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Improving the DRG system in Hungary

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Abstract

Handling cases should be a profitable endeavour for the hospitals, but high caseloads have them running in the red. The reason for this may very well be the way the weighting is structured in the DRG system. The current way of thinking is that the indirect costs of the hospital care must be distributed on the case's days and the average of the direct costs can be added into the calculation of the DRG class's weighting factor. A dissenting opinion calls for creating the total weight proportionally by the direct costs. This paper shows an alternative, which balances both opinions by implementing corrective measures for the DRG class weigh, and thus is able to make complicated cases profitable.

Keywords:
Medical Informatics; DRG; Hospital management; Health management

Introduction

It is a well-known fact that hospital departments can be classified into two classes: profitable and unprofitable. Furthermore, hospitals are afraid of complicated cases. The institutes (at first medical universities and specialty institutes, such as heart surgery, oncology, traumatology, etc), whose caseloads are higher than average, become unprofitable at a higher rate, and this happens year after year. The question then becomes: can this be caused by the DRG system itself. There is an on-going debate about how to take into account the hospital's high indirect costs in the calculation method of the weighting factors of the DRG class.

Materials and methods

The weighting factor is proportional to the cost of an acute hospital case; such weighting factor can be divided into indirect and direct cost elements. We name indirect those cost elements, which can not be assigned, or we don't want to assign directly to any case.

The method of determining the weighting factor is not the subject of this paper, but it can be summarised as calculated by a representative assay, which has gathered the direct and indirect cost elements and assigned to the given DRG class. They calculate the total costs, which represent the institute's budget.

Based on this calculation method the weighting factor can be written in the following form:

$$s_i = r_i + d_i \qquad (1)$$

where s_i is the weighting factor of the i^{th} DRG class, while r_i is proportional to the indirect cost part, and d_i is proportional to the direct cost part by that calculation method.

There is no exact criteria how to split the costs into indirect and direct, in such a way that it can be assumed that indirect costs can contain some hidden direct costs, that the hidden direct cost could be assigned to the case, theoretically. Using this theorem let

$$r_i = r_{0i} + r_{di} \qquad (2)$$

where r_{0i} is the "clean" indirect, while r_{di} is the hidden direct content of the total indirect part.
(1) can be written as

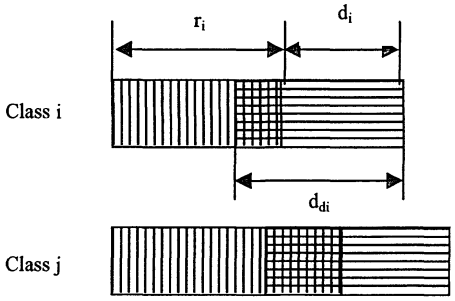
$$s_i = r_{0i} + r_{di} + d_i = r_{0i} + d_{di} \tag{3}$$

where

$$d_{di} = r_{di} + d_i \tag{4}$$

the corrected direct part of the i^{th} DRG class.

The following graph illustrates the hidden direct cost.



Widths of the rectangles are proportional to the weighting factor. The widths of the different colour components are proportional to their cost components. Obviously the hidden direct components can be not the same size, determination of them is not easy because they are hidden.

Fig. 1. : Indirect, direct and hidden direct parts

It can be assumed that hidden direct components are proportional to the direct components, that is

$$r_{di} = xd_i \tag{5}$$

Use this (1) can be transformed into the following:

$$s_i^m = r_{0i} + d_{di} = r_{0i} + xd_i + d_i = r_{0i} + (1+x)d_i \tag{6}$$

How can x be determined? I use the following at the calculation of x:

1. The present version of DRG in Hungary (HBCs 4.3).
2. Performance of the year 2001.
3. The fact that the modification of DRG's structure must not increase or decrease the frame amount to cover all financed costs at national level.

The performance in year 2001:

$$S=2237654,\ D=936438,\ R=1301216,\ N=18222129. \tag{7}$$

S is the total weighting factor, D is it's direct part, R is the indirect part, while N is the sum of the nursed days.
It appears that the rate of indirect cost is over 58% within the total cost. That very high rate used to account for the high wage cost rate, which is approximately the same, within the total hospital budget. There is not any rule on what wages must be accounted as indirect costs, so some of the wages also can be included in hidden costs.

