Implementation of E-learning Technology in the Healthcare Sector of Bangladesh: A Brief Review

Moonmoon Aktar[1], Mohammad Shobujur Rahman[2]

**Corresponding author:** Dr Moonmoon Aktar moonmoonaktar13@gmail.com  
**Institution:** 1. University of Glasgow, 2. Bangladesh University of Professionals  
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**Abstract**

In today's technology-driven era, countries around the world are adopting e-health as well as e-learning opportunities for the improvement of healthcare. Bangladesh, in particular, is progressively approving e-learning in the healthcare sector. This review article aims to gain an in-depth understanding of the efficacy of e-learning opportunities in the healthcare sector of Bangladesh as well as a recommendation for future studies in this field. For the purpose of this review, articles were extracted from one database (MEDLINE Ovid) and Google search results. In total, thirteen articles and one report were included that are elaborately discussed in the results section. A review of the literature undertaken found that adopting e-learning or e-health has an optimistic impact in the expansion of healthcare in Bangladesh however there is a need for clear government policy to sustain the progress towards a Digital Bangladesh. The results from this study and published data support this conclusion.

**Keywords:** E-learning; e-health; m health; telemedicine; Bangladesh.

**Introduction**

The idea of "E-learning" is expressed in terms of ‘electronic learning’ -where learning takes place mostly without the aid of printed material. The students can take part in any online course on the desired topic with the help of the Internet, audio/video recording, interactive television programmes etc. With the advancement of Internet technology and the availability of mobile phones as well as computers, the popularity of e-learning is increasing every day. E-learning can incorporate training as well as guidance from experts in a specific field of study (Mahmud, 2010). M-learning is integrated as part of e-learning where it stands for "mobile-learning" in general (Krishnapillai, 2004). Since the year 2000, the concept of m-learning has grown in various ways. According to Baran (2014; 18), the evolution of these concepts has mainly highlighted positive m-learning traits such as "mobility" (Sharples et al., 2009), "ability" (Parsons and Ryu, 2006), and "immediateness" (Kynäslahti, 2003). However, regardless of the presentation, m-learning is considered the new stage of e-learning as smart mobile phone technology has made it popular among students (Korucu and Alkan, 2011).
Categorized as a "least developed country" and bearing the burden of weak economy (Least Developed Country Category: Bangladesh Profile, 2018), it is not easy for Bangladesh to adopt e-learning in a widespread manner. Having poor English proficiency and lack of technical equipment in educational institutions as well as the absence of infrastructure (for instance, electricity and telephone lines in rural parts of the country) are considered a hindrance to establish e-learning (Mahmud and Gope, 2009). With so many obstacles side by side, the government of Bangladesh is determined to obtain a Digital Bangladesh by 2021, encouraging the utilization of information communication technologies (ICT) to establish e-governance, e-learning, and so on (Karim, 2010). Although statistics from the government website and articles are available regarding the prospect of e-learning in Bangladesh, its impact on the healthcare sector is specifically not known. The health sector of Bangladesh as well is trying to integrate digital technology and modern learning opportunities such as e-learning in recent years, but very little data is available regarding the impact of e-learning in this sector. In this given situation, this article tries to provide a brief overview of the recent application of e-learning opportunities along with the probable challenges in Bangladesh’s health sector.

Materials and methods

This was a short review; however, a systematic search was conducted using the appropriate keywords in the MEDLINE Ovid database (1946-May 2020). The explanation for using this Medline Ovid database instead of PubMed can be explained by the fact that the Ovid Medline subset contains 98% of the data reported in PubMed. In addition, it allows writers to perform more accurate and sophisticated searches. Data search strategies for the database and keywords used can be found in the Appendix 1.

The following techniques were used to make searching more accurate and focused:

- Search-field descriptors, such as [mp] were added to search terms to control database searching and retrieve records containing search terms in the title, original title, abstract, subject heading, name of substance, and registry word fields.

- Boolean operators were used to combine search terms for a more sophisticated and focused database search. "OR" was included to ensure the results contain at least one of the search terms: - for example, learning/ or education/. "AND" was used to narrow the scope of the results and make it relevant for one country - Bangladesh.

Grey literature and hand searching: Google Scholar, a common web-based academic search engine was used to perform grey literature searching to prevent publication bias. A search on the national websites was conducted to find relevant national reports. Also, screening the reference lists of studies already selected for inclusion in the review was conducted to identify additional relevant studies for this paper.

There was no restriction on the types of study design. Moreover, there were no restrictions regarding the time and language of publication because applying date limits could have resulted in a significant reduction in the relevant studies, which is already a huge problem in this region. Besides, Bengali is the national language spoken in the studied country, therefore restricting the language of studies used could have possibly led to publication bias.

