HEALTHCARE DELIVERY INNOVATION AND ITS TROUBLING IMPLEMENTATION

Quentin Marsman[1]

[1] Bachelor Student Medicine, Radboud university medical center, Nijmegen, the Netherlands.

Abstract

Review

Innovation is an important part of healthcare as it is always changing, which asks for new technologies and new ways to approach the delivery of healthcare. The implementation of innovation into the field of healthcare delivery seems rather difficult for a number of reasons. The most important of these include hindering regulation, passive patients and lack of leadership. In New Zealand, the Health Practitioners Competence Assurance Act (HPCA Act) shows that regulation does not have to be a barrier to innovation. It regulates the safety of the public by ensuring the competence of practitioners via regulations but also leaves room for practitioners to make their own choices and participate in innovation. Since the book *Open Innovation*, this concept is emerging in the field of innovation. This comprises the idea that for successful innovation one should not only rely on internal knowledge but also look beyond the walls of their company. Healthcare could exploit this idea to its advantage, although the rigid structure of healthcare and the inability to make use of patient knowledge seem to be barriers to this type of innovation. The Indiana University Center for Healthcare Innovation and Implementation Science (IU-CHIIS) gives us an example that innovation is possible in the delivery of healthcare. This centre builds an agile and adaptable learning system with which they achieved a lot in the first year of their existence. It remains to be seen what the effects will be on the long term. In conclusion, others need to learn from the IU-CHIIS to develop an adaptable open system in which innovation and regulation can go hand in hand.

Introduction

Innovation is an important aspect of healthcare and it has been throughout the history of medicine and healthcare. New ideas were essential for the development of the first national health insurance system in 1883 in Germany and for all that followed [1]. The life expectancy of people in the Netherlands went from 71.5 years in 1950 to 81.7 years in 2017 [2, 3]. This increase is mainly due to the improved healthcare system in the Netherlands, which in turn is predominantly caused by many innovations during those years. Some innovations led to major breakthroughs in healthcare such as the discovery of antibiotics by Alexander Fleming in 1928 [4]. To this date, innovations still make a difference in healthcare and remain of vital importance to keep improving healthcare. For example, many researchers are working on a possible cure for cancer, a disease with high mortality worldwide. However, innovation is not always easy to implement. Implementing innovation in the field of healthcare delivery (meaning the way healthcare is provided to the patient), for example, appears to be challenging. In this article, we will review current literature on innovation management to identify which factors influence innovation and further elaborate on the difficulties concerning implementing these innovations in the field of healthcare delivery. Lastly, open innovation is discussed and an example of successful innovation implementation is given.

What is innovation?

The definition of innovation is "the development and the successful implementation of new, improved products, services or production and delivery processes" [5-7]. The process of innovation consists of three basic steps that need to be taken : 1) Idea generation, 2) successful development of that idea into an useable concept and 3) successful application of that concept [7]. To successfully accomplish these three steps a few criteria need to be met. An important condition is a climate suitable for innovation; all people in the organisation need to be willing to be innovative [5]. This does not mean that everyone has to be creative, but it requires the ability to let go of conventional practices and ideas. In his article, Cumming *et al.* mentions a few parameters that have to do with the development process [7]. He differentiates into three contributing factors: signal, controls and noise; and two outputs: response and error state [7]. Signal comprises the initial idea for the innovation, the needs of the consumer and the correspondence with the corporate strategy [7]. The controls are the resources that can help to turn the idea into an innovation, such as the correct knowledge, equipment, people and a well-managed plan [7]. Noises are the factors that can disturb the process [7]. These include internal noises, like pressure for success and concerns for the costs and external noises, like changes in the market, financial situation and wishes of the consumer [7]. The outcome of the process can either be the response (a successful application of the idea) or the error state (an unwanted product or a faulty product) [7].

