

# Evaluating the quality of coding in the Portuguese public sector hospitals, 2006-2007

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## INTRODUCTION

Since the 80s, all inpatient stays in public sector, acute care hospitals in Portugal are grouped into Diagnosis Related Groups (DRG), given previous ICD-9-CM (International Classification of Diseases – 9th Revision – Clinical Modification) coding.

The fact that both hospital assessment and financing depends, at least in part, on the DRG generated can lead to deliberate and/or systematic changes in diagnostic and/or procedures coding in an attempt to maximize performance and payment. Grouping incorrect diagnoses and/or procedures will inevitably be reflected in the case-mix index and the financing. Assessing the quality of clinical coding becomes thus essential to ensure a fair financing.

In this context, there has been growing interest on the part of the central administration of the Portuguese health care system (Administração Central do Sistema de Saúde, ACSS) in taking the necessary measures to ensure the quality of the information produced, namely through clinical coding audits.

In this study, we present the results of 48 audits, concerning 2006 and 2007, and we show the potential impact of DRG changes in terms of financing, using a large, differentiated central hospital as case study.

## METHODOLOGY

Clinical coding audits have focused mostly on the public enterprise hospitals, and on the traditional public sector hospitals with larger budgets.

These audits are conducted by teams of physicians (of a group of around 10, with training and experience in this field), with the support of the team responsible for this area at the ACSS.

Each audit is preceded by a preparatory meeting of the audit team (2 elements, a chief auditor and a second) with the ACSS team, for sample analysis. This is followed by a one-day visit to the hospital being audited, and then by a second meeting between the audit team and the ACSS team, for evaluation of results and discussion of the final report for the audited hospital.

In terms of sample size, on average, 80 to 85 episodes are scrutinised in each hospital/audit. About half of this sample is drawn randomly from the discharges database. Easy-to-code DRG are excluded beforehand (e.g. DRG 371, 373, 409, 410 e 629). The remaining half of each sample is purposefully selected: a detailed analysis by the ACSS team members of the hospital's DRG database leads to a selection of cases that seem likely to include coding errors.

To prepare the audits, the teams rely on the “Auditor” software, and on indicators developed specifically for this purpose, namely: the number of readmissions occurring in the 72 hours after the initial admission; episodes grouped in DRG with major complications or co-morbidities with a home discharge and with a length of stay equal or shorter than the lower threshold for that DRG; cases of minor surgery and inpatient admissions transferred to another NHS hospital (for lack of appropriate resources in the first). Using this software, errors and inconsistencies in the sample selected for the audit are identified. The software calculates the percentage of codes not acceptable as main diagnosis, coding errors (simultaneous opposing codes), and alerts to potential coding problems or to inadequate information in clinical records (a non-specific main diagnosis, a questionable admission and a late effect as main diagnosis, a non-specific surgical procedure, records with no procedures coded, and long episodes without complications or co-morbidities associated). The audit form currently used by the team of auditing physicians is attached as Annex 1.

After the audit, meetings are held to analyse the main problems detected with the hospitals that showed higher percentages of non-compliance in critical aspects, to focus on their correction. Non-compliance in critical aspects might be related to coding errors or to organisational problems (e.g. inappropriate admissions to have ambulatory exams, in the hospital or elsewhere). These meetings are also used to clarify doubts and to share coding instructions.

## RESULTS

### I. NATIONAL DATABASE CHARACTERISTICS

We analysed the DRG databases from 2003 to 2007. Over these 5 years, medical DRGs have accounted for over half of the total national inpatient activity in acute care, public sector hospitals, although with a decreasing relative weight, given the increase of ambulatory surgery (table 1).