The present version of DRG rules in Hungary states that length of stay over the upper trim point (limit days) of the given DRG class, are financed as *long day*. It has a daily fee, that is 75% of the long term care daily fee, that is s_h=*0,02625/day*.

This rule mentions that the costs, which must be covered by the long day weighting factor, are independent of the disease of the patient. Because direct costs are related to given cases and given diseases, we may suppose that there are not direct costs included the weighting factor of the long day. It covers clearly indirect costs; it also does not include hidden direct cost either. We may suppose that there are not differences in any nursing day's indirect costs, let it be over or under an upper limit day of any DRG class. So, we can assume that clear indirect costs are proportional to the nursing days in any DRG class. Let

$$r_{0i} = s_h a_i \tag{8}$$

where a_i is the average length of stay ("normative nursing day") is the i[th] DRG class. Let

$$R_0 = \sum_i r_{0i} n_i, R_d = \sum_i r_{di} n_i, D_d = \sum_i d_{di} n_i, D = \sum_i d_i n_i \tag{9}$$

For the all cases in the year 2001 in Hungary, where n_i is the number of cases in the i[th] DRG class.

$$R_0 = Ns_h = 478331 \text{ and} \tag{10}$$

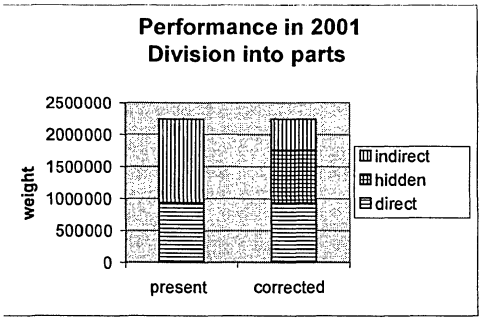
$$D_d = S - R_0 = 1759323, \text{ that is} \tag{11}$$

$$R_d = D_d - D = 822885 \tag{12}$$

(9) and (6) together give

$$\mathbf{D_d = \sum_i (d_i + r_{di}) = (1 + x)D}, \text{ that is} \tag{13}$$

$$x = \frac{D_d}{D} - 1 \tag{14}$$



As flashes on the graph above show, the rate of the hidden costs is nearly as big as the rate of direct costs. That means that presently we assign only every second HUF directly to that hospital case, where it is used, effectively.

Fig. 2. Indirect, hidden direct and direct rates

Because the indirect costs are defined, as they are the same in every DRG classes, it can be expressed as

$$R = \sum_i r_i n_i \tag{15}$$

and

$$r_i = \frac{R}{N} a_i \tag{16}$$

(9) and (16) gives that

$$\frac{r_i}{r_{0i}} = \frac{R}{R_0} \tag{17}$$

Results

Using the rates of the summarised data the result is a corrected weighting factor:

$$\begin{aligned} s_i^m &= r_{0i} + (1+x)d_i = \\ &= r_{0i} + \frac{D_d}{D}(s_i - \frac{R}{R_0} r_{0i}) = \\ &= \frac{D_d}{D} s_i - (\frac{R}{R_0} - 1) s_h a_i \end{aligned} \tag{18}$$

Let

$$S^m = \sum_i s_i^m n_i \tag{19}$$

the sum of the performance in the corrected weighting factors, while

$$S = \sum_i s_i n_i \tag{20}$$

the sum of the performance in the original weighting factors. By the HBCs 4.3 and (6)

$$\begin{aligned} S^m &= \sum_i s_i^m n_i = \\ &= \sum_i (r_{0i} + (1+x)d_i) n_i \end{aligned} \tag{21}$$

(14) and (9) gives that

$$\begin{aligned} S^m &= \sum_i r_{0i} n_i + \sum_i (1 + \frac{D_d}{D} - 1) d_i n_i = \\ &= R_0 + \frac{D_d}{D} D = R_0 + D_d = S \end{aligned} \tag{22}$$

This means that the correction satisfies the goal that the total performance must not be changed. (18) shows that the modification makes more profitable the cases, which have shorter nursing period and high weighting factor.

