



Uncovering the Tripartite Relationship between eHealth, Patients and Healthcare Professionals

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Abstract

This study is part of a broader study that explored factors that influence healthcare professionals' (HCPs) adoption and use of eHealth in their clinical practices in Sub Saharan Africa (SSA). eHealth is reported to bring about positive transformation in the clinical setting, but despite this, there is limited information on how HCPs in SSA interact with this technology. This study employed a mixed method approach called Q methodology to uncover these professionals' viewpoints on their relationship with eHealth in their respective clinical practices. Findings from the study uncovered and proposed a tripartite model of relationship between eHealth, healthcare professionals and their patients/families. Four divergent tripartite relationships were identified which define the viewpoints of these HCPs within this study. These viewpoints are identified as A, B, C and D based on how they interact with the constructs of the tripartite relationship. Though the findings from this study may not be generalisable beyond the participants of the study, nevertheless, the concept generated could be transferable to other similar settings. This will help understand how eHealth contributions are viewed by HCPs within the clinical practices.

Keywords: *eHealth, Sub-Saharan Africa, Healthcare professionals, Tripartite relationship, Q methodology, Viewpoints.*

Introduction

Sub-Saharan Africa (SSA), a region with 33 of 48 of the world's poorest countries (Wamala & Augustine, 2013) is identified to have many health problems due to its high disease burden, expanding population, shortage of healthcare professionals and poor infrastructure (Akanbi *et al.*, 2012; Mars, 2012). Wamala and Augustine (2013) classified the healthcare challenges facing SSA into two categories, the technological and the non-technological challenges. The technological challenge they identified cover issues of poor infrastructure for eHealth

implementation, while the non-technological involves both individual (HCP) and government policies affecting adopting ICT within healthcare practices.

Thus, the emergence of eHealth presents as a solution to some of the health problems affecting SSA (Akanbi *et al.*, 2012; Mars, 2012; Obasola, Mabawonku, & Lagunju, 2015; Zayyad & Toykan, 2018) by providing an opportunity to address these issues. Despite this, some researchers have identified lack of political will by certain governments within

the region such as Nigeria, towards developing and implementing health policies that incorporate eHealth within its mandates (Mars, 2012; Zayyad & Toycan, 2018). The common reason these governments give is generally due to the expensive burden of eHealth resources. Other researchers have also identified that in certain countries where governments have implemented eHealth policies such as South Africa and Ethiopia, HCPs lag behind in adopting it within their clinical practices (Wamala & Augustine, 2013). The reason provided by these researchers for the HCP's behaviours were due to an increased burden of already existing workload, and in some instances fear of using new technologies (M. P. Gagnon, Desmartis, *et al.*, 2012; Zayyad & Toycan, 2018).

In addressing these challenges and in line with achieving the provision of quality healthcare, certain governments in SSA have taken measures to include ICT within the healthcare practices within their countries.

Furthermore, recent studies have shown that some countries within SSA that have successfully adopted eHealth for improving quality healthcare have recorded significant gains in this regard (Zayyad & Toycan, 2018). These researchers have identified improved patient identification, structured documentation and reporting, better financial management and decreased patient waiting time, as some of the benefits. Others researchers such as Qureshi (2016) have identified that incorporating ICT within healthcare played a major role in the tracking of cases during the Ebola epidemic in African countries such as Nigeria.

In Nigeria, the Federal Ministry of Health (FMOH) has a division responsible for eHealth which among its duties is to support the implementation of eHealth policies and initiatives, support the development and compliance to legal framework on eHealth adoption and implementation and also support the collaboration between the country and

international organisations towards eHealth adoption and implementation (FMOH, 2017). However, the FMOH has stated the eHealth policy within the country is still at an emerging stage. This means healthcare institutions within the country are not yet bound by a well-defined eHealth policy for eHealth adoption and use within the clinical environment. As a result, each hospital can decide to identify, administer and oversee eHealth tools within its boundaries. The United Nations Foundation (2014) reported that the drivers for eHealth within Nigeria revolve around political, commitment and healthcare needs by the country. As such, the government recognises eHealth as an important driver towards improved quality healthcare within the country. In addition, the report stated that the government has no clear guidance on how to engage with stakeholders in eHealth use, to ensure that these technologies integrate appropriately with existing workflows within the clinical area. Also, it was recognised that healthcare financing for such tools rests on the healthcare institutions who will use these eHealth tools (United Nations Foundation, 2014).

