

Exploring the use of smartphones and tablets by medical House Officers in Korle-Bu Teaching Hospital

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SUMMARY

Background Smartphones and tablets are being used widely in the Western World creating benefits in healthcare. The Ministry of Health in Ghana has an e-Health strategy, with the aim of integrating such resources into healthcare. Whilst there are numerous mHealth projects going on in Ghana, there is little evidence of doctors using such devices in their practice.

Method A qualitative study was undertaken in Korle-Bu Teaching Hospital. Random sampling was used to identify House Officers, who engaged in semi-structured interviews. Interviews were recorded, transcribed and analysed using thematic content analysis. Consent was gained from all participants and the University of Leeds granted ethical approval.

Results The results demonstrate that current House Officers began using smartphones and tablets at various stages during medical school. Their use has increased since qualification. Although the overall use has increased, some staff remain resistant to the use of smartphones and tablets. In the future, the integration of smartphones and tablets into medical practice can be improved by integration with the medical curriculum and accepted practice

Conclusion: House Officers are routinely using smartphones and tablets to assist them in their daily practice. The use is informal and is peer led. Whilst they bring many benefits, there are issues, which need to be addressed. In Korle-Bu Teaching Hospital integrating smartphone and tablet use into practice is feasible and would prove beneficial.

Keywords: Smartphones, technology, doctors, education, Ghana

INTRODUCTION

Smartphones and tablets are important components in the future of healthcare; the evidence of this is all around. In the Western world smartphones and tablets are being used by doctors to help them in numerous settings.¹ From medical students to consultants, smartphones and tablets are changing the way medicine is taught and practiced.^{2,3} In settings with abundant resources the infiltration of smartphones and tablets is extremely visible. However, it is in resource poor settings where such interventions could have a significant impact and contribute to strengthening their health care systems.^{4,5} Whilst there is vast potential for the use of such devices in medicine, there is little published research looking at how it is being used, particularly in developing countries.⁶

A literature review carried out in December 2012, uncovered that mobile computing devices are already being used in healthcare in Ghana.

Most interventions began as community-based projects, to determine the efficacy of scaling them up in the future.⁶ Currently the most widespread programme is MDNet, a collaboration between Vodafone and the Ghanaian Medical Association (GMA). MDNet enables free communication between all doctors within the country, encouraging sharing of expertise and increased communication between doctors.^{7,8}

Although mobile computing devices are being used in Ghana, it is in different ways to the Western World. The Ministry of Health have developed an e-Health strategy to help integrate all aspects of e-Health into Ghana's healthcare system.⁹ However, there is little indication of frontline use of e-Health by doctors in the literature. Evidence suggests that the benefits that smartphones and tablets are demonstrating in the developed world are not being seen in clinical practice in Ghana.⁶

An important part of medical education is learning in a way that is appropriate for the system that one will work in.¹⁰ As medical practice continues to change, it is important to ensure that adaptation is being reflected in medical education. It is important to understand where and how doctors are being exposed to the changes occurring, and how they are adapting. Recently qualified doctors are best placed to reflect on concurrent changes in clinical practice and medical education. They have a recent experience of education but are also now operating in an evolving medical system. Understanding the attitudes and experiences of these individuals is important in being able to ascertain how doctors are adapting in an evolving healthcare system.

With this in mind, the aim of this research was to explore the experience of Medical House Officers to the use of smartphones and tablets in medical practice in Korle-Bu Teaching Hospital

METHODS

The study took place in Korle-Bu Teaching Hospital, one of 3 Teaching Hospitals in the country which employs around 25% of all qualified doctors in Ghana.¹¹ Medical students from the University of Ghana Medical School receive most of their clinical training in Korle-Bu and many remain in this hospital to work once graduated.

The qualitative research method chosen for this research was Semi-structured interviews. A qualitative method was chosen as this would help to explore people's ideas and perceptions. This method was better suited to achieving the aim of the research as people's attitudes and experiences cannot be quantified. An initial pilot interview was conducted before the study began. This pilot interview informed some minor alterations to the question guide so that all objectives could be met. Interviews were carried out until data saturation was reached. Once it reached a stage where no new themes or ideas were emerging from the interviews, then each new interview would provide diminishing returns. Research carried out by Guest, Bunce and Johnson suggested that data saturation would be reached within 12 interviews. In total 12 interviews were carried out between 28/05/13 – 10/06/13 and by this point data saturation had been reached.

