Smart Pharma: Towards Efficient Healthcare Ecosystem

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Abstract. New innovative health related technologies will help people to empower them by making more aware of their health-related problems, early prevention and precaution of diseases. The technologies will be providing a platform for various disciplines of science to collaborate and solve problems people are facing. This paper proposes a smart pharma approach to empower the physician-patient relationship by utilizing new technological tools. Furthermore, a generic framework for efficient healthcare ecosystem is proposed to realize the smart pharma approach.

Keywords: Smart pharma · Patient empowerment · Digital metamorphosis
Beyond-the-pill concept · Telemedicine

1 Introduction

Digital metamorphosis and innovative transition of technologies have put pharmaceutical industries to think beyond the pill concept. New trends in technology will most likely disrupt prevailing existing models of pharmaceutical industries. There is a need of behavioral change from this prevalent model to more future oriented approach. Modern technologies are in process to empower common people to be more concerned about their lives. This calls for a smart pharma approach, which should be patient-oriented rather than focusing the market and maintaining competition with the existing brands and medications. It is not necessary to have a complete shift from the existing pharmaceutical models, as it may create financial burden to individual pharmaceutical industries. Therefore, a smart approach is required to make smart pharma and proactive business models. The smart approach will be able to cope and predict the upcoming disruption, and will provide suggestions for adaptation and changes in the existing models. Welfare technologies such as health care system and medical devices are facing a new era of innovations. This continuous transition will set a new platform for futuristic health care system.

O. Fratu et al. (Eds.): FABULOUS 2017, LNICST 241, pp. 77–82, 2018.
https://doi.org/10.1007/978-3-319-92213-3_12

1.1 New Trends in Health Care Technology

World Health Organization (WHO) has given us the definition of patient empowerment. It is the power and control, which makes patients to have a better control on their health-related decision making. The empowered and proactive patients have good understanding of latest method of treatment and medication therapy. There are some recent technology trends which have a potential to disrupt existing health care industry. For example, wearable smart devices have made easier for people to use various sensors with ability to continuously check and predict their health status. Toxicological information about different chemicals, metals is easily accessible today by using mobile apps related to drug-drug interaction, drug-food interaction and different medication with their chemical names. Moreover, a number of mobile apps can suggest over the counter drugs, their side effects and synergistic effects with different ingredients. Genetic engineering is another area, which is already disrupting the pharmaceutical industry as there are many companies provide data to people about their genes. People can now easily get familiar about their genetics, metabolic defects and acceptance to different diseases. Moreover, 3D printing is transforming manufacturing industry and already making a huge impact on electronic to airline industries. The 3D printers are being adopted in pharmaceutical industry and will make on demand and targeted drugs. This will also give a chance to new innovators and small companies to come and practice their ideas. Apricia pharmaceuticals has already approved a 3D printed drug called Spritam, which is being used in epilepsy. Generic name of this medication is Levetiracetam and it is available in market with different drug delivery systems [1].

This paper outlines open issues that must be addressed to develop a smart pharma (patient-oriented pharma) in opposite to existing market-oriented approach. The organization of this paper is as follows. Section 2 discusses the existing model of relationship between pharma and consumers. Section 3 presents the proposed the framework for the efficient healthcare considering a smart pharma concept. The concluding remarks are provided in Sect. 4.

2 Description of Old Model and Traditional Relationship Between Pharma and Consumers

Methods utilized by major pharmaceutical companies to sell medicinal products to physicians are mostly by the medical representatives. The medical representatives visit physicians periodically and introduce newly developed products. This usually includes the description of indications for the particular disease or symptoms.

Pharmaceutical companies invest quite a lot in their marketing area rather than developing a new drug entity and research. The budget summary of promotional activity for prescription medication has been given in the US congressional budget office in 2007. This describe about the amount of money pharmaceutical companies spent in their promotional activities which is around 29.5 billion US$.

Consumer digest described this amount as 28 billion US$ in 2008 and 50% of this amount has been given to physician a part of promotional activity. Budget is also further divided to different promotional activities [2].

New drug entity takes about 12 years in average to come from research lab to market. After a new drug discovery, pharmaceutical company gets patent rights of their medicines. Only 5 in 5000 drugs are approved for preliminary clinical trials. For many drugs, the research and development cost is quite high and companies may struggle to make enough money for further development of drugs. Technical innovations in clinical trials can be helpful to reduce research and development costs. For example, using wearable devices and new sensors can automatically gather and analyze the data this can reduce the cost and speed of trails. Moreover, emerging technology such as organ-on-a-chip (OOC) has a huge potential to reduce the overall cost of testing drugs on a subject [3].

Medical representatives are focused to promote drugs from marketing point of view, so they can tell about their beneficial effects more and tell less about possible side effects. Pharmaceutical companies should spend a good amount of money to improve their skills and competences rather than just to be focusing on marketing.

There is a need to understand what products medical representatives are going to present, and there should be clear goals and strategy placed beforehand. Some physicians have a specific list of prescribing medication therefore It would be waste of resources to send them constant reminders. Physicians will prescribe these mostly in case when patient's exact situation is unknown [4].

In above mentioned model patients are mostly ignored in approaching. The methods utilized are not as direct to patients or common public. People in future will become more aware what to get. Sometimes treatment totally depends on patient's behavior, for example if a patient is already positive for a particular medication then he or she will most likely subscribe it. Free samples are usually given to physicians with a hope that they will prescribe these samples or medication, but this happens mostly in opposite, physician switch to other free samples and takes the benefit rather giving pharmaceutical companies the ultimate benefit.

3 Smart Pharma: A Futuristic Approach

People are becoming more and more aware of drugs due to the use of various technological tools. The increasing public awareness would make pharmaceutical industries difficult to hide facts and figures as well as data related to drugs. This change from thinking to infrastructure and behavior should be improvised. Otherwise, the pharmaceutical current approach would be hard to realize in the coming years.

