods

This retrospective cohort study included as a basic set all the hospitalization reports of the patients admitted in the Clinical Centre in Kragujevac in the period from January 1, 2006 to December 31, 2013. The data were taken from the database of the Biostatistics and Medical Informatics Center in the Institute of Public Health in Kragujevac as a referent institution which Clinical Centre in Kragujevac provides with hospitalization reports.

The basic set contained more than 400,000 reports. It would be unrealistic to analyze such a large set of reports, so a representative subset of 5% of simple and random samples was made, without repetition which contained 20,422 hospitalization reports. Out of the given number of reports, 18,173 hospitalization reports were complete and they were further analyzed in the paper. By ensuring that all the reports had the same probability of being chosen, many sampling errors, biased sampling and other mistakes unrelated to sampling have been avoided, and given conclusions are reliable and valid and they can be generalized to the whole set of reports.

Admission diagnoses and discharge diagnoses are recorded in the form of 4-digit numbers. At the beginning of the analysis, diagnoses were grouped according to the International Classification of Diseases, 10th revision (ICD10) into 21 groups. One report could contain only: one admission diagnoses, one discharge diagnoses and two comorbidities.

The diagnostic group agreement was measured in two ways. Firstly, we compared the agreement of admission diagnostic groups with the main causes of illness and then the agreement of main causes of illnesses with admission diagnostic groups. The agreement was defined within ICD10 disease groups. In order to avoid robustness of the system, a new variable was formed that monitored the diagnostic group accordance. The advantage of diagnostic group comparison according to the ICD groups is better clarity, but the disadvantage is the lack of preciseness. Discharge diagnostic groups are used as a "gold standard" in the comparison.

The analysis of the diagnostic group agreement according to ICD10 groups was conducted using Cohen's Kappa statistic and 95% of confidence interval. In case of perfect matching, the value of the Kappa coefficient is 1. If the value of the Kappa coefficient is close to 0, that means that matching is coincidental and if it is less than 0, the probability of matching is even less than coincidental. Multiple testing was done firstly, by testing the whole sample, then only by reports which contained an additional illness beside a primary one and finally by testing those samples with no comorbidities.

Mann-Whitney U-test and χ^2-test was used to test the importance of hospital length of stay, the age and gender of patients.

Statistical significance was defined by the value of $p \leq 0.05$. Statistical analyses were performed using Statistical Package for the Social Sciences (SPSS) version 19.0.

Results

From the total of 20,422 hospitalization reports, 2,184 reports (10.7%) lacked admission diagnoses, 65 reports (0.3%) did not have the discharge diagnostic group.

By analyzing only the complete reports (those which had both admission and discharge diagnostic groups), a total of 18,173, we noticed that in 22% of cases there was a disagreement between ICD10 admission diagnostic groups and discharge diagnostic groups. In those reports, we noticed a significantly longer hospital length of stay, the patients were older and often of male gender with a larger number of comorbidities. The value of the Kappa coefficient for the whole model in the specified period of time was 0.76 (0.75–0.77) (Table 1).

Beside the primary illness, comorbidities were found in 24.1% of reports (4372), either one (in 2,670 reports) or two comorbidities (in 1,702 repots). The most common comorbidities were diseases of the circulatory system (more than 20%). The value of the Kappa coefficient in the reports containing comorbidities (one or two) was 0.67 (0.64–0.69),

Table 1

Sample characteristics

Variable		Agreement	Disagreement	*p*	Kappa	95% CI
LOS (days), $\bar{x} \pm SD$		7.2 ± 8.8	7.5 ± 7.8	< 0.01		
Age (years), $\bar{x} \pm SD$		47.4 ± 22.2	54.0 ± 21.5	< 0.01		
Gender, n (%)				< 0.01		
female	9,685 (53.3)	7,927 (81.8)	1,758 (18.2)			
male	8,488 (46.7)	6,257 (73.7)	2,231 (26.3)		0.76	0.75–0.77

LOS – length of stay; $\bar{x}$ – mean; SD – standard deviation; CI – confidence intervals.

while the value of the same coefficient in the reports which did not have comorbidities was 0.78 (0.77–0.79).