Discussion

The next graphs illustrate the behaviour of the corrected DRG weighting factors. There is shown the rate of the new and old weighting factor by the old one:

$$f(s) = \frac{s^m}{s}(s) \tag{23}$$

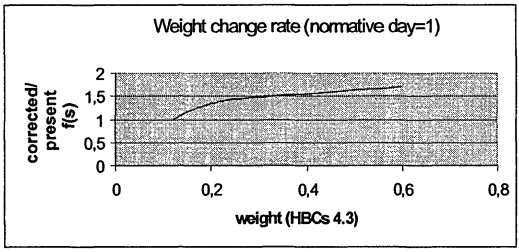


Fig. 3.

- Normative day=1

The lowest weighting factor value is 0.12316. Substituting into (18), the corrected weighting factor value is 0.12348, which is 1.0026 times more. The highest weighting factor value is 0.*24502*. The corrected weighting factor value is 0.35242, which is 1.44 times more. These mean that the correction makes more profitable the complicated cases.

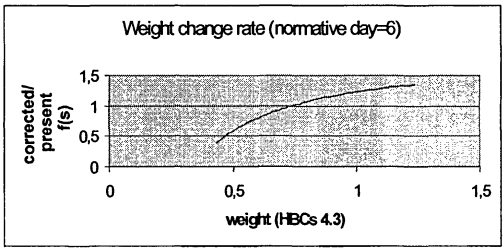


Fig. 4.

- Normative day=6

The lowest weighting factor value is 0.43552. Substituting into (18), the corrected weighting factor value is 0.17078, which is 0.39 times less. The highest weighting factor value is 1.23574. The corrected weighting factor value is 1.67418, which is 1.44 times more. These mean that the correction makes more profitable the complicated cases, while making unprofitable the simple cases.

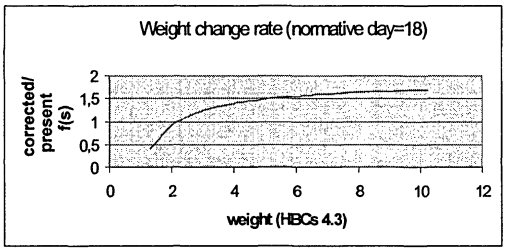


Fig. 5.

- Normative day=18

The lowest weighting factor value is 1.3191. Substituting into (18), the corrected weighting factor value is 0.5359, which is 0.4 times less. The highest weighting factor value is 10.22769. The corrected weighting factor value is 17.2728, which is 1.69 times more. These means that the tendency, that is, the simple cases become unprofitable while the complicated cases become profitable, is stronger as the normative day grows.

The decreasing of the average length of stay and the interest in doing complicated cases both were goals of introducing the DRG system. It is evident, that the corrected weighting factors motivated these goals. The examples above show that the simplest cases (which could be handled as outpatient in most of the cases) become even unprofitable in hospitals while the complicated cases become profitable as the normative day arises. It also can be seen that the same weighting factored DRG class can be profitable at short nursing period, while unprofitable at long nursing period.

Conclusion

Apply this model, there can be calculated the modified performances of the hospitals in 2001. Supposing the same cases in every DRG classes, the incomes change; the growths of the income of the most unprofitable institutes (medical, universities, etc) are covering their debts.

The opposite opinions on the disputation are the day-proportional indirect costs and the direct cost proportional total cost / weighting factors. This paper suggests the day-proportional indirect costs, but - as it can be seen on Fig. 6. - the weighting factor would be proportional to the direct costs, and behaviours as a compromise between those opinions.

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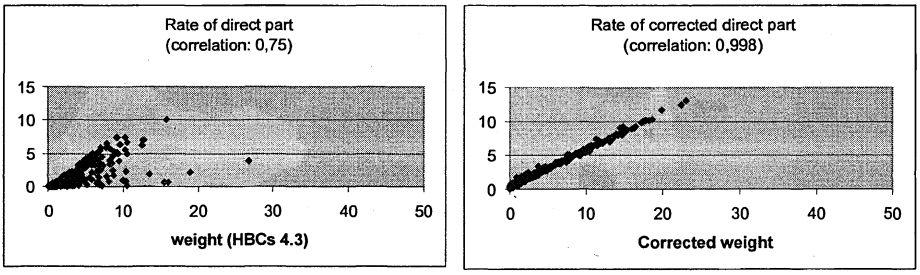

Fig. 6.

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