"TRACHEOSTOMY OR VENTILATION>95 HOURS: CAUSES AND CONSEQUENCES OF THE VARIABILITY OF LENGTH OF STAY IN ROMANIAN HOSPITALS"

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INTRODUCTION

After three years following the introduction of the Romanian DRG Classification system into practice, and two minor adjustments already made, there is a continuous concern of the Ministry of Health, National Insurance House and The National Casemix Center from the National School of Public Health for finding ways to calibrate the classification system to Romanian hospitals needs and ensure a fair resource allocation between hospitals. There is an obvious tendency of hospitals to misreport/overcode the cases, trying to increase the revenues through per case financing, due to scarce financial resources available and insufficient coding auditing. Given this situation, the routine analysis of casemix data is vital for detecting the errors with great impact in reimbursement, maintaining the equilibrium of the resource allocation using the DRG system.

The lack of the routinely-based costing project is a serious impediment in measuring the true waste of money consequently to a vicious coding, as well in the evaluation of the potential discrepancy between the real cost and the reimbursement. Still, the analyses of the activity related-indicators (like LOS) might indicate a great variability of clinical practice and consequently in costs for similar cases.

This is the case of the DRG A1040 Tracheostomy or ventilation>95 hours. A tracheostomy can be performed as an emergency procedure -if someone is unable to breathe following an injury or accident, or a planned procedure, to help someone who can't breathe normally because of a long-term condition such as cancer of the neck, or other situations. Adequate assistance for patients with tracheostomies in hospital settings is an important issue. Yearly in Australia and New Zealand more than 7000 patients receive tracheostomies (0.026 at 1000 inhabitants), while in Romania more than 9800 cases of tracheostomy were reported in 2011, discharged dead or alive (0.046 at 1000 inhabitants), or about 0.028 cases/1000 inhabitants discharged alive.

Since preliminary analysis have shown an increasing frequency of these cases during the last two years in Romania, a special study was conducted for these well-reimbursed cases

INTRODUCTION: The Ministry of Health wishes to calibrate the classification system to Romanian needs. The analyses of LOS might indicate a great variability of clinical practice and in costs for similar cases- like DRG A1040 Tracheostomy or ventilation>95 hours. There is an increasing frequency of these well-reimbursed cases in Romania. The aim of the study is to identify the differences in hospital stay.

METHODS: all cases discharged from Romanian hospitals in 2011, acute wards, validated, grouped in DRG A1040. The LOS was analysed after the type of hospital (ANOVA), its normality (Kolmogorov-Smirnoff), if it varies after the assigning procedure, with the number of secondary diagnosis or the age (Pearson).

RESULTS: 5949 cases discharged alive, the largest range for LOS =347 days in the same hospital, highest variability in district hospitals. The distribution of LOS is not normal, until the removal of cases over 17 days. Splitting cases after the assigning procedure, the 3 subgroups are more homogenous, not normal. The means of the samples are statistically significant different (p=0.000, T-test). The correlation between the LOS and the number of secondary diagnosis or patient’s age is a weak one, (r=0.1640, respectively r=-0.1418).

CONCLUSIONS: There are large variations in the LOS, after type of hospitals, or the assigning procedure. Statistical tests show that might be two or three different types of cases that currently go in A1040, leading to the idea of potential splitting of the group

Keywords. Tracheostomy, case mix, LOS, classification

(RW=14.2331, this means over 14 times the national average per weighted case, which is about 320 Euros). The aim of the study was to identify the differences in hospital stay (as a proxy for resource consumption) between hospitals, and the factors associated with longer hospitals stays. Additional, the opportunity of splitting this DRG group into two smaller groups was studied, as a potential way to adapt the classification system to the Romanian reality.

1. METHODS

The study includes all cases discharged from Romanian hospital in 2011, from acute care wards, validated for being reimbursed, grouped in DRG A1040. Additional, the group classified in A1040 was split into two sub-groups, after the assigning procedure, as follows:

<table>
<thead>
<tr>
<th>Group</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>group 1</td>
<td>G05005</td>
<td>continuous ventilatory support over 96 hours</td>
</tr>
<tr>
<td>group 2</td>
<td>G01001</td>
<td>laringo-pharyngectomy and plastic reconstruction</td>
</tr>
<tr>
<td></td>
<td>G01703</td>
<td>open permanent tracheostomy</td>
</tr>
<tr>
<td></td>
<td>G01601</td>
<td>cricostomy</td>
</tr>
<tr>
<td></td>
<td>G01701</td>
<td>percutaneous tracheostomy</td>
</tr>
<tr>
<td></td>
<td>G01702</td>
<td>open temporary tracheostomy</td>
</tr>
<tr>
<td>group 3</td>
<td>G04907</td>
<td>management of tracheostomy</td>
</tr>
</tbody>
</table>
The LOS was analyzed after the type of hospital (ANOVA). Hospitals where the range between minimum and maximum LOS was very large were studied separately, considering the principal diagnosis, procedures and the status at discharge (deceased cases were removed from the analysis). An analysis of outliers was done. We studied if the distribution of LOS is a normal one (Kolmogorov-Smirnov test), if it varies after the assigning procedure (tracheostomy or ventilation), or if there is a correlation between the LOS and the number of secondary diagnosis or the age of the patient (Pearson). Ranges, means, standard deviation, median and mode were calculated. An analysis of outliers was done.