Resistance to change

In his article, Gorman *et al.* showed that healthcare systems are resistant to changes on the macro level (the core operating model) [8]. Despite the drastic change in disease burden, the hospital-based and doctor-led model has not really changed all that much over the last 150 years [8]. According to the article by Gorman, this is due to eight core barriers, which are shortly addressed in table 1 [8]. Wass *et al.* state that regulation seems to hinder innovation [9]. For example, lack of access to patient data is a barrier to innovation in health information services [10].

In the last decade, there have been many changes in the regulation of healthcare, due to the public asking for better regulation [11]. Most governments around the world have acknowledged this [11]. However, seeing barrier five described by Gorman, raises the question whether good regulation and significant innovation team up [8]. As described by Coates, the experience with the Health Practitioners Competence Assurance Act (HPCA Act) in New Zealand shows that they do quite well [11]. The purpose of the HPCA Act is to protect the health of patients by offering mechanisms to ensure the competence of health practitioners during their career [12]. This act obliges practitioners to have a minimum level of competence and to keep up to date with the newest developments in their field [13]. When they do not, regulators can confiscate the ability of them to practise [11].

The HPCA Act seems to have the appropriate balance between regulation and innovation [11]. On the one hand, there is a distinct standard of competence the practitioners have to live up to, ensuring good regulation of the quality of healthcare [11]. On the other hand, the regulators are given enough flexibility with respect to "how they structure the professions they regulate and what they require practitioners to do", leaving enough room for innovation in the healthcare delivery [11].

Table 1: Core barriers for the resistance of healthcare to changes on the macro level.

Core Barriers for Resistance of Healthcare to Changes on the Macro Level			
Models of healthcare are currently centred around the provider and the **consumers are too passive**. Innovation happens only when healthcare becomes 'patient-owned'. That is, patients need to be involved in the process of innovating healthcare delivery. 1	**Insufficient intelligence** in the health system: a lack of required intelligence can make the development of innovations unsuccessful and inefficient. 3	**Regulation leads to restriction**: The regulation of healthcare can be a barrier to innovation. 5	**Territorial behaviour** by potentially disrupted groups and professions: their behaviour is often overstated by the business models and funding schemes, which leads to a negative contribution to innovation. 7
Lack of leadership among clinicians: leadership training does not have a sufficient aim, worsening the training in the process. 2	**Restrictive business models and funding**: the systems of funding and salaries are not always constructed to support innovation, leading to inhibition of innovation and a possible loss of productivity. 4	**Litigation can be a threat to innovation** and can lead to uptake of provider-protective healthcare with low utility. 6	**Flawed health systems**: ministries and departments of health are frequently role conflicted and tactically weak. The ministry is usually not a purchaser, leading to a lack in the stimulation of innovation. 8

However, the Act is not perfect in the sense that it does not explicitly encourages regulators to innovatively change healthcare delivery. For example, if the regulators are encouraged to address health workforce issues, a greater extent of innovation could be achieved [11]. Furthermore, a recent study by Bismarck *et al*. suggests that data, which guides the regulation of practitioners, could be used more often and in a better way [14]. This data could be of vital importance to innovation in the delivery of healthcare.

Open innovation

With the population aging and the ever-growing burden of chronic diseases, healthcare cannot rely on internal knowledge (from within the organisation) only [9]. It must incorporate external knowledge (from outside the organisation) next to internal knowledge to keep their innovation at a steady level [9]. This asks for the so-called 'open innovation' defined by Wass *et al*. as innovation in which an organisation looks beyond the traditional boundaries of their organisation in their innovation process [9].

Since the book *Open innovation* by Chesbrough, the field of open innovation has received enormous amounts of interest [10]. Studies in the context of healthcare are nevertheless lacking, as only 18 articles were published in the period between 2003 and 2014 [9]. Although there is a lack of studies, some things can be carefully concluded. In the first place, open innovation shows some constraining factors in healthcare. The organisation in healthcare is difficult because there are a lot of local variations in the practices in healthcare. In most cases, healthcare also lacks the structure to use the knowledge of the patient and user to improve innovation [9]. In their paper, Dias and Escoval show that hospitals with the classical hierarchical structure have three times less chance of the development of an innovation than hospitals with a dynamic structure [15].