Thus, healthcare administrators in healthcare institutions become "saddled" with the choices of which eHealth resource should be adopted to support healthcare within the scope of the organisation. These choices are further influenced by the provision of the eHealth tools by donor projects (Akanbi *et al.*, 2012). This limits the ability of HCPs themselves to influence which eHealth should be provided within their respective clinical practices. This is because decision-makers tend to "supply" the clinical environment with any eHealth tool(s) they deem fit even if it may not be clinically adopted by the HCPs.

In relation to the tripartite relationship between eHealth, HCPs, and patients, Coiera, Ash, and Berg (2016) identified that despite the positive attributes of eHealth within clinical practice, it does not work in isolation. They suggest that these technologies interact

with other components within the “complex and socio-technical healthcare system” (p163) to bring about a desired outcome. Thus, HCPs must make decisions based on competing demands within the ever-dynamic clinical environment on whether to adopt and use technology or not. These views are coming against the backdrop of what Weiner (2012) foresaw as an eHealth revolution which will bring about positive transformation within the clinical environment. In comparison to developed regions of the world that have documented evidence on the adoption and use of eHealth among HCPs, developing regions such as Sub-Saharan Africa have limited information on eHealth uptake (Akanbi *et al.*, 2012).

As such van Gemert-Pijnen *et al.* (2011) suggests that HCPs are sceptical in adoption and use of these technologies. They claim that HCPs argue that the technologies do not work for them or show benefit for their patients. Though this may resonate with some of what Coiera *et al.* (2016) argue, it may not be said to be applicable to all HCPs. Nonetheless, van Gemert-Pijnen *et al.* (2011) while reviewing frameworks to develop a holistic framework for eHealth uptake and impact noted that some user-centred eHealth frameworks advocate three important areas

involved in eHealth adoption in clinical practice. These are the HCPs, the eHealth tools, and the patient. Thus, in the current research study, these three areas are perceived to relate to each other in a “triangular” or tripartite interaction and in including “clinical tasks” co-existing with eHealth (see Figure 1).

Though the distance between the points on the triangle may be assumed to vary depending on the description of the relationship as exists within this study. For example, a positive relationship between either of HCP, patient or eHealth will reduce the distance between those areas. On the contrary, should the distance between any two points on the triangle be wide, it could be perceived that those points may not have a favourable interaction. This change in length is influenced by modifiers such as clinical autonomy, resistance, availability/access to eHealth, age and gender which influenced the choices of these HCPs to adopt and use the eHealth tools.