The most common admission diagnostic groups were: neoplasm, pregnancy, childbirth and puerperium, diseases of the circulatory system, diseases of the digestive system and diseases of the respiratory system with the Kappa coefficient ranging from 0.59 (diseases of the respiratory system) to 0.94 (neoplasm) (Table 2).

The analysis of certain ICD10 subgroups showed that the value of the Kappa coefficient range from $\kappa = 0.33$ for hypertensive diseases to $\kappa = 0.90$ for hernia (Table 3).

The 5 most common ICD10 discharge diagnostic groups matched five, previously mentioned, most common ICD10 admission diagnostic groups but the Kappa coefficient value was different, ranging from 0.38 (circulatory system diseases) to 0.81 (neoplasm) (Table 4).

The order of occurrence of ICD10 admission and discharge diagnostic groups in relation to the total number of ICD10 admission and discharge diagnostic groups is shown in the Table 5. It can be seen that the biggest change happens with diseases of the genitourinary system. Namely, disease of the genitourinary tract as an admission diagnostic group occupied the 3rd place and as a discharge diagnostic group it occupied the 9th place with Kappa coefficient value of 0.21 (Table 2). As it can be seen in Table 6, a large number of admission diagnostic groups for ICD10 XIV (Diseases of the genitourinary system) matched the discharge diagnostic group ICD XXI (Factors influencing health status and contact with health services). Analysis of reports in which the admission diagnostic group was chronic renal insufficiency (N18) showed that in 99.3% of reports factors influencing health status and contact with health services were listed as the discharge diagnostic group.

The change from the 5th to the 3rd place can be seen in the diseases of the circulatory system while the Kappa coefficient value was 0.61 (Table 2). Table 6 shows that the most common discharge diagnostic groups after diseases of the circulatory system were diseases of the nervous system, symptoms, signs and abnormal clinical and lab results which were not classified in the 2nd place and endocrine, nutritional and metabolic diseases. Mental and behavioral disorders fell from the 10th place to the 12th. The Kappa coefficient value was 0.79 (Table 2) and as the most common discharge diagnostic group apart from mental disorders, there were symptoms, signs and abnormal clinical and lab results which were not classified in the 2nd place (Table 6). With other diagnostic groups, the variations were insignificant changing the order by one place.

Table 2

Admission diagnostic groups of International Classification of Diseases, 10th revision (ICD 10)
Kappa statistics and 95% CI

Admission diagnoses (ICD 10)	n	Agreement n (%)	Disagreement n (%)	Kappa	95% CI
Certain infectious and parasitic diseases	671	639 (95.2)	32 (4.8)	0.84	0.81–0.87
Neoplasm	3,426	3,351 (97.8)	75 (2.2)	0.94	0.93–0.95
Diseases of the blood and blood-forming organs	318	294 (92.5)	24 (7.5)	0.88	0.84–0.92
Endocrine, nutritional and metabolic diseases	454	366 (80.6)	88 (19.4)	0.75	0.71–0.79
Mental and behavioral disorders	469	425 (90.6)	44 (9.4)	0.79	0.75–0.83
Diseases of the nervous system	981	748 (76.2)	233 (23.8)	0.67	0.64–0.70
Diseases of the eye and adnexa	409	387 (94.6)	22 (5.4)	0.93	0.85–0.99
Diseases of the ear and mastoid process	59	45 (76.3)	14 (23.7)	0.68	0.56–0.80
Diseases of the circulatory system	1,403	1,144 (81.5)	259 (18.5)	0.61	0.58–0.64
Diseases of the respiratory system	1,030	876 (85)	154 (15)	0.59	0.56–0.62
Diseases of the digestive system	1,192	1,092 (91.6)	100 (8.4)	0.77	0.75–0.79
Diseases of the skin and subcutaneous tissue	172	138 (80.2)	34 (19.8)	0.73	0.67–0.79
Diseases of the musculoskeletal system and connective tissue	449	414 (92.2)	35 (7.8)	0.72	0.68–0.76
Diseases of the genitourinary system	2,313	634 (27.4)	1,679 (72.6)	0.21	0.19–0.23
Pregnancy, childbirth and the puerperium	1,696	1,677 (98.3)	29 (1.7)	0.75	0.73–0.77
Other subgroups of ICD10	3,130	1,963 (62.7)	1,167 (37.3)	0.48	0.46–0.50

CI – confidence intervals.

