

 Supplementary files are available for this work. For more information about accessing these files, follow the link from the Table of Contents to "Reading the Supplementary Files".

ELABORATION OF A MODEL FOR THE MANAGEMENT OF THE NUMBER OF SPECIALIZED DOCTORS IN THE SPANISH HEALTH SYSTEM

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The purpose of this study is to analyze the existence of an important imbalance between supply and demand of specialized doctors in the Spanish Health System. The specific sequence followed in the supply of MIR vacancies¹, along the eighties and nineties, has generated this problem.

The way of allocation MIR vacancies, along the time, has created many problems. This fact has led the Spanish Health System toward a situation of uncertainty and growing inefficiency.

During the second half of the seventies and eighties, the Spanish Health System lived a strong expansion. This generated a great demand of physicians; which overcame, amply, the readiness of doctors. Equally, in the nineties, the supply of MIR vacancies has been increased gradually²; even when the necessities of physicians have diminished.

The necessity of specialized doctors coincides with the years of smaller supply. It forces to hire foreign specialized doctors and graduates to work as physicians without having the necessary degree. This last group it is known, nowadays in Spain, as MESTO — Physicians Without Official Degree—; which have gone acquiring formation as specialized doctors but they don't have the official degree demanded at the present time.

Equally, the way of allocation MIR vacancies along the time has caused another problems; for example, the historical bag of graduates without specialty or the specialized doctors' "bag".

The supply of MIR vacancies constitutes the main instrument of planning human resources in the Spanish Health System. Nevertheless, this supply has been carried out by the immediate necessities of physicians and for the short-term orientation in solving problems.

Then, the objective of this work is the elaboration of a model whose purpose is to identify the causes or origins of those imbalances. So that alternative policies are proposed. Its purpose is to learn of the system behavior rather the realization of future forecasts.

In this way, previously to the elaboration of the model, the factors that seem interact generating the observed symptoms are identified. Lastly, the main feedback loops are shown and the causal diagram of departure is elaborated.

Obviously, once these factors are identified, it should be kept in mind that the model is a simplified representation of the reality. It is impossible, and even harmful³, to keep all of them in mind. So, it have been included those factors that are considered more significant by the experts, and the factors that don't seem to be important in the system

¹ House physician (intern).

² The coverage rate —MIR vacancies allocated on new graduated— initially was very reduced. Although, at the present time the number MIR vacancies allocated overcomes the number of recently graduated.

³ To include or to exclude too many details can be harmful. If some important factor is excluded it won't be valid on getting the knowledge that is wanted on the system that is analyzing. On the other hand, if too many details are included, the model will become as complex as the reality and it will hinder its understanding.

behavior have been excluded. Some of the most important factors in the generation of the observed symptoms are the following ones:

- *Historical “bag” of graduates without specialty.* This bag increases due to the graduates that don't enter to the system. The existence of this bag determines the number of MIR vacancies to allocate; and therefore the evolution of the number of specialized doctors.
- *Coverage graduates/MIR.* That is to say, the percentage of graduates those enter to the system. A bigger coverage supposes a smaller increment in the historical “bag” of graduates without specialty.
- *“Numerus clausus”⁴* as method of controlling of the growth of the historical bag of graduates without specialty. At the beginning of the eighties, restrictive mechanisms of access to the Faculties of Medicine in Spain are created, due to the strong growth of the students registered in the same ones. The *numerus clausus* will determine the number of graduates.
- *Social necessities,* which are very difficult of estimating since they don't depend, exclusively, on the population's figures that are necessary to assist. Those depend on their problems of health, of the opportunities and vacancies of work positions, of the demographic structure or, for example, of the opening of new hospital centers.
- *Retirement rate.* The age of the current employed physicians presents a great concentration between 36 and 50 years old. Taking in account that at the moment the age of forced retirement is fixed at the age of 70, this will condition the evolution of the number of physicians the next years.
- *Rates of specialty.* The percentage of vacancies dedicated to each specialty, which will determine a bigger or smaller saturation in every specialty.
- *Management of house physicians.* Main factor of the detected problem.

The identified factors will be able to be considered as endogenous or exogenous depending on their ability of being controlled by the decision-maker.

Lastly the identified feedback loops and flowcharts are shown. In the causal diagram of departure, the interactions are picked up among the identified variables. On it, it can be observed a series of feedback loops whose global behavior, seemingly, generates the observed evolution of the system. The identification of those loops will allow us to analyze the relationships among the different variables that intervene in the system and how those relationships⁵ determine its evolution. By this, a bigger knowledge will be obtained on the problem and that, in turn, it will allow us to propose a series of recommendations that can improve its behavior.

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⁴ A system of restricted entry to University.

⁵ Frequently, they are affected by delays and by non-linear characteristics.