**Table 1**  
**No. and percentage of episodes coded per year, 2003-2007**

Year	Inpatient episodes				Ambulatory Surgery		TOTAL
	Medical DRG		Surgical DRG				
	No. of episodes	%	No. of episodes	%	No. of episodes	%	
2003	621.170	60%	346.617	34%	64.529	6%	1.032.316
2004	596.825	58%	344.884	34%	81.694	8%	1.023.403
2005	601.514	59%	339.243	33%	86.690	8%	1.027.447
2006	587.515	57%	349.264	34%	98.397	10%	1.035.176
2007	581.009	55%	347.366	33%	133.405	13%	1.061.780

Source: ACSS/Unidade Operacional de Financiamento e Contratualização (UOFC), 2008

Note: Starting from 2007, ambulatory medical care is also coded; it is not however analysed here, since it has not been audited as yet.

The average number of diagnoses and procedures coded per episode has increased, both in terms of inpatient as well as ambulatory surgery episodes (table 2).

**Table 2**  
**Average number of diagnoses and procedures coded per episode, 2003-2007**

Year	Inpatient episodes						Ambulatory Surgery	
	Medical DRG		Surgical DRG		Total			
	Average no. dx	Average no. proc.	Average no. dx	Average no. proc.	Average no. dx	Average no. proc.	Average no. dx	Average no. proc.
2003	3,09	4,80	2,46	4,54	2,86	4,71	1,23	1,68
2004	3,19	5,02	2,51	4,49	2,94	4,83	1,25	1,73
2005	3,26	5,09	2,60	4,49	3,02	4,87	1,28	1,73
2006	3,41	5,14	2,64	4,39	3,12	4,86	1,31	1,79
2007	3,83	5,55	2,96	4,83	3,50	5,28	1,38	1,97

Source: ACSS/UOFC, 2008

## II. CLINICAL CODING AUDIT

Based on the 2006 and 2007 DRG databases, 48 hospitals had clinical coding audits (32 from the 2006 activity, and 16 from 2007), with a total of 4.191 episodes audited (table 3). Of these, 47% (1.971 episodes) were in accordance with ICD-9-CM coding norms; of the remaining, 17% (718 episodes) had coding errors that led to a change in DRG classification.

**Table 3**

**No. and percentage of episodes with coding problems, by type, 2003-2007**

Year	Compliant with ICD-9-CM coding norms	Non-compliant, with critical errors						Non-compliant, with non-critical errors	Total
		Total	Absence of Clinical Information	Unnecessary admission	Coding errors		Other errors		
					w/ change in DRG	w/o change in DRG			
2006	1.135	1.265	72	103	477	541	72	144	2.544
	44,6%	49,7%	2,8%	4,0%	18,8%	21,3%	2,8%	5,7%	100,0%
2007	836	709	71	33	241	319	45	102	1.647
	50,8%	43,0%	4,3%	2,0%	14,6%	19,4%	2,7%	6,2%	100,0%
TOTAL	1.971	1.974	143	136	718	860	117	246	4.191
	47,0%	47,1%	3,4%	3,2%	17,1%	20,5%	2,8%	5,9%	100,0%

Source: ACSS/UOFC, 2008

Analysing randomly selected episodes separately (tables 4 and 5), we notice:

- the percentage of episodes compliant with ICD-9-CM coding norms is of 57,8%; this percentage drops to 36,5% in the non-random sample component;
- in the group of episodes with errors considered critical, the percentages of episodes classified as “unnecessary admission” and “episodes with coding errors and change in DRG” are significantly higher in the non-random sample component (5,8% and 23,1%, respectively, against 0,6% and 11,0%, in the randomly selected episodes;  $p < 0,05$ );
- as to the item “absence of clinical information”, percentages are similar in both sample components.

