Analysis of the Resource Consumption Variation (RCV) within DRGs

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The hot topic

"If the resource consumption by patients with similar problems can be described exactly, the work of the physicians can be compared across; as can the results of one hospital be compared with another, for the actual resource consumption pattern"

KIMBERLY, J.R., POUVOURVILLE, G., 1993

What are the factors that influence RCV?

- Patient characteristics
  - Sex, Age, Principal Disease Severity, Total Patient Severity, Co-morbidities, social-economic factors and education.
- Professionals Characteristics
  - Experience and training.
- Characteristics of the care institutions
  - Qualitative and quantitative dimension, type and ownership.
- Health System Characteristics
  - Degree of state financing and intervention.
- Other characteristics
  - Type of admission, type of episode (surgical or medical), time to hospitalisation or codification mistakes on discharge summaries.

The Data

- 1 million discharges and 498 DRGs from 2002 public Portuguese Hospitals figures.

- The selection of DRGs for this analysis was based on five factors (Production Volume, Complexity, Length of Stay, Severity and Co-morbidities) as well as a measure of variation (Coefficient of Variation).

- The result was a sample of 72 DRGs and arround of 250 thousand inpatient discharges.

Methodology

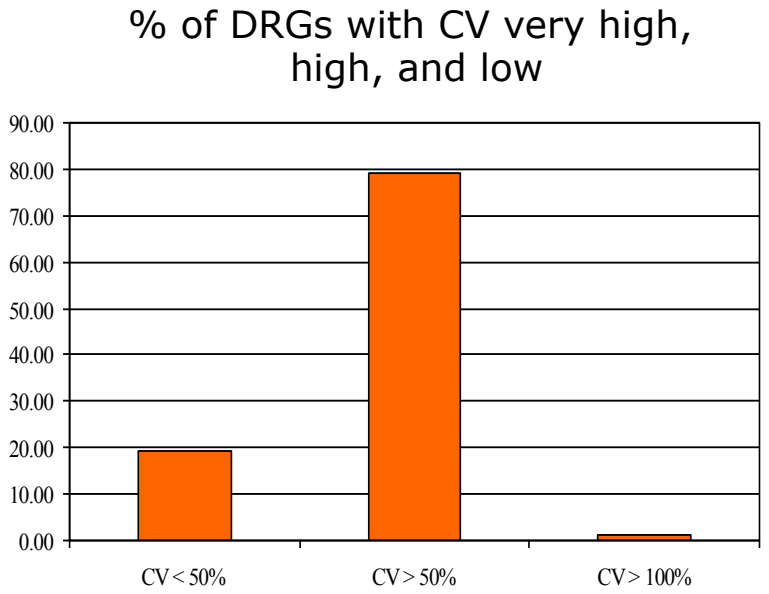
- The variable that permitted the analysis of the RCV was the Coefficient of Variation (CV) of the Length of Stay.

- The variables used in the analysis on the RCV were:
  - DRG Type; Production Volume; Average Length of Stay Index; Total Severity; Co-morbidities; Sex; Average Age; Admission Type; Principal Disease; Number of Hospitals with more than 30 discharges in each DRG.

- The impact of these variables on the RCV measured by CV was analyzed through linear regression.

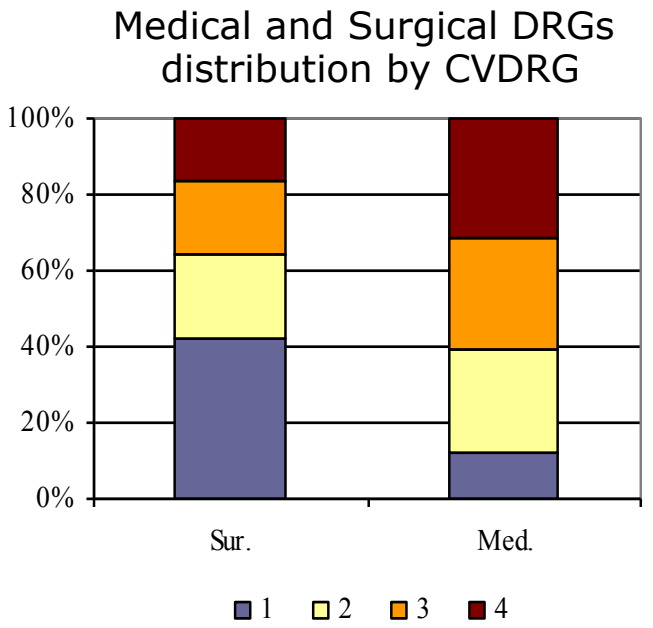
Results – DRGs global analysis

- From 72 DRGs, it was concluded that the highest variations correspond to 80% of DRGs and the lowest variations correspond to 20% of DRGs.



Results – Medical and Surgical analysis

- Approximately 60% of surgical DRGs are situated below the 2nd quartile – lower CV – unlike medical DRGs where approximately 60% show above the 2nd quartile.
- The type of DRG influences the CV, with the medical DRGs showing persistently higher CV values than the surgical ones.



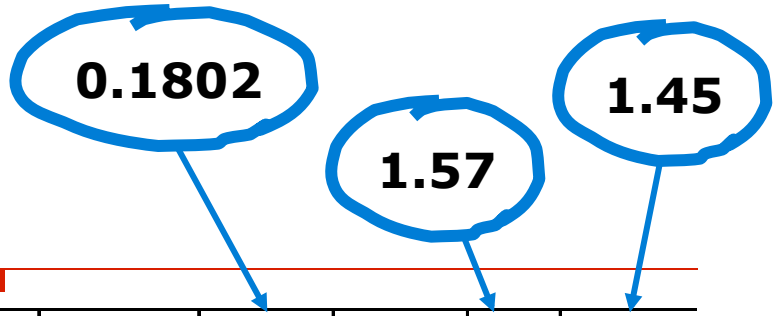
Factors Impact Results on RCV

- The medical DRGs and patient Total Severity (TS) are the factors that seem to influence the variation the most
  - R^2= 27% with a significance level of 0,001.
  - TS 0,009; DRG Type 0,008.

