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How Can Information and Communication Technology Improve Healthcare Inequalities and Healthcare Inequity? The Concept of Context Driven Care

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Abstract. Advances in medicine have improved health and healthcare for many around the world. The challenge is achieving the best outcomes of health via healthcare delivery to every individual. Healthcare inequalities exist within a country and between countries. Health information technology (HIT) has provided a mean to deliver equal access to healthcare services regardless of social context and physical location. In order to achieve better health outcomes for every individual, socio-cultural factors, such as literacy and social context need to consider. This paper argues that HIT while improves healthcare inequalities by providing access, might worsen healthcare inequity. In order to improve healthcare inequity using HIT, this paper argues that we need to consider patients and context, and hence the concept of context driven care. To improve healthcare inequity, we need to conceptually consider the patient's view and methodologically consider design methods that achieve participatory outcomes.

Keywords. Information and communication technology, healthcare inequalities, healthcare inequity, context-driven care.

Introduction

Advances in medicine have improved the lives of many [1]. This, however comes at a price that healthcare cost is increasing and high quality healthcare is increasingly becoming unaffordable for many [2]. Many cutting edge technologies while they improve patient life, also worsen inequality, creating a divide between those who have access to care and those who do not. Advanced economies are spending more than 10% of GDP on health [3], and yet, many patients do not have access to quality care.

A recent multi-country comparison shows the effect of healthcare spending, quality of care, and access to healthcare [4]. Australia has been rated as the country that produces the best healthcare outcome but access to care is poor [4]. The United Kingdom provides the best access to care but health outcomes can be improved [4]. Healthcare inequalities are therefore evident between countries and for patients within a country.

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Technology, in particular information communication technology (ICT) has been developed and adopted into healthcare with the view of improving healthcare outcomes and reducing healthcare inequality [5]. This paper discusses ICT that develops with patients in mind, which might potentially improve healthcare inequalities. While healthcare inequalities might improve with ICT, healthcare inequity might not. This paper discusses the difference between healthcare inequalities and healthcare inequity. This paper then challenges the idea that ICT, as it currently stands will likely improve healthcare inequity. In fact, ICT might widen the gap. This paper argues that in order for ICT to improve healthcare inequity, we need to consider fundamental requirements for good health from the perspective of public and population health and understand how we could help the population achieve these requirements through better designed tools and technology.

1. Current ICT that improves patient healthcare management

The advent of Web 2.0 and internet of things have improved access of ICT and healthcare information for patients, with the promise of engaging patients to participate, manage, and design their own healthcare journey [6]. Many ICT programs and apps have been developed to help individual patients to improve their own health and manage their diseases [7]. These ICT applications could be characterised by their intended health outcomes as below:

- ICT that monitors health parameters for behavioural change (such as step counter)
- ICT that helps with disease prevention (eg. Calorie counter and dietary advice, smoking cessation apps)
- ICT that helps disease management (eg. Apps that helps with chronic disease management where data is obtained from blood glucose meters (diabetes) spirometer (COPD) etc.)

While these ICT devices and apps could have the potential to improve patient outcomes, the fundamental process of health improvement comes from the delivery of information for patients to understand and act upon based on their own healthcare priorities. It requires patients to understand the information, act on the information and monitor the outcome of the action and compare that with the information achieved. Furthermore, such a model has a strong practitioner/healthcare organisation focus, without considering how consumers prioritise and react to these devices and advices. This is further demonstrated in the diagram below.

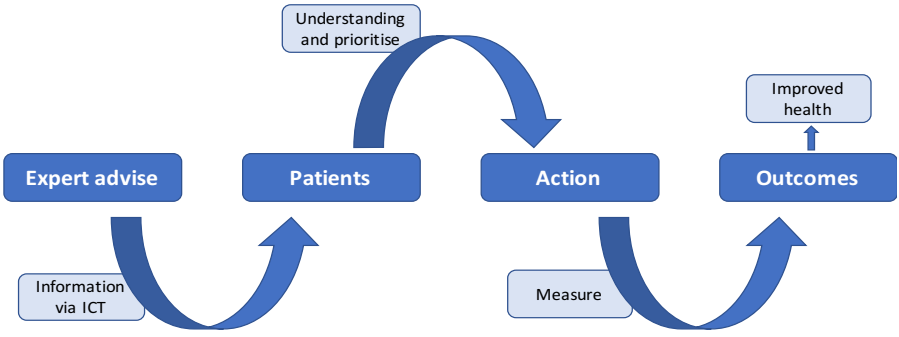

Figure 1. Model of information flow to strengthen patients own mastering of disease

As the use of ICT for patient engagement does not require substantial human resource, the cost can be low while the potential to improve healthcare for all patients is high. Any patients who have access to ICT devices could potentially achieve the same advices and therefore achieve very similar health outcomes. As such, ICT is thought to have the potential to improve healthcare inequalities by providing easy access to health advices for all patients.