**Table 4**

**No. and percentage of randomly selected episodes with coding problems, by type, 2003-2007**

Year	Compliant with ICD-9-CM coding norms	Non-compliant, with critical errors						Non-compliant, with non-critical errors	Total
		Total	Absence of Clinical Information	Unnecessary admission	Coding errors		Other errors		
					w/ change in DRG	w/o change in DRG			
2006	600	402	25	11	122	233	11	69	1.071
	56,0%	37,5%	2,3%	1,0%	11,4%	21,8%	1,0%	6,4%	100,0%
2007	599	335	41	2	107	167	18	70	1.004
	59,7%	33,4%	4,1%	0,2%	10,7%	16,6%	1,8%	7,0%	100,0%
TOTAL	1.199	737	66	13	229	400	29	139	2.075
	57,8%	35,5%	3,2%	0,6%	11,0%	19,3%	1,4%	6,7%	100,0%

Source: ACSS/UOFC, 2008

**Table 5**

**No. and percentage of non-randomly selected episodes with coding problems, by type, 2003-2007**

Year	Compliant with ICD-9-CM coding norms	Non-compliant, with critical errors						Non-compliant, with non-critical errors	Total
		Total	Absence of Clinical Information	Unnecessary admission	Coding errors		Other errors		
					w/ change in DRG	w/o change in DRG			
2006	535	863	47	92	355	308	61	75	1.473
	36,3%	58,6%	3,2%	6,2%	24,1%	20,9%	4,1%	5,1%	100,0%
2007	237	374	30	31	134	152	27	32	643
	36,9%	58,2%	4,7%	4,8%	20,8%	23,6%	4,2%	5,0%	100,0%
TOTAL	772	1.237	77	123	489	460	88	107	2.116
	36,5%	58,5%	3,6%	5,8%	23,1%	21,7%	4,2%	5,1%	100,0%

Source: ACSS/UOFC, 2008

### III. FINANCIAL IMPACT OF AUDITS – A CENTRAL HOSPITAL AS A CASE-STUDY

We then evaluated clinical coding in one of the national health services (Serviço Nacional de Saúde, SNS) central hospitals, for financing purposes a group II hospital (large, central hospitals, highly complex), with the objective of measuring the impact of coding errors, in terms of number of full-time equivalent patients, case-mix index and overall financing given the study sample.

Three hundred and fifteen (315) episodes from 2007 were audited, selected randomly from the DRG database (excluding a few DRG, as described before; for a certainty level of 95%, and allowing for an error margin of 3,35%).

From the audit, we highlight:

- ✓ From the total of audited records (315), 194 (approximately 62%) complied with the ICD-9-CM coding norms;
- ✓ In 101 episodes (32%), critical coding errors were found;
- ✓ In the selected sample, 31 episodes (approximately 10%) had coding errors that determined a change in DRG.
- ✓ Inpatient episodes classified as “Absence of clinical information” (4,4%) should not have been billed, since it is not possible to confirm the clinical coding.

In financial terms, this hospital's bill for this sample over-charged the payer by about 4,2 % (approximately 41.000 €), mainly through surgical DRG (both inpatient and ambulatory) and ambulatory medical care (table 6).

**Table 6**  
**Before-after analysis of the sample, in terms of full-time equivalent patients, case-mix index (CMI) and financial value (in €)**

Activity areas	Full-time equivalent patients		CMI		Value (€) (FTE*CMI* Price) (a)	
	Initial	Final	Initial	Final	Initial	Final
Inpatient episodes (total):	247,86	241,29	1,5676	1,5589	931.067	901.350
Surgical episodes	118,82	112,58	2,1098	2,0774	600.682	549.426
Medical episodes	129,05	128,72	1,0684	1,1423	330.385	351.925
Ambulatory care (total):	54	44	0,5739	0,5900	74.260	62.206
Surgical	51	42	0,5879	0,6031	71.847	60.697
Medical	3	2	0,3358	0,3148	2.414	1.509
Invalid episodes	0	2	-	-	-	-
TOTAL	-	-	-	-	1.005.328	963.557
Financial impact (%) after the audit	<b>-4,15%</b>					

Source: ACSS/UOFC, 2008

(a) Price of inpatient admissions and ambulatory care for group II: 2.396,25 €.