The data source was the national database containing the minimum patient level basic dataset, collected for administrative purposes by National School of Public Health, Management and Professional Development in Health Bucharest. Data validation was made according to a set of rules approved by the president of the National Insurance House.

2. RESULTS

At national level, 5949 cases classified in DRG A1040 were discharged alive, out of 9879 cases classified there. All the following analysis regards cases discharged alive.

The distribution of LOS is not normal, but one very much left-skewed (mean 16 days, median 12, mode 7, std deviation=17.198, skewness 3.986). The value of test Kolmogorov-Smirnov Z is 13.688. The median of the LOS was 12 days, with an interquartile interval of [6;21], minimum 0 day and maximum 347 days. (Figure 1)

The highest variability was recorded in district hospitals, 347 days in the same hospital. The LOS varies according the type of the hospital (institute, clinical, district, city..), as shown in multivariate Anova analysis (p<0.005).

The low and high limit of the LOS for this DRG is 2, respectively 68 days. We searched the outliers beyond this limits, and found that only 10 hospitals had outliers. A special case was an Emergency District Hospital from the North of the country, having the most of the cases, due to some patients with “management of tracheostomy” (27 outliers out of a total of 58 outliers at national level). (Figure 2)

Surprisingly, in spite of the theoretical “gravity” of patients receiving procedures from DRG A 1040, many are discharged as “steady state” or “cured”.

Removing values over 17 hospital days, the distribution becomes normal (mean and median 8 days, mode 7 days). This could mean that LOS are characteristic for acute patients, who have shorter hospital stays. (Figure 3)

Splitting the cases according the assigning procedure (management of tracheostomy, tracheostomy, ventilation>95 hours), the three samples obtained seems to be more homogenous, although not normal either. (Figure 4, Table 1)
starting in ICU settings and requiring at least one-two weeks before the healing of the scar. During early days, the care of the stoma should be performed under the surveillance of a specialist, later, people with a permanent tracheostomy being trained to clean the tube by themselves. Tracheostomy sutures should be removed 7 days post insertion. Our study have shown that in Romania there are hospitals discharging patient after only 2 days, and declare them cured.

3.2 Variations in LOS

There are large variations in the LOS of cases classified in A1040, the range of the values being different for different types of hospitals, or after the procedure which leads to the DRG group. The LOS is not depending on the number of comorbidities or the age of the patient. The diagnosis for cases receiving ventilation (group 1) covered a wider range than those for cases with management of tracheostomy (group3) were two diagnosis covered 50% of cases.

3.3 Coding errors

Case study: One Emergency District Hospital, situated at about 80 km from the capital Bucharest, must be especially analyzed, since he discharged alive and “cured” 45 out of 53 patients with tracheostomy.

None of these cases had a LOS over 4 days, more, some cases stayed in hospital only 2 days. All 45 cases were admitted as emergencies and discharged without being transferred in other facility or hospital.
They were admitted for acute respiratory failure, and received antibiotic injection, general anesthesia ASA 19 (using artificial airways) and temporary open tracheostomy with laryngoscopy. This is the common coding pattern for all these cases, and only these procedures were reported for the patients. This rise the following question: if temporary open tracheostomy was performed for solving the acute respiratory failure (due to a temporary laryngeal obstacle), how could be possible to perform a general anesthesia including intubation? Another question is: how could a patient having open temporary tracheostomy to be discharged “cured” after 2-4 days, even form surgical point of view?

Other errors in coding were identified, triggering in-place control missions from the Insurance House. As a consequence of these controls, the cases were resent for validation, and the number decreased from 5948 to 5325 (about 10%). The new median is 21 days of hospitalization for cases receiving the ventilation procedure, without any change in median for the other two groups.

**Conclusions**

Starting from a hypothesis that not all the cases grouped in A1040 really belong there, the analysis have shown that there are rather three different situations. The first one groups the cases with continuous ventilator support 96 hours, with a mean LOS of 25 days- the longest of all. International studies quotes a median length of stay for these cases of 42 to 34.5 days\(^2\). Even if international values for LOS are much longer, it seems feasible that this group is the one that requires the most resources and hosts the most complex cases.

The second one groups cases with surgical procedures characteristic for performing a tracheostomy, and hosts cases with a mean LOS of 16 days- at the national mean for A1040.

The third one groups cases who went to the hospital especially for the monitoring of an already existing tracheostomy, having LOS of 11 days and median of 7 days- these are probably the less expensive cases, less complex, than the previous two.

Statistical tests show that the differences between the three types of cases that currently go in A1040 are significant, leading to the idea of potential splitting of the group in two or more adjacent groups.

The costs must be different for a case that only spend 2 days in hospital and one spending over 17 days or more, but the decision to modify the classification should preferably be supported by costing projects, supported also by National Insurance House and the Ministry of Health. Such projects could be initiated as a consequence of a rigorous analysis of LOS and other clinical indicators, performed by research institutions as National School of Public Health, Management and Professional Development in Health.

**Acknowledgements**

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