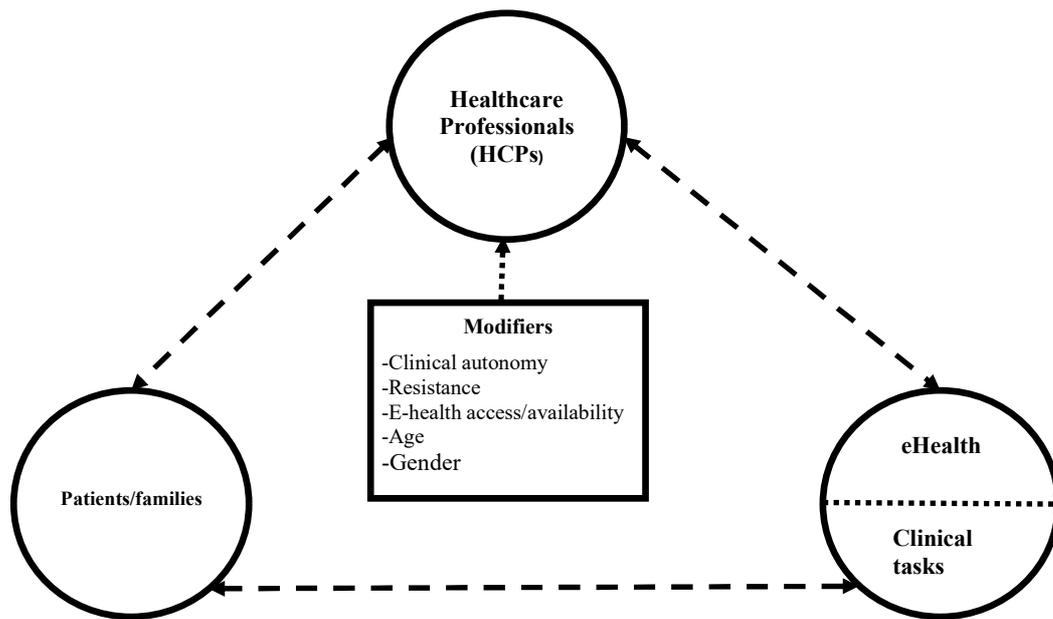


Figure 1: *Tripartite Relationship: HCPs-eHealth-Patients/Families*

Methodology

Overview

This is part of a broader study that explores HCPs adoption and use of eHealth within clinical practice in SSA using models of technology acceptance and Qmethodology.

Aim

The aim of this paper is to uncover the *tripartite* relationship that exists within clinical practice between eHealth, HCPs and patients/families.

Design

An exploratory descriptive design was employed using Q methodology.

Sample

Thirty-six HCPs participated in the study. These comprised 18 nurses and 18 physicians who have experience in using eHealth within their clinical practices. Participants' age ranged from 31-56 years including 19 males and 17 female HCPs.

Ethical Considerations

Ethical approval was obtained from the Faculty of Medicine and Health Sciences Ethics Committee, the University of Nottingham and the ethical review board at the institution where the studies were conducted (H16022016SoHS and ABUTHZ/HREC/V10/2016).

Data Collection

Traditionally, data collection in Qmethodology is done by participants rank-ordering a set of statements along a sorting grid of agreement to disagreement. Thus, in this study, each participant rank-ordered (Qsort) forty-six statements covering their adoption and use of eHealth within their clinical practice. This was followed by an interview to discuss how they ranked the statements. Details on how the statements were developed could be found in Ladan, Wharrad, and Windle (2018).

Most Disagree						Most Agree						
-6	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	+6
1 card	3 cards	3 cards	4 cards	4 cards	5 cards	6 cards	5 cards	4 cards	4 cards	3 cards	3 cards	1 card

Figure 2: Ranking Pattern

Data Analysis

A by-person factor analysis was done using PQMethod version 2.35. This is a Q methodology dedicated software developed by Peter Schmolck which is freely available for download during this study. It involved an inverted factor analysis after the inter-correlation of participants ranking.

Each participants’ completed Qsort was inter-correlated with other completed Qsorts to yield a correlation matrix (Watts & Stenner, 2012, 2014). This correlation was followed by Centroid factor analysis and Varimax rotation.

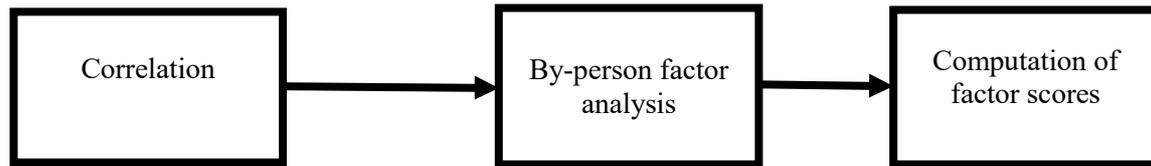


Figure 3: The Three Main Stages in Qmethodologyanalysis

Data Analysis

Results

Data analysis yielded four distinct factors representing viewpoints of the HCPs relationship with eHealth and patients/families. Table 1 shows the characteristics of the factors.

Table 1: Characteristics of Factors

Factor	Participants/Q-sorts	Percentage (%)
1	7	19.4
2	7	19.4
3	6	16.7
4	8	22.2
<i>Confounding</i>	3	8.3
<i>Non-significant</i>	5	14.0

Table 1 identifies the number of HCPs’ completed Q-sorts that loaded on each of the four factors/viewpoints (see Figures 4, 5, 6 & 7).

