Editor's Note

Data are becoming increasingly important in health management. Just think of the advantages that could derive from monitoring the vital signs of any person and their symptoms turning them into an online platform that, upon proper authorization, doctors could access at any time and from any place. This is just an example of the kind of transformation processes that health management is undergoing.

In this improvement of health services triggered by new technologies, Big Data is playing a prominent role. The benefits derived from Big Data [1] are becoming a reality in health fields [2] [3] as diverse as: medical services, synthesis of data from medical histories and clinical analysis, management of health centers, hospital administration, distribution of material (especially relevant to specific epidemic needs), detection and prevention of possible side effects of drugs and treatments, scientific documentation (generation, storage and exploitation), medical research, fight against cancer or Pandemic prevention.

Big Data allows integrating structured and unstructured data effectively. Where Big Data can bring more value is in the analysis of unstructured data, in which there is more knowledge to be discovered and exploited. In addition to all this, there is data coming from social networks and those generated by the Internet of things; devices, sensors, medical instruments, fitness equipment, ...

But the important thing is not to have a lot of data, but the fact that Big Data tools contribute to the design and implementation of efficient processes that help us carry out health care policies based not only on the available data, but also on their interpretation and understanding. This is how it can effectively contribute to improving health care, saving lives, expanding access to health systems and optimizing costs. In this regard, the important role played by Big Data in genomic research and genome sequencing should be mentioned.

Looking to the future the challenge is how to efficiently manage the growing amount of data that is being generated. Medicine and health are undergoing profound changes. Technological innovation combined with automation and miniaturization has triggered an explosion in data production, which represents an important potential for improvement in health. At the same time, we face a wide range of challenges [4]. Exploitation of available data through progress in genomic medicine, imaging, and a wide range of mobile health applications or connected devices is hampered by numerous historical, technical, legal and political barriers. The lack of harmonization of data formats, processing, analysis and data transfer is a source of incompatibilities and loss of opportunities that society should not afford.

This special issue is designed with the primary objective of showing what we have just pointed out: the diversity of fields where big data is used and consequently, how it is increasingly gaining importance as a tool for analysis and research in the field of healing. In this sense there are papers related to the following topics: re-using electronic health records with artificial intelligence, big data analytics solution for intelligent healthcare management, development of a predictive model for successful induction of labour, big data and the efficient management of outpatient visits, development of injury prevention policies following a big data approach, generating big data sets from knowledge-based decision support systems to pursue value-based healthcare, the use of administrative records of health information both for diagnoses and patients, and an analysis of the European public health system model and the corresponding healthcare and management-related information systems, the challenges that these health systems are currently facing, and the possible contributions of big data solutions to this field.

The paper issued by Ignacio Hernández Medrano, Jorge Tello Guijarro, Cristóbal Belda, Alberto Ureña, Ignacio Salcedo, Horacio Saggion and Luis Espinosa Anke, "Savana: re-using Electronic Health Records with Artificial Intelligence" focused on the fact that health information grows exponentially [5], thus generating more knowledge than we can apply [6]. Unlike what happened in the past, today doctors no longer have time to keep updated. This fact explains well the reason why only one in five medical decisions are strictly based on evidence, a fact that leads to variability. A possible solution can be found on clinical decision support systems [7], based on big data analysis. As the processing of large amounts of information gains relevance, big data analytics can see and correlate further than the human mind can. This is where healthcare professionals count on a new tool to deal with growing information. Savana uses natural language processing and neural networks to expand medical terminologies, allowing the re-use of natural language directly from clinical reports. This automated and precise digital extraction allows the generation of a real time information engine, to be applied to care, research and management.

"DataCare: Big Data Analytics Solution for Intelligent Healthcare Management" is the research carried out by Alejandro Baldominos, Fernando De Rada, and Yago Saez.

This paper presents DataCare, a solution for intelligent healthcare management. This tool is able not only to retrieve and aggregate data from different key performance indicators in healthcare centers [8][9], but also to estimate future values for these key performance indicators and, as a result, fire early alerts when undesirable values are about to occur or provide recommendations to improve the quality of service.

The architecture built up in this research ensures high scalability which enables processing very high data volumes coming at fast speed from a large set of sources.

This article describes the architecture designed for this project and the results obtained after conducting a pilot in a healthcare center. Useful conclusions have been drawn regarding to how key performance indicators change based on different situations, and how they affect patients' satisfaction [10].

The paper of Cristina Pruenza, María Teulón, Luis Lechuga, Julia Díaz and Ana González "Development of a predictive model for induction success of labour" focused on a relevant issue for obstetricians; that is the induction procedure. Obstetricians face the need to end a pregnancy, usually for medical reasons or less frequently, for social reasons. The success of the induction procedure is conditioned by a multitude of maternal and fetal variables that appear before or during pregnancy or birth process, with a low predictive value. The failure of the induction process involves performing a caesarean section. This project arises from the clinical need to resolve a situation of uncertainty that frequently occurs in our clinical practice. Since the weight of clinical variables is not adequately evaluated. We find it very interesting to know a priori the possibility of success of induction in order to dismiss those inductions with high probability of failure, avoiding unnecessary procedures or postponing end if possible. We developed a predictive model of induced labour success [11] as a support tool in clinical decision making. Improving the predictability of a successful induction is one of the current challenges of obstetrics because of its negative impact. Identifying those patients with high chances of failure will allow us to offer them a better care, thus improving their health outcomes and patient perceived quality. Therefore a Clinical Decision Support System [12] was developed to give support to Obstetricians.