Table 3

Agreement between some subgroups of International Classification of Diseases, 10th revision (ICD 10)

Subgroups of ICD10	Admission diagnostic groups (n)	Discharge diagnostic groups (n)	Agreement	Kappa	95% CI
Ischaemic heart diseases	400	312	290	0.57	0.52–0.62
Other forms of heart disease	272	242	191	0.55	0.49–0.61
Cerebrovascular diseases	269	224	201	0.57	0.51–0.63
Hypertensive diseases	220	125	96	0.33	0.30–0.36
Chronic lower respiratory diseases	340	302	259	0.51	0.45–0.57
Influenza and pneumonia	211	224	164	0.5	0.41–0.59
Other diseases of the digestive system	153	146	141	0.65	0.57–0.73
Diseases of liver	228	223	218	0.83	0.78–0.88
Hernia	221	232	211	0.9	0.85–0.95
Other diseases of intestines	193	165	155	0.69	0.62–0.76

CI – confidence intervals.

Table 4

Discharge diagnoses of International Classification of Diseases, 10th revision (ICD 10)
Kappa statistics and 95% confidences interval (CI)

Discharge diagnostic groups (ICD 10 groups)	n	Agreement n (%)	Disagreement n (%)	Kappa	95%CI
Certain infectious and parasitic diseases	772	639 (82.8)	133 (17.2)	0.63	0.59–0.67
Neoplasm	3,602	3,351 (93)	251 (7)	0.81	0.80–0.82
Diseases of the blood and blood-forming organs	330	294 (89.1)	36 (10.9)	0.66	0.61–0.71
Endocrine, nutritional and metabolic diseases	457	366 (80.1)	92 (19.9)	0.55	0.51–0.59
Mental and behavioral disorders	464	425 (91.6)	39 (8.4)	0.7	0.66–0.74
Diseases of the nervous system	921	748 (81.2)	173 (18.8)	0.7	0.67–0.73
Diseases of the eye and adnexa	391	387 (99)	4 (1)	0.95	0.92–0.98
Diseases of the ear and mastoid process	82	45 (54.9)	37 (45.1)	0.6	0.49–0.71
Diseases of the circulatory system	1,640	1,144 (69.8)	496 (30.2)	0.38	0.36–0.40
Diseases of the respiratory system	1,139	876 (76.9)	263 (23.1)	0.52	0.49–0.55
Diseases of the digestive system	1,366	1,092 (79.9)	275 (20.1)	0.55	0.53–0.57
Diseases of the skin and subcutaneous tissue	166	138 (83.1)	28 (16.9)	0.65	0.58–0.72
Diseases of the musculoskeletal system and connective tissue	488	414 (84.8)	74 (15.2)	0.54	0.50–0.58
Diseases of the genitourinary system	768	634 (82.6)	134 (17.4)	0.66	0.63–0.69
Pregnancy, childbirth and the puerperium	1,721	1,667 (96.9)	54 (3.1)	0.73	0.71–0.75
Other subgroups of ICD 10	3,865	1,967 (50.9)	1,905 (49.1)	0.36	0.35–0.37

