

Critical Challenges for Adopting Personalized Medicine System in Healthcare Management: Perspectives of Clinicians and Patients

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ABSTRACT

Personalized Medicine is an emerging approach in today's healthcare management. It bears a very strong potential to consolidate modern e-health systems fundamentally. Scientists have already discovered some of the personalized drugs that can shift the whole medicare process into a new dimension. However, bringing the change in healthcare management is an easy task. There are several critical challenges in the implementation of Personalized Medicine systems. This paper aims at identifying some of these critical challenges through a survey with medical doctors and patients. Challenges involved in implementing Personalized Medicine are listed. A questionnaire was distributed amongst a set of medical doctors, medical researchers, practitioners in pharmaceutical industries, regulatory board members, and a larger section of patients. The response data collected thereby were analysed statistically by using t-test. Summary of the descriptive statistical results of the responses received from medical doctors and patients are presented in tabular form. Based upon the statistical analysis, an attempt has been made in the paper to make a ranking of the challenges. A comparison of the perspectives of the doctors and patients has been made by using bar diagrams. The observations have been discussed in detail and some specific conclusions have been made. To the best of the author's knowledge and belief, this is the first academic paper in which an attempt has been made to suggest the crucial challenges for the implementation of Personalized Medicine. The study shows that both the medical doctors and patients perceive that genomic analysis of all the individuals is the most critical challenge.

Keywords: E-Health, Genomic Tests, Medicare systems, Personalized Medicine, T-Test, Trial and Error Method

DOI: 10.4018/ijehmc.2014040104

1. INTRODUCTION

With the advent of genomic revolution, need for personalized medicines, that is, medicines that are genome-specific is being felt in all corners. There are many drawbacks of the traditional treatment procedure, where the treatment is started only after a particular disease manifests in a patient's body. Also there is hardly any medicine that is free from side effects. That is why, by the application of a drug, a clinician may cure/suppress a particular disease, but in the sequel, due to the reaction of the drug, the onset of some other disease is of common occurrence. All these happen because of lack of information on the part of a clinician as to how the physiological systems of different individuals react to drugs. It may be noted that in the traditional treatment procedure, the method of treatment, including the selection of drugs used by a clinician is based on observation of tests performed on a population of large size and consideration of statistical averages. Thus the drugs normally used as anti-depressant do not work in considerable number of cases. The drugs used in chemotherapy in the treatment of cancer fail for a majority of cancer patients. The failure cases have briefly been summarized by Spear et al. (2001) and Abraham (2007).

Variation in a single gene that alters the phenotype may be categorized as single gene variation, while variations in a large number of genes are known as complex variations. This kind of variation may be caused due to interaction with different environmental factors. Complex variation often involves small cumulative effects of mutations of many genes. Personalized healthcare management involves understanding the nature and contribution of these implicated genes and the environmental factors. In this system, drugs need to be prepared keeping an eye to these variations. For getting this information genomic testing is required. Based on DNA mutation, the tests can be of Somatic or Germ cell type of genomic tests. Based on the observation of these tests Personalized Medicine can facilitate disease prediction, prevention

and treatment by determining first whether a person is in the risk of developing a particular disease. By using this methodology, it is possible to develop early prevention strategies. It can also help detect the onset of the disease at the very initial stage. Thereby it accelerates in the effective treatment and can prevent side effects resulting from the medicine that has been traditionally being used for all, sometimes as a trial and error method of treatment. In this way, medical practitioners will be able to provide more effective prevention of diseases too. It will be more time, space and cost effective, and will reduce the probability of drug adversary. However, as already mentioned, due to multiple reasons, Personalized Medicine could not yet be incorporated by present medicare systems in a broad scale. While adopting this new paradigm, all concerned are likely to face multifold challenges including technical and social ones, as discussed earlier in this section.

In personalized healthcare management, by using genetic information of a given individual, it is possible to customize a powerful medicine for a given patient. So Personalized Medicine system bears the promise to provide a much better medical diagnosis, which in turn offers the clinician an opportunity to select a more powerful and much safer drug to an individual patient. It is, in this way, possible to tailor health care by following the particular genetic makeup of an individual patient. Such a treatment method for the patient also inherently offers an opportunity to minimize the side effects of drugs in the patient's body. It is hoped that in personalized medical health care system, a combination of the expertise of geneticists and clinicians will lead to finding out a strategy for different individuals having different genetic constitutions to maintain good health. The said system will enable the clinicians to select appropriate drugs for the same disease for different patients having different genetic constitution. It will also be possible to select the proper drug to be used in the therapeutic procedures to be used for different patients having varied genetic constitutions. Another

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