Random sampling was carried out within the defined group of House Officers. The administration of Korle-Bu teaching hospital provided a list of all the employed House Officers. From this list, a random number generator was used to select potential participants who were then approached to attempt recruitment into the study. Candidates were selected from all specialities.

Interviews were conducted in English in a private room. Incentives were not offered to participants. All interviews were digitally recorded. Written consent was gained for all interviews.

Full manual transcription of all interviews was carried out. Thematic content analysis as a data analysis tool.¹² Once the data was fully transcribed, it was necessary to become familiarised with the data. Once this was achieved, the data was organised and indexed using an a-priori coding frame.^{12, 13} Ethical approval for the research was sought and granted by the University of Leeds.

Limitations

It was only possible to speak to a small proportion of the 115 House Officers who work in Korle-Bu and it is possible that their responses are not representative of the true situation. Given that Korle-Bu is such a large hospital in the capital, what is relevant in this setting may not be relevant in other facilities.

It was only possible to interview first year House Officers, as second year House Officers are based in regional and district hospitals.¹¹ Having an extra years experience of work may have provided an additional perspective.

RESULTS

Introduction to smartphone and tablet use in relation to medicine

The results of this study suggest that all current House Officers, from the graduating class from Ghana Medical School, began using either a smartphone or tablet in medical school. All the interviewed House Officers reported that they started using a combination of these devices during Medical School, ranging from exposure in first year to final year. Numerous responders spoke of their devices with a sense of pride and saw their devices as integral to their work. Although the integration of a smartphone or tablet into medical learning had no clear starting point, one common finding was that it appeared to be peer influenced, with very little input from the medical school.

It appears that mobile phones and tablets were being used in all aspects of work in medical school. There were some core activities that were common with most participants, with a few individuals taking advantage of a wider range of their devices capabilities. Easy access to the internet facilitated effective use. Most respondents reported using Medscape as a tool, suggesting the nature of peer influenced use.

In addition to this, people used their devices for writing notes, searching for drug doses, using specialty specific apps and looking up differentials. It was interesting to note that some participants purposefully chose not to use certain apps such as dating apps, as they would not have access to these tools in their exams.

Participants who owned tablets had a wider range of usage, seeming to make use of the bigger screen size. Learning about managing cases by taking pictures from patient's folders, to be read at a convenient time was one such example. Others used their tablet for sharing past questions and some users downloaded textbooks onto their devices.

For many participants their devices were used to supplement more traditional learning. Smartphone use and textbooks complimented each other, a device being used for quick information and the textbook being used at a later point to supplement this information.

This was highlighted most accurately by one response, *"I've not substituted the smartphone for the literature. I always get back to the books and read and understand it. But when I need quick information the smartphone is there for me to give the quick information."*

It was interesting to note that whilst in medical school, not owning a smartphone or tablet was not a barrier to accessing the information available on those platforms. People who did not own a smartphone or tablet would often borrow a colleague's device when looking for a quick reference. Participants found that familiarising themselves with the available technology whilst studying has made using them in clinical practice easier and more effective.

Reactions to the use of smartphones and tablets in medical school

Respondents all stated that the experience of using these devices during medical school made them more competent and comfortable with them once working. However, the reaction to the use of these devices from seniors appeared to be mixed. One consistent response was that in most lectures devices could not be used. This was captured most aptly in the response, *"sometime you use it you come to class and you open your iPad and the lecturer gets angry because he thinks you're trying to show off and are not paying attention to him."* Although this was the general response, there were exceptions. It was felt that younger lecturers were much more accommodating of using devices in lectures.

In contrast, from a clinical point of view it was felt that consultants and other staff were more accommodating. Participants responded that they may get a little teasing from consultants, but few mentioned active discouragement.

While all participants felt comfortable using smartphones and tablets, they felt that this mode of learning was not emphasised in university. The use of smartphones and tablets appeared to be very much peer led whilst the medical school focused solely on traditional teaching methods.

This was reflected in the response, *"Maybe the younger generations are using mobile phones to learn, but in teaching they are not much, they are not emphasising on it as probably it should have been. Nobody specifically emphasised the use of mobile phones erm to say you should use it."*

Use of smartphones and tablets as House Officers

From observation and discussion it was established that all participants possessed a smartphone, and some also had tablets in addition to this. There was belief that colleagues were similar. The use of these devices appears to focus around 3 broad areas, communication, as a reference tool and use during active management of a patient. This is a broader use than was seen whilst still in medical school.