On the other hand, open innovation appears to have some positive outcomes according to Wass *et al*. [9]. This manner of innovation appears to shift the patient from passive to active actor, thus solving the first barrier defined in table 1. Furthermore, it leads to collaboration between several actors [9]. As an example, according to the study by Dias and Escoval mentioned above, hospitals use universities, subcontracted organisations, and healthcare users as external collaborators [15]. Finally, Davey *et al*. display that open innovation can have a positive effect on access to the market [16]. It provides medical innovators with the possibility of the multi-perspective ideas of scientists, engineers, clinicians, and patients [16]. As a result, innovations are more evidence focused and reach the market faster [16].

The Indiana University Center for Healthcare Innovation and Implementation Science (IU-CHIIS)

IU-CHIIS is an example of an organisation that succeeds in improving healthcare delivery by implementing innovations. Launched in September 2013, this organisation aims to offer education and engagement services to aid healthcare delivery systems in meeting the threefold aim proposed by the Institute of Medicine in the United States (US): better care with improved outcomes, at lower costs and with enhanced clinical experiences for patients [17, 18].

They achieved a lot in their first year. They successfully scaled up a dementia and depression care model for older adults from 200 to 2,000 patients, enlarged the Accountable Care Unit from four to fourteen units [19]. The latter led to a 58% reduction in length of stay in the hospital, a 35% reduction in readmissions and a 50% reduction in mortality rate [19]. Furthermore, they created the first program in the US, in which a certificate in innovation and implementation science can be received [19]. This Graduate Certificate Program in Health Innovation & Implementation Science is focused on delivering professionals the skill sets required to become leaders of change in the healthcare system [20]. Lastly, they got funding from National Institutes of Health to investigate the pros

of dementia screening, develop a patient-reported symptom monitor, evaluate side effects of medication and conduct a delirium evaluation in the senior emergency department [19].

This teaches us about the necessity of an agile and adaptable learning system stretching beyond the hospital system [19]. As the paragraph about open innovation suggests, it is crucial for this system to look beyond the traditional boundaries rather than relying on internal knowledge alone. Six components are of vital importance for this to work: effective sensors of the environment; rapid bidirectional information transportation; knowledge storage; critical decision making utilising advanced analytics; efficient, lean and safe execution and last but not least reliable data monitoring [19]. Given the presence of these components, this agile and adaptable learning system can be very effective [19].

From the IU-CHIIS, three sources of variation in the delivery of healthcare emerged: 1) the process of complex decision making, influenced by clinical knowledge and expertise and the implementation of evidence-based practices, 2) the production line, influenced by tools such as quality and process improvement and 3) the complex response of the patient, influenced by personalised medicine, pharmacogenomics and socioeconomic position [19].

Conclusion

In conclusion, there are various reasons as to why implementing innovations in healthcare delivery is proven to be so difficult. The main reason as to why this is the case is the resistance of healthcare to changes on the macro-scale. This is due to various factors including bad innovation models, lack of leadership and passiveness of the patient. The case of open innovation elaborates on these problems, highlighting the local variations in healthcare making innovation challenging. However, it also has some positive effects, such as more active patients, better collaboration and access to more markets. Furthermore, the IU-CHIIS shows that it is possible to create an agile, adaptable learning system in healthcare in which innovation can lead to better healthcare delivery. Then again, this project has just started and the long term results are not really clear, but it seems very promising. In the future, above-mentioned resistances need to be overcome and other projects need to learn from the IU-CHIIS to stimulate innovation to improve the quality of healthcare by enhancing the efficiency and cost-effectiveness of healthcare delivery.

The strategy of the Radboud university medical center is to be personalised and innovative by trying to use innovation in diagnostics, treatment and prevention of diseases. The mission of the Radboud university medical center, which is 'to have a significant impact on healthcare' is a mission that closely resembles the mission of RAMS by wanting to have an impact on the medical scientific formation of (bio) medical students and impact healthcare.