- On the other factors we didn't find a significance level.

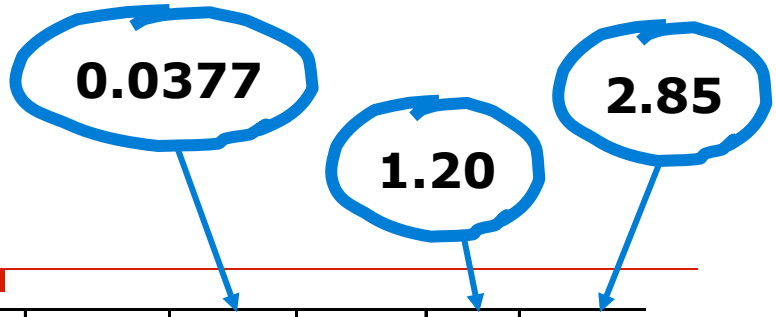
- So, TS was the variable that we chose to perform a detailed analysis:
  - Total Severity was split into 3 levels (NG1, NG2 e NG3) and for each level and DRG, the Average Length of Stay and CV were calculated.
  - This analysis lead to the existence of 2 DRG groups: one with higher CVs and another with lower CVs.

DRGs with higher CV



DRG		Severity Levels	DRG Type	Global CV	Total Severity	Principal Disease	COM	COMPL
3	Craniotomy, age 0-17	2,3	sur	78.8173	0.0664	18	1.24	3.60
82	Respiratory neoplasm	1,2,3	med	84.9222	0.3238	37	1.60	1.52
123	Circulatory disorders with AMI, expired	2,3	med	90.7860	0.5869	8	2.20	1.18
124	Circulatory disorders except AMI, with card cath and complex diagnostic	2,3	med	80.0579	0.0469	28	1.79	1.39
172	Digestive malignancy, with CC	1,3	med	79.5615	0.3052	26	1.90	1.56
173	Digestive malignancy, w/o CC	1,3	med	83.2308	0.1924	15	0.83	0.92
182	Esophagitis, gastroent, and misc digest disorders, age > 17, with CC	2,3	med	72.8065	0.0402	26	2.51	0.82
183	Esophagitis, gastroent, and misc digest disorders, age > 17, w/o CC	2,3	med	74.6329	0.0161	29	0.84	0.53
203	Malignancy of hepatobiliary system or pancreas	1,2	med	83.5059	0.2996	29	1.70	1.47
205	Disorders of liver except malig., cirr., alc hepa, with CC	1,2	med	80.3749	0.1221	15	2.21	1.31
206	Disorders of liver except malig., cirr., alc hepa, w/o CC	1,2,3	med	107.6842	0.0156	11	0.48	0.62
236	Fractures of hip and pelvis	1,2	med	84.2623	0.1455	4	1.39	1.30
403	Lymphoma and non-acute leukemia, with CC	1,2,3	med	76.7687	0.2569	24	2.65	2.73
404	Lymphoma and non-acute leukemia, w/o CC	1,2,3	med	84.3638	0.1520	29	0.96	1.32

DRGs with lower CV



DRG	Severity Levels	DRG Type	Global CV	Total Severity	Principal Disease	COM	COMPL
105 Cardiac valve and other major cardiothoracic proc w/o card cath	1,2,3	sur	37.3195	0.0323	15	1.69	6.06
107 Coronary bypass with cardiac cath	1,2,3	sur	41.3792	0.0420	4	2.52	5.73
109 Coronary bypass w/o cardiac cath	1,2,3	sur	26.7004	0.0238	3	2.26	3.92
121 Circulatory disorders with AMI and major complications, discharged alive	1,2,3	med	42.3780	0.1476	7	2.41	2.10
122 Circulatory disorders with AMI w/o major complications, discharged alive	1,2,3	med	39.5376	0.0762	10	1.93	1.24
125 Circulatory disorders except AMI, with card cath w/o complex diagnostic	1,2,3	med	37.2806	0.0314	28	0.85	1.04
149 Major small and large bowel procedures, w/o CC	2,3	sur	39.9861	0.0226	26	0.83	1.96
154 Stomach, esophageal, and duodenal procedures, age >17, with CC	1,2,3	sur	61.2241	0.1597	26	2.69	4.48
155 Stomach, esophageal, and duodenal procedures, age >17, w/o CC	1,2,3	sur	48.2928	0.0172	26	0.66	1.94
156 Stomach, esophageal, and duodenal procedures, age 0-17	1,2	sur	69.4869	0.0000	13	0.54	2.01
209 Major joint and limb reattachment procedures of lower extremity	1,3	sur	39.8300	0.0134	32	0.93	3.93
211 Hip and femur procedures except major joint, age > 17, w/o CC	1,2,3	sur	46.2506	0.0117	36.00	0.71	1.97
322 Kidney and urinary tract infections, age 0-17	1,3	med	48.1449	0.0082	6	0.51	0.70

Main Implications and Recommendations

- **Implications on the level of financing**, depending on the case-mix of the hospital, the DRGs can become over or under financed
  - "Is the financing model based on DRGs adequate?"
- **Implication on the different clinical practices** both between hospitals and between direct providers
  - Implement *Clinical Governance* effectively;
  - and/or implement a system for patient classification that takes into account patient severity.
- **Implications on DRG construction and maintenance in Portugal**
  - DRG must be followed and updated along time.