There were three main ways that smartphones were used for communication. The primary mode was for making referrals to other departments. Participants often had classmates who worked in different departments and so could make quick telephone referrals prior to completing a paper referral. A secondary use was for planning management. House Officers could call the seniors to discuss patient management in a timely manner. In addition to this, information could easily be shared between colleagues regarding meetings and other events.

This is an area where apps are particularly useful, *"Yeah there's 'Whatsapp', now 'Viber', and also Facebook. Our class for instance, which just graduated, we have a Facebook page."*

The use of smartphones and tablets as reference tools has continued from medical school in much the same vein. Having easy access to the internet gave participants instant access to information. In addition to this, specialty specific apps are used more widely. Personal learning is also possible during free time. Whilst this is similar to what was done in medical school it appears that it is now being done more frequently.

The final category of use was in the active management of patients. This was two-fold. One aspect was managing patient's blood results. Consecutive blood results would be input onto an excel spreadsheet so that changes could be tracked.

The final use was only seen in managing surgical patients and wound recovery. Pictures would be taken on consecutive days, making assessing wound progression or deterioration easier. If wounds were deteriorating this could be spotted at an earlier stage and interventions made.

Personal views on smartphones and tablets in medicine

In general, participants saw these devices as beneficial and holding an important place in future medical practice. Although overwhelmingly seen as positive influences, concerns were raised regarding some aspects of their use.

Many participants feel that soon such technology will be indispensable, *"well I think it's something that we can't do without... yeah I think it's quite an important thing and vital in our practice as junior doctors or House Officers."* There is a degree of optimism that now these devices are being used further technological advances will soon be embraced.

There was a degree of caution demonstrated by participants, particularly in regard to the credibility of information found online. Participants were aware that not all information online is robust, however some discussed the difficulty in distinguishing stringent data from that which is less robust. It is an area in which participants would like guidance. *"I think if students or medical officers get to know apps that are genuine, you know that you can trust their information I think it will go it will be very helpful."*

The effect of seniors

Overall the response to using a smartphone or tablet whilst working was more positive than whilst in medical school. Lots of respondents had positive experiences of using their phones whilst working, however there were exceptions.

Whilst most participants did not have problems when using their phones as a student, some found it much easier to use their devices now they are working. One participant noted that, *"As a student you can't be doing something on your phone or tablet with a consultant present but as a doctor nobody prevents you, as long as you are present;"* a big change to their student experience.

Respondents reported that some consultants dislike colleagues using their devices, *"Yeah, erm of course you can't use it in the presence of your consultant. You can't use it whilst you're really having a ward-round going on like openly, you usually hide to do it."*

Whilst some colleagues do not seem to like it, it doesn't appear to deter many House Officers. In contrast, residents were said to be more accommodating and see the benefits of this technology. An interesting response suggested that the problem might not be consultants having issues with the technology but with when people are using it, *"the fact that they don't want us using it whilst they are presenting doesn't mean they don't want us to even acquire them at all."*

Perceived barriers to technology

Although there is some use of the available technology, the common belief is that its full potential is not being reached. There were many different perceptions on what these barriers were, and all may contribute to some extent. There are perceived barriers in both accessing the technology and using the technology. Personal finance is a significant barrier, especially when a student. When on the wards, poor and unreliable signal was highlighted as a limiting factor to smartphone and tablet use.

A few participants brought up infrastructural barriers to smartphone and tablet use. Participants reported equipment which was capable of producing digital images, but lack of compatible equipment on the wards. In addition to this the hospital runs a paper-based system, whilst some participants feel that the hospital could benefit from moving towards an electronic based system. All of this is underpinned by the fact that not all hospital departments possess Wi-Fi capabilities.

DISCUSSION

Through these conversations with House Officers it has been possible to gain an understanding of the ways smartphones and tablets are being used in Korle-Bu Teaching Hospital and an insight into barriers, which may be preventing further integration. Whilst use of smartphones and tablets is largely acceptable to students and House Officers not all senior colleagues appear to be on board. There is belief that with education this can be changed and the potential of these devices can be reached not only in Korle-Bu but in other hospitals too.

All the House Officers involved in this study owned a smartphone, which they used to assist them in medicine, and there was a strongly held belief that amongst their peer group this was similar. The likelihood of this being true is supported by a study in Kenya where 98% of health workers had a personal mobile phone.¹⁴

The implication of this is that any move to formalise the use of smartphones and tablets in this setting may not require expenditure from individuals or the hospital to provide compatible devices. However funding would still be needed to spend on hardware and training.