References

1. Katzmann, L.S. The German Sickness Insurance Programme 1883-1911: Its relevance for contemporary American health policy. London School of Economics and Political Science. (1992).
2. Centraal Bureau voor de Statistiek. Levensverwachting; geslacht, leeftijd (per jaar en periode van vijf jaren). (2018). Retrieved from: https://statline.cbs.nl/Statweb/publication/?DM=SLNL&PA=37360ned&D1=3&D2=a&D3=0,21,61,81&D4=0,8,13,17,24,41,54,65,84,91-96&HDR=G1,T&STB=G2,G3&VW=T (Accessed: 27-03-2019).
3. Science History Institute. Alexander Fleming. Retrieved from: https://www.sciencehistory.org/historical-profile/alexander-fleming (Accessed: 27-03-2019).
4. Science History Institute. James Watson, Francis Crick, Maurice Wilkins, and Rosalind Franklin. Retrieved from: https://www.sciencehistory.org/historical-profile/james-watson-francis-crick-maurice-wilkins-and-rosalind-franklin (Accessed: 27-03-2019).
5. Boer, E.D. 10 onontbeerlijke voorwaarden voor succesvol innovatiemanagement. NENMagazine, 34-37 (2014).
6. Jonker, J. Wat is innovatie? De definitie en betekenis. Management Impact(2018). Retrieved from: https://www.managementimpact.nl/innovatie/artikel/2018/04/wat-innovatie-de-definitie-en-de-betekenis-10115000?vakmedianet-approve-cookies=1&_ga=2.264314191.1975646879.1541932434-107223205.1541932434 (Accessed: 11-11-2018).
7. Cumming, B.S. Innovation overview and future challenges. European Journal of Innovation Management1, 21-29 (1998).
8. Gorman, D. On the barriers to significant innovation in and reform of healthcare. Internal Medicine Journal45, 597-599 (2015).
9. Wass, S. & Vimarlund, V. Healthcare in the age of open innovation - A literature review. Health information management : journal of the Health Information Management Association of Australia45, 121-133 (2016).
10. West, J., et al.Open innovation: The next decade. Research Policy43, 805-811 (2014).
11. Coates, J. Regulation and innovation in healthcare. Internal Medicine Journal45, 989-990 (2015).
12. Ministry of Health. About the Health Practitioners Competence Assurance Act. (2014). Retrieved from: https://www.health.govt.nz/our-work/regulation-health-and-disability-system/health-practitioners-competence-assurance-act/about-health-practitioners-competence-assurance-act (Accessed: 28-03-2019).
13. Midwifery Council. Understanding the legislation. Retrieved from: https://www.midwiferycouncil.health.nz/about-us/legislation (Accessed: 28-03-2019)
14. Bismark, M.M., et al.A step towards evidence-based regulation of health practitioners. Australian Health Review39, 483-485 (2015).
15. Dias, C. & Escoval, A. The open nature of innovation in the hospital sector: The role of external collaboration networks. Health Policy and Technology1, 181-186 (2012).
16. Davey, S.M., et al.Innovation in the medical device sector: an open business model approach for high-tech small firms. Technology Analysis & Strategic Management23, 807-824 (2011).
17. Indiana CTSI. Center for Health Innovation and Implementation Sciences. Retrieved from: https://indianactsi.org/researchers/services-tools/innovation/center-for-health-innovation-and-implementation-sciences/ (Accessed: 28-03-2019).
18. Berwick, D.M., et al. The Triple Aim: Care, Health, And Cost. Health Affairs27, 759-769 (2008).
19. Azar, J., et al.The Indiana University Center for Healthcare Innovation and Implementation Science: Bridging healthcare research and delivery to build a learning healthcare system. Zeitschrift für Evidenz, Fortbildung und Qualität im Gesundheitswesen109, 138-143 (2015).
20. Center for Health Innovation & Implementation Science. Health innovation and implementation science. Retrieved from: http://www.hii.iu.edu/services/education/graduate-certificate/ (Accessed: 28-03-2019).