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## IMPACT OF INNOVATION IN MEDICAL TECHNOLOGY MANAGEMENT

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**Abstract:** Medical Technology has developed to a great extent over the course of many centuries. Since the days of Hippocrates, considered the “Father of Medicine”, advances in the medical field have brought us into a brave new world. With the advent and application of modern technology, the medical field seems to have evolved more in the last 10-20 yrs than in the previous 1000 years. Recently, new ground has been broken throughout the field, involving medical techniques, surgical procedures, and electronic devices. Such advancements have streamlined the practice and science of medicine in the 21st century. The analysis suggests that the relationship between medical technology and spending is complex and often conflicting. Findings were frequently contingent on varying factors, such as the availability of other interventions, patient population, and the methodological approach employed. Moreover, the impact of technology on costs differed across technologies, in that some (eg, cancer drugs, invasive medical devices) had significant financial implications, while others were cost-neutral or cost-saving. In light of these issues, we argue that decision-makers and other commentators should extend their focus beyond costs solely to include consideration of whether medical technology results in better value in health care and broader socioeconomic benefits. It is imperative now days for all the public health policymakers and regulators to keep pace and operate within a rapidly changing technological environment and an often internally lethargic national health delivery structure to ensure that maximum efforts are applied in research and development. Emphasis has to be laid on understanding the patient’s needs which has to be combined with equal amount of investment to develop new ways and means to cure them. Also the affordability of such treatment also has to be kept in mind. This research papers aims at highlighting all those changes and trends which the health care industry has taken to in order to grow and significantly advance in this competitive world.

**Keywords:** Innovation, Healthcare, Technology, Patients

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**Introduction:** The increase in fundamental knowledge concerning human health and the mechanisms of disease has been so rapid during the second half of this century that we have often been described as living in a time of biological revolution. Our society for the past several decades has valued biomedical innovation and its promise of improving the management of health and disease. Rapid advances in biomedical research have to a great extent stimulated the development of numerous efficacious medical technologies, but their translation into clinical use has raised complex medical, economic, and social issues. .

Today the cost of technology acquisition is not the only cost involved, other hidden costs are also considered when deciding to make a new investment in technology. These include operating cost, human resource, training, space allocation and other improvements.

Medical technology alone will not determine future outcomes; demographics and health trends also play a very important role. So we also consider the

implications for spending and investment as successive factor in health care.

This work’s insights into the nature and advancements in medical innovation which contribute to the present healthcare industry and how best it protects patients by offering the best while fostering innovation and securing benefits.

**Literature Review:** It is frequently suggested that the routine and consistent adoption of innovative and cost-effective technologies is a prerequisite of a high-performing health service (Coyte and Holmes, 2007). Apart from improving the quality of healthcare services, procurement and implementation of technological innovations can play a key role in making patient care more flexible and responsive, and ensuring efficiency in the use of scarce public sector resources (Winkleman and Choo, 2003; Djellal and Gallouj, 2007).

However, the rate of adoption of technology into healthcare practice is commonly considered to be poor (Sheldon et al, 2004; Black, 2006). Indeed, the ability to effectively manage knowledge is

increasingly seen as essential to modern healthcare systems seeking to deliver on both quality and efficiency expectations (Brailer, 1999).

Medical innovation can be broadly defined as “new drugs, devices and clinical practices introduced over time into the provision of health care” (Consoli and Mina 2009). A complex set of actors is involved in the creation, dissemination and use of medical innovations, and the different phases or activities are closely linked.

Medical devices users are one of the primary stakeholders of medical device technologies. Therefore, knowledge of their needs and their involvement in medical device development and assessment (MDD&A) are important. In addition, understanding of users’ needs is important as it determines the success or failure of technology development (Cahill, 1994; Shaw, 1998) and the quality of the product (Keiser and Smith, 1994).

Windrum& Garcia-Goni (2008) provide a similar multi-agent model of health innovation systems, but also put emphasis on a fourth domain – the policy domain, which to great extent contributes to shaping how innovation processes occurs and which innovations are selected. In traditional innovation models developed for understanding private sector innovation, the market is the important selection mechanism. The selection mechanisms for medical innovations are much more complex. In health innovation, the policy domain is an important selection mechanism, but also influences idea generation and not least regulates how new potential innovations develop.

