KNOWLEDGE, ATTITUDE, AND PRACTICE OF E-HEALTH AMONG DOCTORS WORKING AT SELECTED PRIVATE HOSPITALS IN DHAKA, BANGLADESH

Rehana Parvin BPT, MPH, Md Shahjahan MCPS, MD

School of Health Sciences, Department of Public Health, State University of Bangladesh, Dhaka, Bangladesh

Abstract

Twenty-first century healthcare systems face many challenges, eHealth amongst them (i.e., use of Information and Communications Technology for health). The nature and functions of eHealth services are expanding rapidly in Bangladesh, especially in the hospital care setting. Effective functioning of eHealth in a hospital is greatly facilitated when doctors have good knowledge and positive acceptance of eHealth. This study explores the current knowledge, attitude, and practice of eHealth of doctors at a 'micro level'. Using a cross-sectional descriptive survey, 112 doctors were selected from four hospitals by simple random sampling. The self-administered and semi-structured survey used by both open and closed ended questions to assess the knowledge, attitude, and practice of eHealth. Of the 112 doctors 50% had average knowledge of eHealth. About 26% had good knowledge and 24% had poor knowledge of eHealth. Among the respondents 78% had a favourable attitude, and 22% had a moderately favourable attitude. The most common uses of eHealth identified were patient follow-up (42%) and diagnostics (28%). The mobile phone was the modality most frequently used by respondents (63%), with use of computers rated as a frequent modality. Associations between the knowledge level and age, gender, rank and service length of the respondents were found in the study. The majority of respondents had average knowledge of eHealth and supported associated eHealth systems. The results of this study are expected to help in future successful implementation of eHealth systems in Bangladesh.

Keywords: eHealth; knowledge attitude and practice; Bangladesh.

Introduction

Today technology covers all work sectors throughout the world, including the health sector. eHealth is a broad term, defined by the WHO as the use of Information and Communications Technology (ICT) for health. It may involve clinical communications between healthcare providers for such activities as online referrals, electronic prescribing, and sharing of electronic health records. It can also provide access to information databases, knowledge resources and decision support tools to guide service delivery.[1,2] eHealth has the potential to not only improve health, but decrease healthcare costs, enhance scientific understanding of health issues, increase equity of healthcare, and improve communication between and amongst healthcare providers and patients.[1,2] In a more philosophical sense it has been suggested eHealth is "a commitment for networked, global thinking, to improve healthcare locally, regionally, and worldwide by using information and communication technology".[3]

Since ancient times, people confronted with illness have striven to marshal information or expertise not available at the patient's bedside, for example by going to a healer, or describing the symptoms of a patient too sick to travel and then taking the recommended therapy back to the patient. This age-old approach to telemedicine is still in use today in some remote areas. The term has been in use since 1967, when Dr Kenneth Bird created a two-way audiovisual microwave circuit that enabled physicians at the Massachusetts General Hospital in Boston to provide medical care to patients three miles away at the Logan International Airport Medical Station. The power of the Internet to advance telemedicine was first brought to light by a seminal event in April 1995. An SOS e-mail message was sent through the Internet requesting international help for a Chinese university student named Zhu Lingling, who was suffering from an

unknown, but what seemed to be a severe, disease. This led to the first recorded Internet diagnosis – of Guillian-Barré syndrome.[4]

The associated practice of medical record-keeping dates back to the fifth century BC. In Hippocratic literature, medical records were used to demonstrate causes and courses of diseases. The modern medical record first came into use in the early 20th century. The idea of the Electronic Health Record (EHR) system was first discussed during the 1960s but was not considered seriously until 1991, when the United States Institute of Medicine issued a major report urging the adoption of computer-based patient records.[4]

eHealth in Bangladesh

eHealth is developing a well connected health system, with services including 'Mobile Phone Health Service'. (mHealth). eHealth initiatives in Bangladesh began in 1998 when the Ministry of Health and Family Welfare undertook the Health and Population Sector Programme (HPSP) to enhance efficiency of programme implementation in the health sector. Under the HPSP, all health and population-based activities were listed and grouped in different lines or sectors. One Line Director was assigned to look after each sector. The major responsibility for eHealth implementation in the health services went to Line Director of the Management Information System health (MIS). Other Line Directors such as Line Director pre-service and medical education, Line Director planning and research) Line Director hospital and other Line Directors for vertical programmes also shared some responsibilities in their respective fields. In 2003, the HPSP was revised and renamed the Health, Nutrition and Population Sector Programme (HNPSP) with a new Operational Plan (OP) for Financial Years 2003-2010. Current eHealth activities are thus being implemented under HNPSP FY2003-2010 OP.[5]

Recently the government has taken many steps to improve the eHealth system. For example, the Directorate General of Health Services (DGHS) created a website to help the public find the nearest government health centre. The Government has also taken initiatives to train health service staff and volunteers through a digital training system. In addition mobile service operators are providing health services through cell phones. These initiatives allow people all over Bangladesh to connect with mobile health services. In addition, the MIS-Health of the

DGHS has taken many steps to expand and improve the services of eHealth including quality, and received a special prize for its mobile phone health service on August 9, 2010 at the e-Content and ICT for Development Contest organised by D.Net and the Ministry of Science and ICT.[6]

The Institute of Epidemiology, Disease Control and Research (IEDCR) has started recording any unusual health events reported through the newspaper, television, personal sources, and local health authorities. IEDCR has also created the Priority Communicable Disease Surveillance system, for which data are updated weekly through web-based software from 70 terminals throughout the country (64 districts and 6 divisional headquarters). Plans are underway to expand the terminals to the upazilla (subdistrict) level.[6] The Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders has started computerisation of health services by efficient queue management, evaluation of patients, updated nursing service, integration of laboratory and pharmacy data, etc. Medinova Hospital has been operating a telemedicine service since 2007 that connects patients through video conferencing with physicians in India as follow up of treatment or assessment.

