Exploring healthcare professionals adoption and use of Information and Communication Technology using Q-methodology and Models of Technology Acceptance

Ladan, Muhammad Awwal[1], Wharrad Heather[1] and Windle Richard[1]

[1] School of Health Sciences, University of Nottingham

Contact:
Muhammad.Ladan@nottingham.ac.uk

Background

Information and communication technologies (ICTs) and more specifically e-health are viewed as important tools within healthcare. They are used to support clinical activities such as interactions between healthcare professionals and patients, clinical self-development, patient education, routine clinical activities, and also have the potential to address many challenges affecting healthcare sectors globally. However, there is still limited information on how technologies are adopted and used within clinical practice by health professionals particularly in countries in Sub Saharan Africa (SSA).

Method

This study used Q-methodology and models of technology acceptance (Technology Acceptance Model-TAM and Unified Theory of Acceptance and Use of Technology-UTUAT) to explore the factors that influence ICT adoption among nurses and physicians in clinical practice in SSA. Thirty-six participants from a tertiary hospital in SSA were recruited and conducted Q-sorting of 46 statements derived from the literature around e-health adoption and use and were organised around six combined themes of both the TAM and UTAUT, relating to their interaction with e-health in their clinical practice.

Results

Four factors emerged after both Centroid factor analysis and Varimax rotation. Both Crib sheets and agreement/disagreement statements were used in the interpretation of the Factors.

Factor 1: Patient-focused e-health advocates

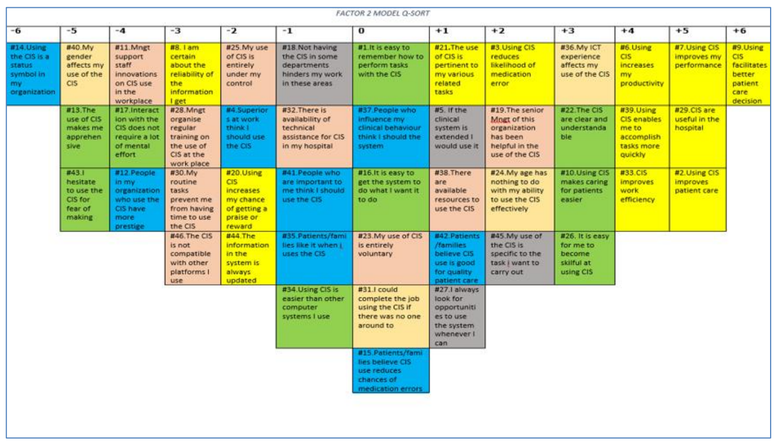
Factor 1 has seven significantly loading participants and explains 13% of the study variance. It has an eigenvalue of 4.68. Five of the loading participants are physicians and two are nurses. There are two females and five males with an average age of 37.7 years. Healthcare professionals (HCPs) within this factor recognise that clinical ICT/ e-health improves their work efficiency without the influence of their personal characteristics such as age and gender or their previous ICT experience. They consider the views of their patients/families when using e-health and will continue using it if it is made available beyond their departments. Though they identify it is difficult to become used to the ICTs, it still helps them accomplish tasks more quickly. Diminished support from management and superiors led to provision of e-health resources which are challenging to adopt and use. HCPs have concerns when it comes to access to such technologies and this affects their confidence when applying these technologies within their clinical practice.

Factor 3: Traditionalistic-pragmatists

Factor 3 has six significantly loading participants and explains 10% of the study variance. It has an eigenvalue of 3.6. Three of the participants are nurses and three are physicians. There are three females and three males within this Factor and they have an average age of 42.8 years. Having identified that their use of clinical ICT resources as voluntary and within their control, HCPs within this factor indicate that the available e-health resources enables them to accomplish their clinical tasks quickly, even though its use interferes with other routine clinical activities. Although the HCPs have some confidence in the use of the e-health technologies they are still hesitant in the use of it. Moreover, participants within this factor can continue carrying out their clinical responsibilities without the e-health resources. Patients/families views are not considered to be determinants for the uptake of such technologies by these HCPs

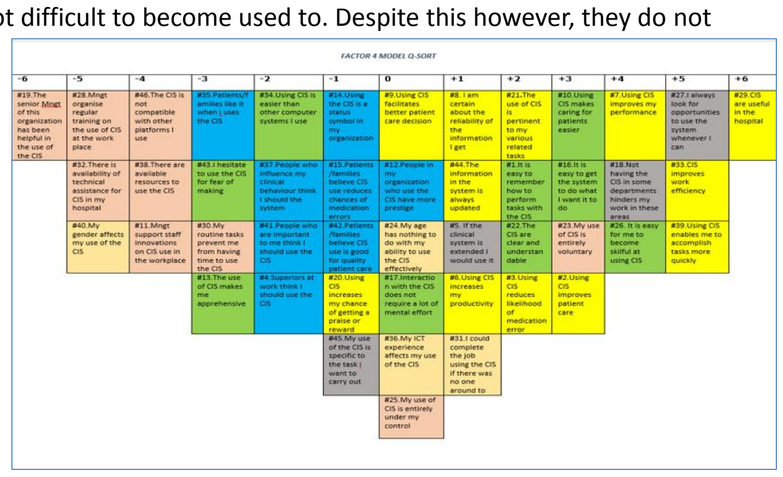
Factor 2: Task-focused e-health advocates