According to Morlacchi& Nelson (2011), research and policy interests within the area of medical innovations have until recently been heavily skewed towards the first category, and development of new drugs in particular, whereas research on medical technologies and particularly intangible or soft medical innovations have relatively recently gained attention. Likewise, the strong interest in the impact of biotechnology on pharmacological innovations and the pharmaceutical industry that dominated the literature from the late 1990s and throughout the first decade of the 21st century has been superseded by research publications with a more nuanced picture of innovation processes, and a critical perspective of the radical innovation image often associated with this sector.

**Objectives:** The basic objective of this research is to highlight and understand the changing trends and innovation in medical technology which redefines the process of patient treatment in this competitive new era.

**Research Methodology:** This research is based on secondary data. Information was collected from various journals, research articles and reports.

**Findings:** Technology convergence holds the promise of markedly improving patient care and safety. At the same time, however, integrating a large number of medical devices and IT networks can increase risk to patients if any of the elements in the interconnected chain of care delivery technology fail. Technology that can facilitate the delivery of complex, sophisticated care in the home and other non-traditional settings includes the following:

**Remote clinical monitoring of patients progress**

With this technology, patients need not visit a doctor every time they need an advice and get their reports and progress examined. The home care monitoring systems can collect the patient’s vitals i.e. blood pressure, heart rate, sugar etc which can be transmitted over a common shared network or on secured internet networks which can be easily accessed by doctors and they can accordingly advice the patient about the treatment and his progress. This helps people of old age, differently abled persons and all those who find it difficult to visit a doctor and seek his advice.

**Portable technology:** This is becoming increasingly popular among people. Now there are portable devices which eliminate the need to actually visit a traditional hospital. Glucometers, portable ultrasound devices, defibrillators, mechanical ventilators etc. are such examples which provide enhanced care to patients

**Telemedicine:** The use of telemedicine, defined as “the use of medical information exchanged from one site to another via electronic communications for the health and education of the patient or health-care provider and for the purpose of improving patient care, treatment, and services” has significantly increased in the recent years especially in developing nations. It will continue to grow as the chronic disease burden grows in both industrialized and developing nations. However, this will occur only if there are sufficient numbers of appropriately trained clinicians (which there are not at present) to use the

technology as adjuncts to and facilitators of patient care.

**Computer Aided Surgery:** Image based surgery as it also referred to as is presently common in neurosurgery but is off late picking up in other surgical areas, including trauma, cardiac, and gynaecologic procedures. Image-guided surgical systems usually consist of an imaging component and a surgical tracking component, which together create three-dimensional images of the relevant anatomy. This technology will increase the efficiency and also reduce the time taken to carry out complex surgeries. Also it will have a significant impact on heart transplants' which involves at most precision and care.

**Bionic Pancreas:** Advances in developing the so called bionic pancreas that seamlessly and automatically mimics pancreatic endocrine functions in patients with diabetes is far ahead of projections. These are also known as artificial pancreas. The Virginia closed loop artificial pancreas interfaces with an android phone via the diabetes information application and has an insulin pump. More than 20 groups around the world are working on the versions of bionic pancreas and experts predict it to be developed by 2023 or may be sooner.

**Conclusion and Suggestions:** Overall, there is a particular shortage of data relating to the efficiency of knowledge management interventions. The tenuous link between intervention and observed outcomes makes return on investment difficult to measure and this is compounded by an absence of explicit

incorporation of cost-effectiveness considerations within implementation studies.

This means that introduction of new technologies adds to both complexity and cost. There is a similar lack of clarity regarding knowledge management and risk, and the benefits of knowledge management in reducing perceptions of risk tend to be assumed. The cost involved in developing new and innovative machines is tremendous and requires a lot of homework and effort by various researchers. Also clinical scientist need to plan their investments with an emphasis on cost and benefit analysis. More and more research institutes needs to be installed which would encourage researchers to take risks and tread on new paths. Central and State governments have to properly channelize the research and development in medical innovation. They need to provide adequate funding and opportunities to all which would motivate people to find something new. The health ministry in collaboration with ministry of science and technology should encourage programs and conferences which provide a platform where people could come and discuss the changing trends in health care.

There is need for detailed empirical investigations of collaborative models, and the potential synergies and tensions involved, if the "open innovation agenda" is to produce promising results and value for involved participants. As seen in the above discussion, better understanding about the collaboration between the clinical domain and the science-industry complex of biotechnology is necessary.

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