Discussion

Factors Affecting the Tripartite Interaction

Despite the common acceptance that eHealth could positively impact healthcare practice (M.-P. Gagnon *et al.*, 2009; M.-P. Gagnon, Nsangou, Payne-Gagnon, Grenier, & Sicotte, 2014; M. P. Gagnon, Desmartis, *et al.*, 2012; M. P. Gagnon, Orruño, Asua, Abdeljelil, & Emparanza, 2012; Huryk, 2010), van Gemert-Pijnen *et al.* (2011), Doolin (2016) and Harrison, Koppel, and Bar-Lev (2007) reported that unintended/undesired consequences usually arise that alter the type of tripartite relationship that exists. Among such consequences are issues of clinical autonomy (Brewster, Mountain, Wessels, Kelly, & Hawley, 2014; Verhoeven, Steehouder, Hendrix, & van Gemert-Pijnen, 2009) and resistance to technology (Doolin, 2004; Greenhalgh, Swinglehurst, & Stones, 2014; Timmons, 2003) which play an important part in determining how HCPs interpret how eHealth modify their interactions with the patients vis-à-vis the triangular relationship.

Both issues of resistance and clinical autonomy resonate with the viewpoint C. A participant comment clearly describes such:

“Yes, there are, there were moments when the IT (information technology) was introduced but some certain individuals [senior physicians] actually resist it. Feeling that because it is not understandable, it’s not clear to them as in complicates their work that is the task that is been given to them. So, they prefer to adopt in the manual way rather than going the ICT way. But for most of them, it’s because it’s not clear to them actually” (Participant 3)

Clinical Autonomy

Verhoeven *et al.* (2009) explored factors affecting healthcare workers adoption of an online resource for infection control. They identified that senior physicians reported that they have the necessary skills and training and

will therefore not engage with the resource provided. Similarly, senior physicians were identified to have the same views in the study by Hains, Fuller, Ward, and Pearson (2009) as mentioned above. Thus, the consequence of the availability of both eHealth tools in the aforementioned studies and also by the participant 3 statement above, evidently shows that senior physicians drive the issue of clinical autonomy to avoid adoption of eHealth tools. The views of senior physicians in Verhoeven *et al.* (2009) is contrary to the views of senior nurses reported by Gosling, 2004 cited in Gerrish *et al.* (2006). He reported that senior nurses were shown to utilise information technologies more than their junior colleagues. However, in the current research study despite acknowledging that eHealth could make a positive contribution to clinical practice HCPs in viewpoint C seem to agree with the findings of Verhoeven *et al.* (2009). These HCPs are comfortable by doing what they have routinely been doing without integrating the eHealth in their daily clinical activities. The already busy setting of the clinical area hinders the adoption of eHealth as suggested by Bossen (2007) because of the recursive nature of these technologies, eHealth use is seen by them as an extra task and thus avoided. In addition, Brewster *et al.* (2014) review of factors affecting frontline staff acceptance of health technologies reported that nurses often view eHealth as extra responsibility and not a part of routine healthcare practice. Verhoeven *et al.* (2009) add to this by arguing that the already existing stress at the workplace and poor understanding of how eHealth tools work, these HCPs get “put off” from adopting and using them.

However, Doolin (2004) suggests that some HCPs fail to adopt healthcare technologies as a defensive technique to avoid having an audit trail of the errors they might make. Threatened clinical autonomy was identified among the most important barriers to

physician adoption of eHealth technology in the review by de Groot, Raissi, Kwon, and Santana (2016). They reported that some physicians will not change their practice patterns due to the introduction of certain technologies such as telemedicine. The authors implied that this category of HCPs may fear that the eHealth could threaten their independent decisions. Thus de Groot *et al.* (2016) infer that this may expose flaws in senior physicians decision making or it could be that they fear change due to poor understanding of how the technology works as in viewpoint C in this study and the statement by participant 3 above.