## CONCLUSIONS

The quality of clinical coding of inpatient admissions and ambulatory surgery in Portuguese public sector acute care hospitals has improved over the last few years, partly due to educational activities led by the ACSS (with initial training and refresher courses), as well as to the implementation of audits with feedback to the hospitals.

However, 53% of the records audited still show coding errors, 47% still show problems deemed by the auditors as critical, and 17% had coding errors leading to changes in DRG. As expected, these problems are more prevalent if samples are not random. Using just one hospital as an example, we found that these findings were responsible, in the sample studied, for an excess billing of about 4%.

In summary, the quality of clinical coding is essential to ensure an unbiased assessment of hospital performance and fair financing. From our analyses, it becomes apparent that a significant number of problems still persists in clinical coding, namely in terms of the quality of the information available in clinical records, in the quality of coding itself, and also in terms of the organisation of hospital services (with, for instance, unnecessary inpatient admissions, for the purpose of diagnostic tests that could be done in an ambulatory setting). These have, from a central perspective, a significant impact in financial terms.

## ANNEX 1: AUDIT FORM - EXAMPLE



**Hospital X**

**Readmission within 5 days**

Episode number: 78589

Admission date: 27-05-2007 17:42:20

Sex: M

Discharge date: 31-05-2007 12:15:00

Date of birth: 12-08-1928

Length of stay: 4

Third payer: SNS

Date of first surgical intervention:

DESIGNATION					Validation
<b>Diagnosis</b>	<b>External Causes of Injury and Poisoning</b>				
<b>Principal Diagnosis</b>					
5570	Acute Vascular Insufficiency of Intestine				
<b>Secondary Diagnosis</b>					
0389	Unspecified Septicemia				
V443	Colostomy				
78552	Septic shock				
<b>Procedures</b>					
9053	Microsc. Examinat. Of blood - culture and sensitivity				
8819	Other X-ray of abdomen				
9059	Microsc. Examinat. Of blood - other microsc. examinat.				
<b>Type of admission</b>	Urgent		<b>Destination after discharge</b>	Deceased	
<b>Motive for referral</b>			<b>Hospital referred to</b>		

### Signatures:

Chief Auditor

Auditor

Date:



**Hospital X**  
**Readmission within 5 days**

Episode number: 78589	Admission date: 27-05-2007	17:42:20
Sex: M	Discharge date: 31-05-2007	12:15:00
Date of birth: 12-08-1928	Length of stay: 4	
Third payer: SNS	Date of first surgical intervention:	

Compliance or non-compliance with the ICD-9-CM coding norms	
<b>1) Compliant with the ICD-9-CM coding norms</b>	
<b>2) Not compliant with the ICD-9-CM coding norms, critical error<sup>1</sup></b>	
2.1 Clinical Information	
2.1.1 No information on the clinical record	
2.1.2 The existing information is not sufficient to validate the coding	
2.1.3 Contradictory information between records	
2.2 Undue Inpatient Admission	
2.2.1 Diagnostic Tests	
2.2.2 Ambulatory	
2.2.3 Minor Surgery	
2.2.4 Others	
2.3 With Change of DRG	
2.3.1 Incorrect Principal Diagnosis	
2.3.2 Wrong Choice of Principal Diagnosis	
2.3.3 Incorrect Procedure/procedure not performed/procedure not coded or duplicated codes	
2.3.4 Incorrect Secondary Diagnosis/Secondary Diagnosis not coded or duplicated coded	
2.4 Without Change of DRG	
2.5 Wrong Type of Admission, Destination after discharge, Motive of referral, Wrong dates....	
2.6 Others	
<b>3) Not compliant with the ICD-9-CM coding norms, non-critical error</b>	
<b>Comments:</b>	

<sup>1</sup> Critical errors are those deemed by the auditors very relevant to characterise an episode. These are divided in 4 major groups: absence of clinical information, unnecessary admission, and episodes with coding errors, with or without change in DRG.

**Signatures:**

Chief Auditor

Auditor

Date