2. Impact of current ICT on healthcare inequalities and healthcare inequity.

As demonstrated in figure 1 above, current ICT development and design has the potential to improve healthcare outcomes and healthcare inequalities. ICT in its current form, however, might not be as effective to improve healthcare inequities. Healthcare inequalities are defined as differences in health status or in the distribution of health determinants due to healthcare delivery, while healthcare inequities are defined as avoidable and unjust inequalities in health between groups [8]. Current design of technology has helped to reduce healthcare inequalities by delivering expert advices to patients regardless of their social status and location. The assumption is that technology use to receive advice will lead to better health outcomes. In its current form, however, ICT for patient's health improvement requires good literacy and good ehealth literacy, as well as the appropriate social context in order to prioritise disease prevention and management [7,9]. This process will also need patients to have the motivation to achieve the desired outcome. If all these contexts are in place, then ICT will achieve good outcomes. In order to achieve these outcomes, however, patients will need to have a good level of education and communication skills. They will also need to have knowledge, means and abilities to modify their behaviours for their own health or to manage their own diseases. Most importantly, the desired outcomes of these interventions will not be evident immediately, there will be a lag time between action and recognizable outcomes.

This ideal model, however, faces significant challenges in real life, when social and environmental context is being considered. When we consider patients who are vulnerable and marginalised, then it becomes obvious that current ICT does not necessarily deliver the intended outcomes. This brings up the concept of healthcare inequity, at which unjust inequalities exist despite the use of technology. In fact, the development and utlisation of ICT might well widen the gap of healthcare inequalities.

Firstly, in this model of healthcare improvement, there is a big assumption that patients have adequate level of literacy, both reading and writing, but also ehealth literacy to understand and receive the necessary message. Secondly, there is an assumption that once the message is received by patients, they have the means, financial or otherwise to use these technologies and act upon the information provided by these technologies. Good diet and exercise equipment do impose financial constraints, and medical appointments and check-up require transportation and time, if not financial means to pay for services in pay-for-service care model. Thirdly, once patients receive the information, they need to make the link in their context that certain health related behaviours are associated with long term health outcomes. These health outcomes are often not an immediate reward but longer-term improvements. Finally, patients need to take into consideration their own health context to sometimes modify the message to suit their own needs.

3. ICT might disempower vulnerable patients.

While the benefits of ICT in patient engagement and empowerment have been discussed, the risks of ICT in disempowering patients and disengaging patients have not been discussed as much in the literature [9]. This paper argues that ICT in its current form could well have unintended consequences for vulnerable and at risks patients.

This first issue to consider is in relation to healthcare professionals. As there are now many widely and easily available healthcare information apps available, healthcare professionals often assume that patients could easily obtain necessary information through ICT to understand their own healthcare issues. When patients who do not or cannot access or act upon these information, they might be considered as patients who are less interested in their own health. The utilisation of ICT by other patients, might therefore produce stigmata for those who do not/cannot use or act upon these healthcare improvement activities.

Secondly, when ICTs are used, and if patients cannot achieve the desired outcomes because of social context, then repeated reminder or suggestions from ICT automatically might disempower and disengage patients through "message fatigue" and widen healthcare inequality. Finally, as ICT for now delivers the message for patients to act in their own environment, e.g. eat healthy, exercise more, patients might not have the knowledge or mean to achieve these. Furthermore, it might not be the priority for the patient to act upon these messages within their particular context.

This paper therefore argues that for ICT to improve healthcare inequalities, we need to consider the particular context of the patient, and use that context to derive what is needed for ICT to deliver for the patient.

4. Context driven population health improvement & patient derived ICT solutions

Current literature considers context as important in ICT implementation in healthcare. This concept is often discussed and considered as context sensitive health informatics [10]. When we consider public and population health and healthcare inequity, however, it is a challenge for us to re-consider whether context sensitive healthcare is enough to deliver improvement, particularly in healthcare inequalities.

To improve patient outcomes using ICT and to reduce healthcare inequity, we need to re-consider the fundamental requirements for health. When we broaden the definition of health beyond diseases and disease prevention, then the fundamental requirements for health will include shelter, availability of food, free from hunger, cold and violence, good social support and friendship as well as a fulfilling role in the society that helps an individual to achieve their own goals [11]. In that regards, innovative and participatory design techniques to engage patients are essential. In Denmark, a study using participatory design walks through high health risks neighhourhood identified socio-cultural aspect of health that ICT might target in order to reduce healthcare inequity [12].

If we consider this broader perspective of population health, and if we truly want to engage patients and deliver health and healthcare for patient through ICT to reduce inequity [12], then, we need to shift from patient-centred care to patient and context driven care. We need to understand the context and priorities from the patient's view and allow patients to direct ICT that could deliver solutions and assist patients to achieve their own set of guided goals for better health. If we understand health from a

broader perspective, and design ICT that is context-driven and patient-derived then we can truly achieve the goals of reduction in healthcare inequity.

From that perspective, ICT must consider and deliver solutions to following areas:

- Knowledge and interactive education: literacy, health literacy, digital literacy and ehealth literacy are fundamental to achieve better health outcomes and ICT can deliver interactively and making that process fun and context driven.
- ICT needs to assist the logistic to achieve better shelter from suffering, such as identification of cheaper or free food supply or shelters available at night.
- ICT can assist patients to prioritise and develop social network without stigmata attached through distant and digital communication.

We therefore propose in this paper that consideration should be given to context driven healthcare and we should develop research in ICT design based on this principle to reduce healthcare inequalities through context driven care.

5. Conclusion

Healthcare inequity and inequalities is a major problem facing all countries around the world. ICT might be able to assist with healthcare inequalities and inequity but it might require a re-think and focusing on the fundamental of health requirements for each individual. Current ICT technologies might not improve healthcare inequitty, instead it might widen the gap. To reduce healthcare inequity, ICTs need to adopt context driven, patient-derived design to provide knowledge, logistics and social network in order to encourage, engage and empower all patients to achieve better health.

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