Resistance to eHealth

Resistance to healthcare technologies has been identified to also influence adoption and use of information technologies in clinical practice (Bacon & Stocking, 2004; Doolin, 2004, 2016; Greenhalgh *et al.*, 2014; Timmons, 2003). Viewpoint C also suggests that HCPs avoid using the eHealth because they do not understand how the technologies work or use it for non-clinical activity. Timmons (2003) argues that what may constitute as “resistance” may vary when describing nurses’ resistance to information technology. This could range from refusal to use the information system to criticism of the available technology (Timmons, 2003) or if using the eHealth is seen as extra work (Eley, Fallon, Soar, Buikstra, & Hegney, 2009). In the same way, resistance to eHealth could be viewed as a message to those in power (Doolin, 2004; Stephen & Theresa, 2000). Doolin (2004) further identifies that it could be a reaction by HCPs to the hospital management to express dissatisfaction with the imposition of eHealth on the HCPs due to non-end-user consultation prior to implementation. Evidently, there were a lot of concerns by HCPs across all the four viewpoints about management attitude in the provision of the eHealth tools in the study area.

Thus the consensus by all the viewpoints A, B, C and D about not getting their superiors’

support to adopting and using these technologies would be an ‘unintended consequence’ (Harrison *et al.*, 2007, p. 542) of these eHealth tools (Lupiáñez-Villanueva, Hardey, Torrent, & Ficapal, 2011). These unintended/unanticipated changes to routine

HCPs in terms of eHealth adoption and use is what Massaro (1993) cited in Timmons (2003) summed up to be as a result of complex and emotional views which could be interpreted as contradictory positions on information technology in clinical practice. eHealth, gender, age, and access

However, other factors also modify the tripartite relationship. Things such as access to the eHealth resource and the internet (Eley *et al.*, 2009; Gerrish *et al.*, 2006; Gough, Ballardie, & Brewer, 2014; Trivedi *et al.*, 2009), age of the HCPs (Eley *et al.*, 2009; Huryk, 2010; Li, Talaei-Khoei, Seale, Ray, & MacIntyre, 2013; Phichitchaisopa & Naenna, 2013) and gender (Bacon & Stocking, 2004; Li *et al.*, 2013; Phichitchaisopa & Naenna, 2013) have been addressed by participants within this study. Indeed, both the issue of gender and age has been identified by all four viewpoints as not affecting their interaction with the eHealth in their clinical practice in this current study.

Though this study does not compare gender or HCPs roles, it does recognise that each HCPs has his/her own characteristics. This variation of characteristics manifests in overlap of duties and roles between HCPs, unlike previous studies that emphasises single role studies (Bacon & Stocking, 2004; Li *et al.*, 2013; Venkatesh, Sykes, & Xiaojun, 2011) or role comparisons in terms of eHealth adoption and use in clinical practice (Hains *et al.*, 2009). Thus, contrary to Bacon and Stocking (2004) that viewed nursing as a feminine profession which gender roles influence eHealth adoption, gender does not influence any of the viewpoints in this study. This shows HCPs in this study have moved away from gender stereotyping in professional roles in clinical

practice at least in relation to eHealth adoption and use.

In addition, age as a factor has also been regarded as having no influence on all the viewpoints in terms of eHealth adoption and use. This also contrasts previous studies that noted younger and junior HCPs are more oriented to use technologies in their practice than senior colleagues (Hains *et al.*, 2009), or that age is correlated with effort expectancy in technology adoption by HCPs (Phichitchaisopa & Naenna, 2013). Huryk (2010) also found out that age consistently influenced nurses' attitudes toward computerised care plan and electronic health records (EHR), emphasising that younger nurses were more inclined to use such

technology than older colleagues. While Menachami and Brooks cited in Li *et al.* (2013) showed that the use of electronic medical records was also inversely associated with physician age. In terms of access to the eHealth within their clinical practice, the viewpoints differ on the availability of the eHealth tools. The varied response in some cases is attributed to the relationship some of the departments in the study location have with external bodies or organisations that offer support. These departments are usually involved in collaborative research activities with these organisations who in turn provide support ranging from the provision of both hardware and software facilities to training in the use of such resources for clinical practice.