Inclusion criteria: Studies/reports that included study population located in Bangladesh, where the study populace is either healthcare workers or patients exposed to e-learning/e-health or m-learning/m-health in healthcare settings were included.

Exclusion criteria: Studies/reports that were not conducted in Bangladesh or did not represent Bangladeshi healthcare workers or patient-based data and did not include any aspects of e-learning/e-health in the abstracts or
The literature search was conducted between May 15th, 2020 to May 18th, 2020 by both reviewers. From MEDLINE Ovid, 370 articles found, among them 11 articles mentioning "m-health" and "Bangladesh" were included. The rest of the articles were excluded due to irrelevance. From Google Scholar and other websites, two articles and one report were included to find out the e-learning status in the healthcare setting of Bangladesh.

The studies, where the full text was not available for screening, were obtained using the University of Glasgow library search engine or Google search. There were no disagreements between the authors regarding studies inclusion.

**Results**

**E-health Status in Bangladesh**

E-health is a broad term that encompasses a range of technologies such as using of computer, telephone, or wireless telecommunication for the benefit of health care practitioners and their care management. In addition, m-health brings such amenities through mobile phones. Bangladesh initiated steps to adopt this technology since the 90s decade. WHO has reported Bangladesh as one of the 15 countries using mHealth to raise health awareness (Ryu, 2012). Figure 1 below shows a detail of the different areas covered by e-health facilities in Bangladesh (Ahmed et al., 2014).

The very first eHealth project was inaugurated here by Swinfen Charitable, a non-profit establishment. Later, the Telemedicine Reference Centre Limited (TRCL), a private company, initiated the use of mobile phones for the delivery of healthcare services. Later in 2006, TRCL collaborated with Grameenphone (GP) and launched a mobile phone call centre for subscribers called ‘Health Line:789’. Numerous government and non-government organizations later stepped forward for the establishment of e-health in Bangladesh. The main objectives of these projects were to ease the delivery of health service and organization of healthcare information. These services started implementing the idea of diagnosing disease of the patient through a telephone call or video-conference, prescribing medicines, or referral to a higher centre where appropriate. Most of the projects developed cloud-based web applications and/or mobile technology according to the service they provide. Although the initiatives proved to be beneficial in individual cases, there was no operational framework for e-health and m-health in the country. Therefore, comprehensive data representing the proportion of people gaining the facilities and attributed benefit on the national health could not be measured (Ahmed et al., 2014).

Figure 1: An overview of e-health services in Bangladesh.
Efficacy of e-health/e-learning

With the impression of e-health initiatives, this paper also wanted to discuss evidence that showed the effectiveness of it. As there is a shortage of qualified healthcare service providers in Bangladesh especially in a rural area, e-health/m-health can act as a milestone to reduce the load of healthcare providers. A study conducted in the remote Chakaria sub-district depicted that although a maximum of the household had mobile phones in their possessions, very few people had the knowledge of m-health service via telecommunication technology and only 2% used mobile phone as a source to take healthcare advice. This data is quite discouraging, on the other hand, it also showed that adherence to prescriptions received via m-health was quite similar to the adherence to prescriptions via a physical visit. So appropriate information dissemination regarding the use of m-health can play an important role in embracing this technology (Khatun et al., 2014). Another study conducted on the same population showed similar results and added the facts that a majority of rural people are interested in joining m-health programs although the proportion was more toward educated participants (having eleven years or more of education) and those belonging to higher socio-economic groups predicting a chance of social inequity (Khatun et al., 2015).

To overcome this obstacle, Bangladesh already started the computerization of health centres at the sub-district level with the provision of Internet connections and servers. In 482 Upazila health complexes and district hospitals, an m-health service has been developed where an on-duty doctor is accessible to patients at any time for mobile phone consultations. A government-run telemedicine service was launched and 43 fully equipped centres were in service by 2014 (Islam and Tabassum, 2015).

To apprehend the benefit of the patient-centred m-health intervention, a mixed-method study was conducted in Dhaka, Bangladesh. A number of diabetic patients attending the outpatient department of a specific hospital took part in the study designed as a randomized control trial. Among them, eighteen patients were included for interviews.
from the control and intervention group. The intervention group received an m-health service via call centre and interactive voice call advising them about medicines, diet, exercise, and lifestyle modifying factors. And from the analysis of the transcripts, researchers found that the patients considered m-health services to have a favourable and practical impact on their life making it beneficial for them (Yasmin et al., 2020).

Another qualitative study to appraise the utilization of m-health in nutrition programs was run that involved focus group discussion and in-depth interviews of mothers of the young children and community health care workers. Mothers of the children depended most on the media and social networks for IYCF (infant & young child feeding) information and considered receiving phone calls from healthcare workers regarding nutrition advice as positive phenomena. The community health workers were also interested to incorporate m-health as it can improve the quality of service and reduce their travel time, thus improving their work output indicating the potential positive impact for m-health (Khan et al., 2018).