One of the key uses of these devices was to quickly access information related to current work. Using a mobile phone for this is not a new concept as studies in Kenya and South Africa have successfully used text messages to a similar effect.^{15, 16} The differences seen in this setting is that individuals are actively seeking the relevant information as opposed to receiving notifications; encouraging independent learning which is recommended by the General Medical Council.¹⁷ House Officers are developing the skills that will help them maintain high levels of clinical practice for years to come. This type of use could have particular benefits when people are working rurally without access to libraries or their own textbooks.

Medical applications used by House Officers could be separated into defined groups of clinical reference and medical calculators. These uses are consistent with other research into how such technology is used.^{10, 18} However they are not being used for patient education and electronic medical records (EMR) access, which is happening in other settings.¹⁹ Patient education did not come up in discussion but EMR did. A perceived deficiency is that Korle-Bu operates a paper-based system for patient notes and results, so no centralised electronic records exist. This was noted as a barrier in patient care and to the formalised use of Smartphones and tablets. Other hospitals in Ghana have reportedly successfully begun implementing EMR systems into their practice. (Unpublished conversation) To maximise the potential of smartphones and tablets an EMR system would be necessary.

A study in India, Malawi and Senegal found that in health systems communication channels tended to be top-down. Communication via phone is limited due to the cost.²⁰ The MDNet platform in Ghana has helped to improve communication, and frequent direct communication between House Office and Consultants is common. However, the delay in House Officers being put onto the system leaves them financially disadvantaged. Decreasing the time it takes to put them on the system could bring further benefits.

Whilst many benefits of these devices were discussed, there were also issues surrounding the safe use of the available technology that need addressing.

Concerns with the legitimacy of accessible information and applications, and the potential loss of these devices were raised as issues that need to be dealt with.

One of the issues raised was identifying if an application was authentic and from a trusted source. This is a genuine concern as applications have been recalled due to errors, and not all applications are reliable.²¹ Reliability is not always easy to establish and so students and House Officers need skills and guidance, to enable them to discover recognised, legitimate medical applications. One way of combating this issue would be utilising the College's of Physician's and Surgeons and their resources to develop a collection recommended applications and websites that can be used for medical references.

Whether using a tablet or a smartphone there are issues with loss and theft. This is particularly pertinent when these devices may contain sensitive information such as patient information or pictures. Little can be done to prevent theft except to exercise vigilance, but steps to protect information can be taken. Pictures are often sent via Whatsapp or stored on the phone, which is inconsistent with studies that use tailored applications to store pictures on a central server, which can then be accessed via a login.^{22, 23} The practice of using Whatsapp and storing images on a personal phone is compromising patient confidentiality. Equipment which supports digital records of images are present in some healthcare facilities however the supporting infrastructure is not in place.⁹ Putting this infrastructure in place would help to remove some of the issues with handling sensitive patient information.

There was a perception that older lecturers, consultants and decision makers were resistant to change. (Unpublished conversation) This may be because they are lacking when it comes to knowledge surrounding smartphone and tablet technology. Interventions, which introduce new technology, normally have a period of education.^{23, 24, 25} The use of smartphones and tablets appears to have grown naturally by a younger, more technologically aware generation, and so no formal education has occurred. The data would suggest that the decision makers appear to be uninformed when it comes to the benefits of this technology. Providing education to this group of people would be essential and necessary to help them make evidence based decisions on advocating such devices in medicine.

Conclusion

This study provided insights into the use and acceptability of smartphones and tablets in Korle-Bu Teaching hospital.

Most students and House Officers are accessing this technology routinely. House Officers tend to feel that mobile computing devices are integral to the future of medical practice, and so feel encouraged to interact with them.

The most confident users of these technologies used them throughout their educational training. Their ability to use them effectively grew over time as they became more comfortable with the capabilities.

There are challenges to the widespread use of these devices in this hospital, and to a wider extent Ghana, but they are not insurmountable. One of the biggest barriers appears to be willingness to adapt, which could be cleared with successful education and understanding of the technological benefits. Another key issue that needs addressing is storing images and other patient information in a secure way that does not compromise confidentiality.

This technology presents an opportunity that can help to dramatically change the health landscape of Korle-Bu and to a greater extent Ghana, and is one that should not be ignored.

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