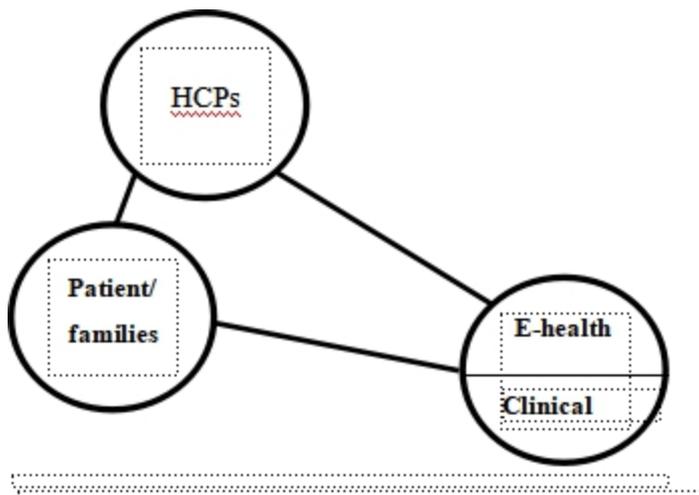


Figure 4: *Viewpoint A*

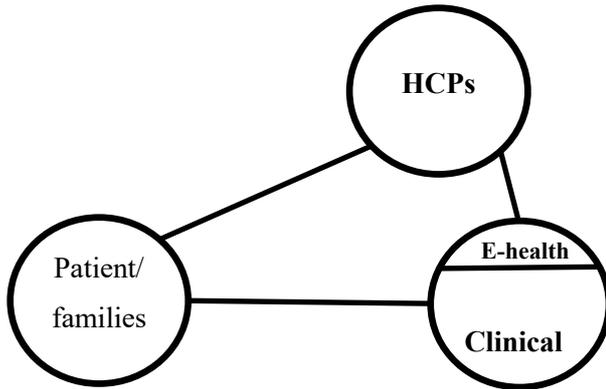


Figure 5: *Viewpoint B*

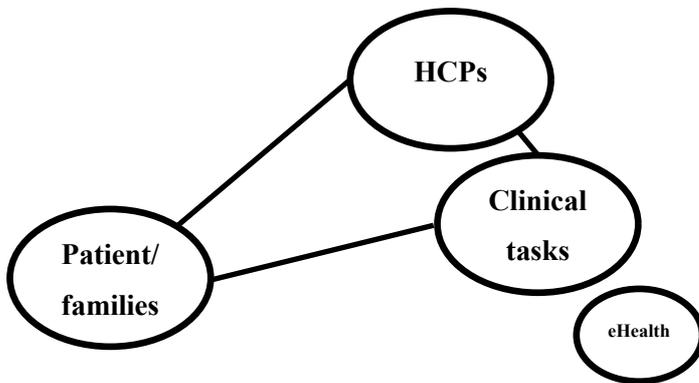


Figure 6: *Viewpoint C*

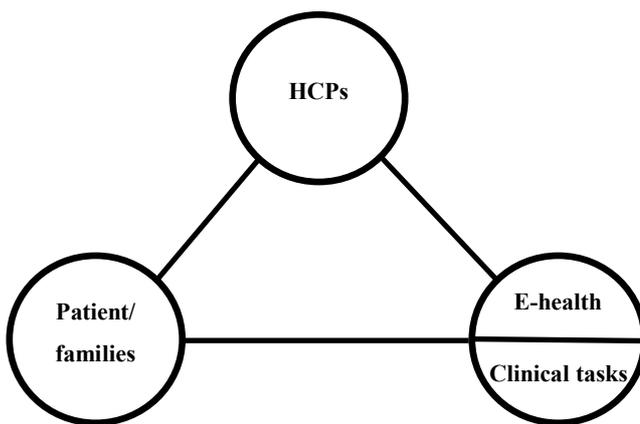


Figure 7: *Viewpoint D*

Conclusion

Each of the four viewpoints has an interpretation on what the eHealth can do to their clinical practice. The description of this contribution is influenced by but not limited to either power (Doolin, 2004), resistance (Doolin, 2004; Timmons, 2003), clinical autonomy (de Grood *et al.*, 2016; Hains *et al.*, 2009; Verhoeven *et al.*, 2009), and access. These factors will invariably modify the tripartite relationship as depicted above. Thus, the distance between the three categories (HCPs, patients, and eHealth) will either lengthen or shorten depending on how each of

the viewpoints interprets the contribution of the factors discussed. It is important to recognise that HCPs have varying interpretation of the contributions that technology makes within their clinical practices. Thus, policies on eHealth within the clinical environment should understudy these tripartite interactions in order to achieve quality healthcare.

Conflict of Interest

The authors declare no conflict of interest.

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