Table 5

Order of admission and discharge diagnostic groups

ICD 10 Groups	Admission diagnostic groups (%)	Order	Discharge diagnostic groups (%)	Order
Neoplasm	18.8	1	19.5	2
Other subgroups of ICD 10	16.1	2	19.6	1
Diseases of the genitourinary system	12.7	3	3.8	9
Pregnancy, childbirth and the puerperium	9.3	4	8.5	4
Diseases of the circulatory system	7.7	5	10.8	3
Diseases of the digestive system	6.6	6	8.1	5
Diseases of the respiratory system	5.7	7	5.8	6
Diseases of the nervous system	5.4	8	4.7	7
Certain infectious and parasitic diseases	3.7	9	4.1	8
Mental and behavioral disorders	2.6	10	2.6	12
Endocrine, nutritional and metabolic diseases	2.5	11.5	3	10.5
Diseases of the musculoskeletal system and connective tissue	2.5	11.5	3	10.5
Diseases of the eye and adnexa	2.3	13	1.9	14
Diseases of the blood and blood-forming organs	1.7	14	2	13
Diseases of the skin and subcutaneous tissue	1	15	1	15
Certain conditions originating in the perinatal period	0.8	16	0.8	16
Congenital malformations, deformations and chromoso-mal abnormalities	0.3	17.5	0.4	17.5
Diseases of the ear and mastoid process	0.3	17.5	0.4	17.5

ICD 10 – International Classification of Diseases, 10th revision.

Table 6

Referral diagnoses / Discharge diagnoses (row/column)

ICD10	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	XXI	Total
I	**639**	3	0	0	1	1	0	1	1	9	7	4	0	2	0	0	1	0	1	0	1	671
II	0	**3,351**	3	8	0	2	0	0	9	9	17	1	0	22	0	0	0	2	1	0	1	3,426
III	0	2	**294**	0	1	0	0	1	6	4	4	0	2	3	1	0	0	0	0	0	0	318
IV	2	2	0	**366**	0	14	0	0	41	4	5	3	4	6	0	0	1	2	0	1	3	454
V	0	4	0	1	**425**	7	0	0	11	2	4	0	0	0	0	0	0	1	12	0	2	469
VI	2	17	0	7	9	**748**	1	2	156	2	0	0	14	0	2	0	1	3	8	0	9	981
VII	0	3	0	0	0	1	**387**	10	3	0	0	0	0	0	0	0	1	0	1	0	3	409
VIII	0	0	1	0	0	3	0	**45**	3	4	0	0	2	1	0	0	0	0	0	0	0	59
IX	1	8	4	13	9	63	0	2	**1,144**	44	23	3	6	4	0	0	0	7	7	2	63	1,403
X	22	35	2	4	1	3	1	3	57	**876**	13	3	2	4	0	0	0	1	1	0	2	1,030
XI	9	25	1	4	0	1	1	1	22	14	**1,092**	0	0	5	0	0	1	6	5	0	5	1,192
XII	3	0	1	6	0	2	0	1	6	2	3	**138**	2	0	0	1	0	1	5	1	0	172
XIII	1	4	0	2	1	8	0	0	5	5	0	0	**414**	0	0	0	1	1	2	0	5	449
XIV	2	27	11	14	0	0	0	1	24	2	3	0	1	**634**	17	0	3	1	1	0	1,572	2,313
XV	1	0	3	0	0	0	0	0	2	0	0	0	1	7	**1,667**	3	0	0	0	0	12	1,696
XVI	0	0	0	1	0	0	1	0	0	0	0	0	0	0	4	**133**	2	0	1	0	0	142
XVII	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**59**	0	0	0	0	60
XVIII	88	46	9	20	13	35	0	15	102	147	157	8	11	62	5	3	4	**384**	28	0	11	1,148
XIX	0	5	0	0	4	10	0	0	7	1	2	5	10	1	0	0	0	3	**965**	4	31	1,048
XX	1	0	0	1	0	0	0	0	13	1	0	0	0	1	0	0	0	0	3	**16**	1	37
XXI	1	70	1	10	0	23	0	0	28	12	36	1	19	16	25	26	5	1	13	2	**406**	695
Total	772	3,602	330	457	464	921	391	82	1,640	1,139	1,366	166	488	768	1,721	166	79	413	1,054	26	2,127	**18,173**

ICD10 – Interational Clasisification of Diseases 10th revision.

