

## Information Technologies to Support Research: Challenges and Action Plan

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**Received:** March 16, 2021; **Published:** March 23, 2021

The health sector generates trillions of gigabytes of data every day ([www.OpenSourceResearchCollaboration.net](http://www.OpenSourceResearchCollaboration.net)). Data can be found national data registries or retrieved from experiments in medical sciences. Data can also be generated from health care applications. There is a vast amount of data so the question is why data use is still limited?

There are many reasons but most important is that few people have the capabilities of mining data for insights or produce results to good use. By focusing on information technology, we can build an incubator that connect those people. Moreover, IT will help us to replicate their expertise in interpretation of data.

Effective data management and data mining require multi-disciplinary teams composed of experts in healthcare, bio-informatics and information technology. These multi-disciplinary teams will close the gap between the rapidly evolving information technology sector and the slowly moving healthcare sector.

The health care system needs to be industrialized [1]. The rigor applied to the planning, design, development and monitoring of things such as cars and cell phones should be applied to patient care [1]. Cars and telephones are built with standards that mandate little variation and high reliability. Health care system deserves the same [1].

For healthcare organizations that successfully integrate data-driven insights into their clinical and operational processes, the rewards can be huge [2]. Healthier patients, lower care costs, more visibility into performance, and higher staff and consumer satisfaction rates are among the many benefits of turning data assets into data insights [2].

The success of modern, evidence based and personalized medical research is highly dependent on the availability of a sufficient data basis in terms of quantity and quality [3]. This often also implies topics like exchange and consolidation of data [4]. In the area of conflict between data privacy, institutional structures and research interests, several technical, organizational and legal challenges emerge. Coping with these challenges is one of the main tasks of information management in medical research [4].

Medicine will evolve from “a clinical science supported by data to a data science supported by clinicians”. Artificial intelligence will play a crucial role in generating solutions for health care system. However, a major barrier to the widespread application of data analytics in health care is the nature health care systems [4]. Unlike many other industries, health care data are hugely sensitive information and sometimes have life or death consequences [4]. This must be taken into consideration when planning projects and inspiration from management of other sensitive types of data may improve management of health care data and encourage data sharing.

### Action plan

Effective data de-identification, sharing and integration will tremendously improve clinical researches. By choosing to focus on information technologies to support clinical research, we shall pave the way to innovation and avoid a situation where clinicians are left behind.

Team approach is the best way to tackle data management issues and get useful results from datasets. A team must have minimum a clinician-scientist, software developer, data management engineer supported by lawyer, patients' representative and eventually experts from other science disciplines according to the nature of the project.

Approvals to retrieve and use health care data involves many players and can take long time. Thus, creating a fast track procedure will enable researchers to conduct their research efficiently in the limited time frames of their projects. This must be done with active involvement of patients' organizations, governmental agencies that monitor data sharing and independent organization if the nature of the research projects deemed it necessary.

Encouraging the growth and development of business intelligence (or the central strategic intelligence) unit<sup>1</sup> which connects researchers and data management teams, will play a major role in improving clinical research projects both quality and quantity. Rewards whether symbolic like recognition of the unit role in research projects both in media and when the project is published in addition to financial incentives will certainly stimulate innovation and service-oriented business model. Team building meetings joining researchers and business intelligence unit must be encouraged and take place in a stimulating atmosphere.

This ecosystem of research requires commitment from politicians, hospital direction and at the individual departments.

As the need for research is growing, the need to plant research culture early in educational life will also increase. Reaching out university students at different stages in the educational path and introducing them to the challenges in health care data management will stimulate their intellectual growth and challenge their creative abilities to produce innovative solutions.

In Denmark for instance, we have large population-wide data register (Danish National Patient Register) which is linked to unique personal identification number assigned to all Danish citizens at birth [6]. Linkage of the source population to other national registries provides information on disease diagnoses, cancers, medical treatments, and surgical procedures. This fortune of health care data is under-utilized.

Plans to link these registries with diagnostic imaging, video films from surgical procedures and electronic health care records require investment in artificial intelligence. There will be a huge potential for learning and improving patient management.

Expertise accumulated in this process will create a great national intangible asset. As the collaboration between clinicians-scientists and information technology engineers matures, many doors to innovation will be opened and many job opportunities will be created.

Time is running and our world is growing more and more competitive. We know that "it is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is most adaptable to change".

### Bibliography

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<sup>1</sup>The unit that helps in retrieving and analysis of health care data.

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**Volume 8 Issue 4 April 2021**

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