Integration of digital technology is also advantageous for healthcare employees that was tested by a recent research. This research investigated the possibility of using an e-learning approach for frontline health-care workers. The study participants were fieldworkers who were provided netbook computers with e-learning courses loaded on it regarding the topic of family planning plus maternal and child health. After the completion of the course, comparing base knowledge scores before and after indicated a statistically significant increase in the knowledge level of the fieldworker. Thus, digital health education can have a noteworthy impact on healthcare providers where resources are scarce (Limaye et al., 2019).

Government of Bangladesh has launched a website called ‘Muktopaath’ to make e-learning available at all hours exclusively for Bangladeshi people. An example of a recent digital health intervention was an e-learning course designed to train registered medical practitioners in Bangladesh named "Online course on coronavirus (Covid-19)". This course, approved by DGHS (Directorate General of Health Services), was made mandatory to all the physicians who would be added to the Bangladesh Covid-19 hotline system. To date, 156251 personnel took part in this course that provided them with the knowledge of management of Covid-19 patients (Featured Course on Coronavirus Disease, 2020). However, no study or article illustrating the impact of this course has been found.

Discussion

Incorporating technology especially in healthcare is a relatively new perception in Bangladesh. The Bangladeshi government has an e-health policy published in 2011. Still, there is a lack of common health standards in health information technology. Restricted Internet access and the high cost of infrastructure makes the adoption of this technology slow. (Islam & Tabassum, 2015). Besides, there is no working relationship between the Ministry of Health and the Ministry of ICT, resulting in a vertical approach to project execution. Further research established the lack of legal and ethical structures for e-health, such as the confidentiality of participants’ data. The findings from this study suggest that there is a noteworthy progression in this sector mostly due to the availability of cell phones. But no studies or data provide evidence on the effectiveness of these initiatives in terms of the health benefits of mass people (Ahmed et al., 2014).

Limitations of the study

There are identifiable shortcomings with the traditional systematic reviews such as, multiple databases could not be included due to time limitation. Another drawback is that this study included articles discussing impacts of e-learning and technology in the health sector as well as reports from other sources representing secondary data, which may not be most accurate.
Conclusions and future work

E-learning has the potential of having a positive impact on the healthcare sector of Bangladesh. The implementation of newer technology and upgraded courses can be valuable for healthcare providers as newer information is added to health science each and every day. This will also be useful in the patient's perspective as patients will have access to credible information regarding health and nutrition. Future work should include designing studies that will find out the effectiveness of this e-learning for healthcare practitioners as well as patient’s health outcome after adopting e-health services as it will help in designing policy in a most effective way. The government should develop a legal framework to incorporate and co-ordinate all of the initiatives by both government and non-government sectors under the same umbrella through establishing a collaboration between ICT professionals, healthcare providers, and healthcare beneficiaries.

Take Home Messages

- E-learning/e-health is a new but gradually popular topic in Bangladesh.
- There are multiple initiatives across the country that are having a favourable impact on the healthcare sector.
- The lack of collaboration between the public and private sectors is obvious and may impede the improvement.

Notes On Contributors

Moonmoon Aktar, MBBS, is a registered medical practitioner in Bangladesh. Currently, she is pursuing a full-time Master of Public Health degree at the University of Glasgow. She has worked as a corresponding author for this article.

Mohammad Shobujur Rahman has recently completed his Masters in ICT from Bangladesh University of Professionals and is currently working as an information technology specialist.

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The authors used Figure 1 for showing the "overview of e-health initiatives in Bangladesh" by Ahmed et al., (2014) and this article is published under license to BioMed Central Ltd. This is an open access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/2.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly credited. The full coloured image is freely available at:
https://bmchealthservres.biomedcentral.com/articles/10.1186/1472-6963-14-260/figures/2

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Appendices

**APPENDIX 1: Search strategies in the database**

Database: MEDLINE (R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily

Platform: Ovid

Database coverage: 1946 to May 15, 2020

Date of search: 18 May 2020

| #  | Searches                                                                 | Results  |
|----|--------------------------------------------------------------------------|----------|
| 1  | Learning / or Education, Distance/ or Internet/                         | 138158   |
| 2  | Telemedicine/ or ”Delivery of Health Care”/                             | 110208   |
| 3  | ”Delivery of Health Care”/ or Mobile Applications/ or                   | 121180   |
|    | Telemedicine/ or Cell Phone/                                             |          |
| 4  | 1 or 2 or 3                                                             | 253919   |
| 5  | Health care.mp. or ”Delivery of Health Care”/                           | 784763   |
| 6  | Bangladesh.mp.or Bangladesh/                                            | 15287    |
| 7  | 4 and 5 and 6                                                           | 370      |

**Declarations**

The author has declared that there are no conflicts of interest.

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Ethics Statement

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