Smart pharma is an approach, which is going to strengthen the relation among physician, patients, and pharmaceutical industries. The following are the proposed behavioral changes needed to change the existing approach with the smart pharma concept.

Patient Empowerment: Patient empowerment is one of the biggest challenges. Continuous innovation is making people aware of products they are consuming and giving suggestions on beneficial or negative effects on their physical health [5]. Pharmaceuticals should contribute in making software to handle the privacy content of the patients actually taking their medication. They must also introduce online portals,

help or suggestive therapy, devices, applications about a particular use of medication and its handling. This application will also guide what kind of hospitals and physician are available to treat a particular indication with multiple attractive offers. Pharma will help in paying charges and other life diet modification.

Patient Record as Family Member: Patients should be treated as family rather than medicinal testbeds. Empowered people will define success of smart pharma [6]. Smart pharma will have a record of patients that are actually benefited with their medication. They will also get timely reviews from their patients. This will help in innovations, needed in previous medication with more aesthetically good and compliance approach. To achieve this goal, we need to create new scientific methods and frameworks. Smart pharma will have an updated record of their customers as family members.

Customized Medication: Customized medication and compounding pharmacies should work for individual consumer rather on individual medicinal product for all society. Human machinery has different pharmacokinetics and pharmacodynamics, which means how drug will react to human body and in opposite how body will react to medication [7]. This can be achieved by launching small compounding pharmacies with company label. These successful small units will be converted to big units. These small units will have patients record, small manufacturing machinery, patient life history, habits and behavior towards disease. Telemedicine practices will require professional approach [8].

Continuous Engagement: Continuous engagement especially for chronic diseases is needed as medications are prescribed for lifetime. Smart pharma will have their data relating to diseases and genetics of consumers. Continuous reminder will be delivered to set patient compliance with therapy and post therapy. These reminders will include chronic diseases alarms for making them more consistent with the medications. They can organize different diseases related programs and awareness campaigns. These programs include different medical tests, behavioral and life modification tutorials, defining different chronic diseases, medication product description and motivational lessons, etc.

Careful Utilization of Incentives: Careful utilization of incentives by knowing the actual users of products should have more focus. In case of chronic diseases and permanent disabilities, gifts and incentives will be shared between patient and physician for encouragement. Continuous reliance with therapy, following the behavioral modification with application services provided by the particular Smart pharma will help in listing constant reviews to keep product alive in market.

Careful Utilization of Budget: Pharmaceutical industries are spending huge resources for marketing. The old system of product promotion that is generally based on physician will become less effective. Pharmaceutical industries will have to shift their budget for marketing on more ground level. Where pharmaceutical and patients can understand each other and less budget will be utilized to the areas which have less benefit. Proactive and strategized plans are required.

4 Proposed Framework for Efficient Healthcare Ecosystem

The proposed model above in Fig. 1 has the ability to cope with future challenges. This will make a healthier connection between patient and Smart pharma. There is a direct approach proposed for patient engagement and overall revenue. The placebo unit, shown in Fig. 1, will act as extension of pharma and suggest direct approaches in order to make direct contact with the consumers. The proposed strategies of placebo unit are:

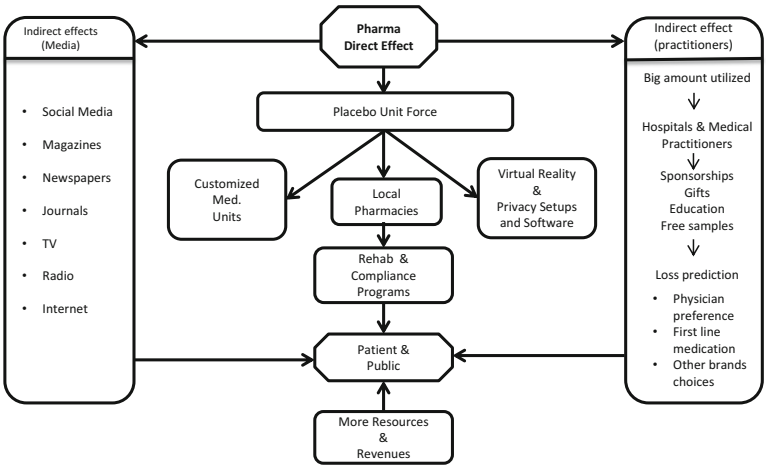

Fig. 1. Proposed framework for efficient healthcare ecosystem.

- It will help in patient customized units, providing application for privacy setups and software to patients for their medications.
- It will also help in preparing marketing budget of Smart pharma to be more focused on patients rather than physician.
- It will also make connections with available pharmacies for collection of patients' data regarding medication and will have a control on their provided inventory.
- For chronic diseases, it will make a permanent symbiotic relationship between pharma and patients.
- It will also provide best facilities to patients who are using the medication and in opposite will get the ultimate benefits and economy.

Indirect approach shown in Fig. 1 is mostly governed by legislative authorities. Legislation on indirect methods are becoming strict because many things we cannot directly indicate to patients on media. Drugs can cause dependency and the ones who have short therapeutic window can seriously harm large population, so understanding between patients and pharma is required because old model will be less effective in future.

5 Conclusions

In this paper, we have proposed a generic framework for efficient healthcare ecosystem which has a number of objectives to close the gap between traditional system and futuristic approach, especially to make a strong connection between Smart pharma and patients. We have discussed that the patient empowerment may bring a big change in the whole healthcare system when consumers will become more aware of what actually they are utilizing. There is a need of many behavioral changes as we proposed in our paper. The ultimate goal is to focus on actual utilizer of product. Further research is required for the detail study of our proposed model.

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