I – Certain infectious and parasitic diseases; II – Neoplasms; III – Diseases of the blood and blood-forming organs and ceratin disorders involving the immune mechanism; IV – Endocrine, nutritional and metabolic diseases; V – Mental and behavioural disorders; VI – Diseases of the nervous system; VII – Diseases of the eye and adnexa; VIII – Diseases of the ear and mastoid process; IX – Diseases of the circulatiory system; X – Diseases of the respiratory system; XI – Diseases of the digestive system; XII – Diseases of the skin and subcutaneous tissue; XIII – Diseases of the musculoskeletal system and connective tissue; XIV – Diseases of the genitourinary system; XV – Pregnancy, childbirth and the puerperium; XVI – Certain conditions originating in the perinatal period; XVII – Congenital malformations, deformations and chromosomal abnormalities; XVIII – Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified; XIX – Injury, poisoning and certain other consequences of external causes; XX – External causes of morbidity and mortality; XXI – Factors influencing health status and contact with health services.

Discussion

A statistic parameter which is most commonly used in determining the degree of agreement between admission and discharge diagnostic groups was the Kappa coefficient.

Using ICD10 discharge diagnostic groups as "the gold standard" has its limitations mainly related to the possibility of double coding which International Classification of Diseases provides. Similarly to our research in which dialysis as a treatment is coded as discharge diagnosis (ICD10 group XXI) with patients who have chronic renal insufficiency (ICD10 group XIV) as an admission diagnosis, the Canadian Institute for Health Research conducted a research and it also referred to a group of ICD10 XXI, specifically the diagnosis Z.54 (convalescence) [8].

The results of the research show that the degree of agreement for the whole model is satisfactory but there are also significant variations for certain diagnostic groups, even though some disagreement was expected. Similarly, in the research conducted in Canada (2006) in which 13,803 hospitalization reports were analyzed, the diagnostic group agreement was registered in 9,328 (67.6%) reports. The value of the Kappa coefficient for 50 most common diagnostic groups was $\kappa = 0.81$ (0.70 to 0.87). The value of the Kappa coefficient for the coronary artery disease was higher than in our research ($\kappa = 0.86$) [8].

In the research conducted in Brazil, there was a higher degree of agreement among the most common diagnostic groups such as primary hypertension where the Kappa coefficient value was $\kappa = 0.74$ [9]. In another research, also conducted in Brazil, the Kappa coefficient value for five leading admission diagnostic groups according to ICD was somewhat higher than in our research (from $\kappa = 0.79$ to $\kappa = 0.98$) [10].

The degree of agreement between admission and discharge diagnoses in patients with or with no diabetes, and with below-knee amputation in the Republic of Ireland (2013), shows that diagnostic group agreement with diabetes patients who had an amputation was $\kappa = 0.82$ (0.75–0.89) [11].

In the research conducted in America in the period from 2005 to 2006, among the patients older than 18 and admitted to Internal medical clinic, diagnostic group disagreement was registered in 68% of cases [12].

In 2000 in Italy analysis of 22,892 patients who came to the Emergency Center due to injuries not caused by violence, showed that in 62.2% of cases the admission diagnostic group from the Emergency Center matched the discharge diagnostic group after the period of hospitalization. It is determined that the possibility of death as an outcome was 30% higher with patients whose admission diagnostic groups did not match their discharge diagnostic groups in relation to those whose diagnostic groups matched [13].

Many factors can influence the degree of agreement between admission and discharge diagnoses. The research conducted in Singapore shows that the diagnoses disagreement occurs mainly as a consequence of the complex medical problem [14]. Other researches show that the disagreement can occur as a consequence of bad prehospitalization diagnostics, diagnostic dilemmas or mistakes such as bad information triage of primary care doctors [15]. The problem also occurs when patients simultaneously have two or more health disorders, and it is difficult to distinguish a primary illness from comorbidities. All of this leads to longer hospital length of stay and higher hospital expenses [16]. Diagnostic group agreement not only shortens hospital length of stay and reduces hospital expenses but it enables a patient to immediately get an adequate treatment without unnecessary waste of time [15].

Conclusion

The report on hospitalization is a reliable individual report on inpatient treatment, and it can be used in determining the degree of the agreement between admission and discharge diagnoses. The most frequent admission diagnostic groups according to the ICD10 match the most frequent discharge diagnostic groups, but the Kappa coefficient values are different. The most frequent diagnostic groups include neoplasm, pregnancy, childbirth and puerperium, diseases of the circulatory system, diseases of the digestive system and diseases of the respiratory system. In the reports in which discrepancies were recorded, there was a statistically significant higher number in hospital days of elderly patients, mostly males, and with a higher number of comorbidities. Defining the factors which cause the discrepancy of admission and discharge diagnostic groups within ICD 10 diagnostic groups can be the subject of a new research.