This has seven significantly loading participants and explains 13% of the study variance. It has an eigenvalue of 4.68. Five of the loading participants are physicians and two are nurses. There are two females and five males within this factor and have an average age of 42.6 years. HCPs within this factor show high value of e-health resources within their clinical practice but they still put a lot of mental effort to get used to it despite having ICT experience. Accordingly, they use these technologies specifically for the tasks they want to perform and without interruption to their routine activities. However, healthcare professionals within this factor still have concerns with the reliability of these technologies. Despite considering the patients/families views as contributors to their own choice to use the e-health resources, e-health resources contribution to their tasks/activities are the main motivators to their use. The hospital management have been more helpful compared to clinical superiors in the provision of voluntary, clear and understandable clinical ICT resources.



Factor 4: Tech-focused e-health advocates

Factor 4 has eight significantly loading participants and explains 15% of the study variance. It has an eigenvalue of 5.4. Five of the participants are nurses and three are physicians. There are four females and four males within this factor and they have an average age of 44.9 years. HCPs acknowledge the importance of the clinical ICT/ e-health within their clinical practice. They recognise that the use of the e-health is crucial to their individual clinical practices and even look for opportunities to use it. This is because they find these technologies not difficult to become used to. Despite this however, they do not strongly rely on it for their clinical decisions because there is less routine update of the e-health and this hinders their adoption and use of it in areas of the hospital where it is lacking. This is also made more challenging by the poor management and technical support including support from both colleagues within and outside the clinical environment.



Consensus statements

All the study factors agree that their gender does not influence their choice to adopt and use the clinical e-health resource for their clinical practices. Moreover, participants across all the four factors also agree that clinical information systems are useful in the hospital, and they agree on the positive contributions of the e-health resources towards their clinical efficiency. However, participants across the four factors seem to acknowledge that their superiors do not support them towards the adoption and use of these e-health resource at the workplace. In addition, participants across the four factors seem to recognise that though it might be easy to become skilful in using the e-health resources, remembering how to use it may not be as easy with the highest ranking identified as +2 and the least ranking identified as 0.

Consensus Statements	Rank			
	Factor 1	Factor 2	Factor 3	Factor 4
It is easy to remember how to perform tasks with the clinical information systems	2	0	0	2
Superiors at work think I should use the clinical information systems	-1	-2	-2	-2
It is easy to become skilful at using the clinical information systems	1	3	3	4
Clinical information systems are useful in the hospital	5	5	5	6
Clinical information systems improves work efficiency	5	4	4	5
My gender affects my use of the clinical information systems	-5	-5	-6	-5

Colour Key

- Perceived usefulness/Performance expectancy
- Perceived ease of use/effort expectancy
- Social influence/ subjective norm
- Facilitating conditions
- Individual differences
- Behavioural intention

Discussion

The **patient-driven adopters** suggests that the HCPs choice of e-health is influenced by the patient preferences to use it in their care (Trivedi et al., 2009). The **task-driven adopters** like in Hains et al. (2009), use the e-health resource only due to convenience and its ability to consolidate the information that they need. The **traditionalist-pragmatists** were similar to the HCPs captured by Hains et al. (2009) and Verhoeven et al. (2009) as clinically autonomous who don't see e-health as part of routine clinical practice. The **e-health champions** look for opportunities to use e-health. Heir et al. (2004) and Joos et al. (2004) describe such HCPs as positive and efficient towards e-health adoption and use.

Conclusion

Using Q methodology and models of technology acceptance, the study explored issues influencing HCPs adoption and use of e-health in their clinical practice. HCPs prioritised sample statements based on how each statement influence their clinical practice. Findings suggest four different viewpoints to the adoption and use of e-health resources in clinical practice. These may help understand how they make their choices about e-health and suggest conceptual application in other similar settings. HCPs should be provided with both routine training and technical support by management and superiors and should be part of decisions on e-health adoption and use in clinical practice. Hypothesis could be generated around these four factors to test application in wider a context for future studies.

References

HAINS, I. M., FULLER, J. M., WARD, R. L. & PEARSON, S.-A. 2009. Standardizing care in medical oncology. Cancer, 115, 5579-5588.; HIER, D. B., ROTHSCHILD A FAU - LEMAISTRE, A., LEMAISTRE A FAU - KEELER, J. & KEELER, J. 2004. Differing faculty and house staff acceptance of an electronic health record one year after implementation. Stud Health Technol Inform, 107, 1300-3.; JOOS, D., CHEN, Q., JIRJIS, J. & JOHNSON, K. B. 2006. An Electronic Medical Record in Primary Care: Impact on Satisfaction, Work Efficiency and Clinic Processes. AMIA Annual Symposium Proceedings, 2006, 394-398.; TRIVEDI, M. H., DALY, E. J., KERN, J. K., GRANNEMANN, B. D., SUNDERAJAN, P. & CLAASSEN, C. A. 2009. Barriers to implementation of a computerized decision support system for depression: an observational report on lessons learned in "real world" clinical settings. BMC Med Inform Decis Mak. 9, 6-6.