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In this article, we proposed a robust method to explore and model a source of clinical information with the purpose of obtaining all possible knowledge. Generally, in classification models it is difficult to find out the contribution that each attribute provides the model with. We worked in this direction to offer transparency to models that may be considered as black boxes. The positive results obtained from both the information recovery system and the predictions and explanations of the classification show the effectiveness and strength of this tool.

"Machine-Learning-Based no show prediction in outpatient visits" is the title of the paper written by C.Elvira, J.C.Gonzálvez, A. Martinez and F. Mochón. A problem in the area of health demand is the high percentage of patients who do not attend their appointments, whether it is a consultation or a test at hospital. In this sense, the present study aims at trying to identify if there is a pattern of behaviour that allows predicting when patients will not keep an appointment [13] for consultation or test. This article involves a study consisting in using big data analysis techniques to try to take measures to improve the consequences of patients not attending to appointments. A predictive model is constructed which uses the information related to medical appointments of patients and the information referring to the patient's history of appointments. In view of the results, it can be stated that the information collected in the data set does not seem sufficient, neither in terms of patient description nor in terms of appointment characteristics, so as to construct a solid predictive model. The improvement of the classifier capacities presented in this work seems to require expanding and debugging the available information, both for patients and appointments.

The paper by Rosa María Cantón Croda and Damián Emilio Gibaja Romero, "Development of Injuries Prevention Policies in Mexico: A Big Data Approach" analyses the agents that can cause injuries in Mexico. Mexican injuries prevention strategies have been focused on injuries caused by car accidents and gender violence. This paper presents a whole analysis of the injuries registered in Mexico in order to have a wider overview of those agents that can cause injuries around the country. Taking into account the amount of information from both public and private sources, obtained from dynamic cubes reported by the Minister of Health, big data strategies are used with the objective of finding an appropriate extraction such as identifying the real correlations between the different variables registered by the Health Sector [14]. The results of the analysis show areas of opportunity to improve the public policies on the subject, particularly in diminishing wounds at living place, public road (pedestrians) and work.

"Generating big data sets from knowledge-based decision support systems to pursue value-based healthcare" is the research carried out by Arturo González-Ferrer, Germán Seara, Joan Cháfer and Julio Mayol. When talking about big data in healthcare we usually refer to how to use data collected from current electronic medical records, either structured or unstructured, so as to answer clinically relevant questions. This operation is typically carried out by means of analytic tools or by extracting relevant data from patient summaries through natural language processing techniques. From another perspective of research in medical computing, powerful initiatives have emerged to help physicians make decisions, in both diagnosis and therapeutics, built upon the existing medical evidence [15] (i.e. knowledge-based decision support systems). Much of the problems these tools have shown, when used in real clinical settings, are related to their implementation and deployment, more than failing to support, but technology is slowly overcoming interoperability and integration issues. Beyond the point-of-care decision support these tools can provide, the data generated when using them, even in controlled trials, could be used to further analyze facts that are traditionally ignored in the current clinical practice. In this paper, the authors reflect on the technologies available to make the leap and how they could help driving healthcare organizations to a shift into a value-based healthcare philosophy [16].

The paper by Diego J. Bodas-Sagi and José M. Labeaga, " Big Data and Health Economics: Opportunities, Challenges and Risks" summarize the possibilities of big data to offer useful information to policy makers [17]. In a world with tight public budgets and ageing populations we find it necessary to save costs [18] in any production process. The use of outcomes from big data could be in the future a way to improve decisions [19] at a lower cost than today. In addition, to list the advantages of properly using data and big data technologies, we also show some challenges and risks that analysts could face. In addition we present a hypothetical example of the use of administrative records with health information both for diagnoses and patients.

The last paper of this special issue is "Big Data and public health systems: issues and opportunities", written by David Rojas de la Escalera and Javier Carnicero Giménez de Azcárate. Over the last years, the need for changing the current model of European public health systems has been repeatedly addressed, in order to ensure their sustainability. Following this line, IT has always been referred to as one of the key instruments for enhancing the information management processes of healthcare organizations, thus contributing to the improvement and evolution of health systems.

More specifically, big data solutions are expected to play a main role, since they are designed for handling huge amounts of information in a fast and efficient way, allowing users to make important decisions quickly. This article reviews the main features of the European public health system model and the corresponding healthcare and management-related information systems, the challenges that these health systems are currently facing and the possible contributions of big data solutions to this field [20]. To that end, the authors share their professional experience on the Spanish public health system and review the existing literature related to this topic.

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