REFERENCES

1. *Ellekjaer H, Holmen J, Kruger J, Terent A.* Identification of Incident Stroke in Norway. Hospital Discharge Data Compared With a Population-Based Stroke Register. Stroke 1999; 30(1): 56−60.
2. *Schoenman JA, Sutton JP, Elixhauser A, Love D.* Understanding and Enhancing the Value of Hospital Discharge Data. Med Care Res Rev 2007; 64(4): 449−68.
3. *Gray BH, Clement JP.* Databases for Research on Nonprofit Health Care Organizations: Opportunities and Limitations. Am Behav Sci 2002; 45(10): 1550−91.
4. *Kieszak SM, Flanders WD, Kosinski AS, Shipp CC, Karp H.* A comparison of the Charlson Comorbidity Index derived from medical record data and administrative billing data. J Clin Epidemiol 1999; 52(2): 137−42.
5. *National Association of State Health Data Organizations* (NAHDO). Consumer-Purchaser Disclosure Project. The state experience in health quality data collection. Washington, DC: National Partnership for Women and Families; 2004.
6. *Roos LL, Gupta S, Soodeen RA, Jebamani L.* Data quality in an information-rich environment: Canada as an example. Can J Aging 2005; 24(1): 153−70.
7. *McGinn T, Wyer PC, Newman TB, Keitz S, Leipzig R, For GG.* Tips for learners of evidence-based medicine: 3. Measures of observer variability (kappa statistic). CMAJ 2004; 171(11): 1369−73.

8. *Juurlink D, Preyra C, Croxford R, Chong A, Austin P, Tu J,* et al. . Canadian Institute for Health Information Discharge Abstract Database: A Validation Study. Toronto: Institute for Clinical Evaluative Sciences; 2006.
9. *Veras CM, Martins MS*. Reliability of data from Authorization Forms for Hospital Admittance, Rio de Janeiro, Brazil. Cad Saude Publica 1994;10(3): 339−55. (Portuguese)
10. *Mathias TA, Soboll ML*. Reliability of diagnoses on authorization forms for hospital admission. Rev Saude Publica 1998; 32(6): 526−32. (Portuguese)
11. *Buckley C, Kearney P, Ali F, Bhuachalla C, Casey C, Roberts G,* et al. Concordance studies between hospital discharge data and medical records for the recording of lower extremity amputation and diabetes in the Republic of Ireland. BMC Res Notes 2013; 6: 148.
12. *Johnson T, Mcnutt R, Odwazny R, Patel D, Baker S*. Discrepancy between admission and discharge diagnoses as a predictor of hospital length of stay. J Hosp Med 2009; 4(4): 234−9.
13. *Farchi S, Camilloni L, Rossi PG, Chini F, Lori G, Tancioni V,* et al. Agreement Between Emergency Room and Discharge Diagnoses in a Population of Injured Inpatients: Determinants and Mortality. J Trauma 2007; 62(5): 1207−14.
14. *Lim GH, Seow E, Koh G, Tan D, Wong HP*. Study on the discrepancies between the admitting diagnoses from the emergency department and the discharge diagnoses. Hong Kong J Emerg Med 2002; 9(2): 78−82.
15. *Graff LG, Wang Y, Borkowski B, Tuozzo K, Foody J, Krumholz H*, et al. Delay in the diagnosis of acute myocardial infarction: Effect on quality of care and its assessment. Acad Emerg Med 2006; 13(9): 931−8.
16. *McNutt R, Johnson T, Kane J, Ackerman M, Odwazny R, Bardhan J*. Cost and quality implications of discrepancies between admitting and discharge diagnoses. Qual Manag Health Care 2012; 21(4): 220−7.

Received on April 27, 2015.
Revised on July 17, 2015.
Accepted on August 28, 2015.
Online First April, 2016.