APPLYING A SIMULATION MODEL TO MANAGE WAITING LISTS FOR HOSPITAL INPATIENT ACTIVITY IN AN EU REGION

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AIMS: To be able to reproduce the behavior of the daily inpatient activity and the length of the stay in the Galician Public hospitals. Another important issue is to study how the number of beds of the hospital affects to the inpatient activity, the length of the stays and, consequently, the waiting list.

MATERIAL AND METHODS: Our working variables are the daily inpatient activity and the length of stays of all the patients admitted to public hospitals in the EU of Galicia in 2009. Hospitals have been classified within three clusters by Reyes (2009). This classification indicates the number of specialities which a given hospital is equipped to treat, reflecting the type of services it may offer (high, average and low case-mix).

To fit a known distribution to each variable allows us to generate new values by means of a Monte-Carlo procedure. Once we can produce new observations of the inpatient activity and patients' stays, we can also create the corresponding simulated waiting list and the occupancy rate. We have replicated the simulation study with different number of beds and we have investigated what is happening in each case. This study was realized under two different hypotheses: 1. assuming that changes in the number of beds don't affect to the inpatient activity behavior; 2. assuming that the inpatient activity pattern is altered with the beds variation. Later, we describe how we have included the beds influence in the generation of new dataset and we compare the obtained outputs with/without the number of beds effect. All the computational programming was developed using the statistical free software R.

RESULTS: Supposing that increasing the number of beds doesn't modify the generation process of new values for the inpatient activity or the length of the stays. The waiting list disappears and the daily occupancy rate is drastically reduced when the number of beds rises (even for the 5% increase). This result would be extended to every cluster and every hospital. When we analyze if inpatient activity is linked with the number of beds and we found that there is a reasonable linear relationship between the two variables. Therefore, we have built a modified simulation process and we must remark that in this case there are no significant differences in terms of waiting lists and occupancy rate when we increase the number of beds of the hospitals in Cluster 1 (highest case-mix). For hospitals in Cluster 2 (middle case-mix) the waiting list almost disappears when the number of beds rises. For hospitals in Cluster 3 (lowest case- mix), the waiting list goes up as the number of beds rises.

CONCLUSIONS: Firstly, the study demonstrated the usefulness of simulation as an aid to analyzing and modifying a complex hospital system –allowing consideration of far more detail and providing more reliable results than otherwise would be possible. Secondly It has been very useful to analyzed the drop in waiting list numbers due to clustering under the new- bed allocation; as well as the development of bed configurations more directly suited to clustering and the creation of a modified cluster plan that would capture most of the patient-days performance of full misplacement without losing much of the misplacement advantage of clustering.