There are around 700 registered clinics and 3,000 diagnostic centres in Bangladesh.[7] However, the same source claims that the number of unregistered clinics and diagnostic centres could be three times that of registered ones, with about 8,000 doctors working in private clinics and hospitals. Around 1,000 specialist doctors are providing services through these private clinics and hospitals. MIS of DGHS is developing eHealth standards and an inter-operability framework for use with database systems developed, or to be developed, by health organisations and programs under the Ministry of Health and Family Welfare and other ministries. Health organisations and programs of the NGOs, development partners and private organisations will also benefit from the standards and inter-operability framework. The purpose of implementing eHealth is to improve the access, efficiency, effectiveness, and quality of clinical and business processes utilised by healthcare organisations, practitioners, and patients. In Bangladesh, eHealth covers the development and use of a wide range of ICT systems for healthcare systems. (Table 1)

Table 1. Examples of government eHealth initiatives in Bangladesh.

• Electronic Health Record (EHR; or electronic medical record / EMR)	• Online Population Health Registry
• Telemedicine service	• Human Resource Databases
• Telemedicine service in Community Clinics	• Online Processing of Dental-Medical Admission Tests
• Telemedicine service in the Union Information and Service Centres	• ADP Progress Monitoring System
• Complaints or suggestions through SMS	• GIS in Health Service
• Pregnancy care advice through SMS	• Schedule Management Software
• Health Statistics by SMS	• Bulk SMS
• Hospital Computerisation	• Digital training facility
	• Internet connectivity in the health system

The government of Bangladesh has taken several steps to implement all these e-services throughout government hospitals and Healthcare Centres of Bangladesh.

eHealth services are also prevalent in the private healthcare sector, with people preferring private hospitals because of their better and more modern treatment and technology options. By implementing eHealth services, and making a 'digital Bangladesh', private health organisations are playing a very important role. Difficulties in implementing eHealth in developing countries like Bangladesh are many. Most people are poor and live in rural areas, and for these people in particular eHealth services provide healthcare access at any time and at a very inexpensive rate.

Given the significant government investment in eHealth and its broad application across the public sector in Bangladesh, it is essential to ensure the public and private sectors are aligned. Thus raised awareness, adequate knowledge, and a positive attitude about eHealth are to be encouraged among the doctors and other healthcare workers of private hospitals. This will engender proper implementation, use, and sustainability of eHealth services in Bangladesh.

This study was undertaken to identify the current knowledge, attitude, and practice of eHealth among doctors working at selected private Hospitals in Dhaka, Bangladesh. Specifically the study captures the socio-demographic characteristics of the respondents, and then identifies the knowledge level of doctors about eHealth, assesses their attitude towards eHealth, and examines the practice of doctors regarding eHealth.

Methods

Sampling technique

Four private hospitals out of ten with more than 100 beds each were selected by simple random sampling using lottery (names are not disclosed to maintain confidentiality). Hospital rosters facilitated random sampling of doctors. About 350 regular doctors worked in these hospitals, and questionnaires were distributed to 150 doctors who fulfilled the inclusion criteria. Doctors who were working at selected private hospitals were included, while doctors who were on job training, volunteers, not available at the time of interview or refused to take part in the study were excluded. A total of 112 doctors responded (75% response rate).

Data collection methods

Data were collected using a self-administrated questionnaire with both open-and closed-ended questions (Appendix 1). The questionnaire contained four sections. Section A: Demographic data; Section B: Knowledge related question; Section C: Attitude related statements; and Section D: Practice related questions.

In section B, 22 questions were presented in three groups to find out the knowledge level of doctors. Responses were graded as correct or incorrect, and knowledge of respondents categorised into three levels based upon these findings: 'Poor knowledge' - 0-50% correct responses; 'average knowledge' - 51-75% correct responses; and 'good knowledge' – above 75% correct responses.

In section C, ten attitude based statements were presented, and respondents asked to indicate their agreement with each statement using a five point

Likert scale: strongly agree, agree, uncertain, disagree, or strongly disagree. To classify attitude towards eHealth, responses were scored (ranging from 'strongly agree' = 5 to 'strongly disagree' = 1). Out of the maximum 50 points, respondents with a total score of 35-50 (70%) were classified as 'favourable', respondents with a total score of 20-34 (40%) were classified as 'moderately favourable', and respondents with a total score of below 20 were classified as 'unfavourable'.

In section D, practice related questions were included. Four questions were asked to find out the most popular modality of eHealth used by the practitioner and their frequency of use.

Data were analysed using SPSS version 17.0 software (SPSS Inc., Chicago, IL) and Microsoft Excel to describe various aspects and relationships of the knowledge, attitude, practice, and socio-demographic status of respondents.

Results

Demographics
Most respondents (n = 72) were 24-33 years of age, with 22% (n = 25) between 34-43 years, and 13% (n = 15) above 43 years of age. According to their rank, 14% (n = 16) were consultants, 13% (n = 14) were registrars, 11% (n = 12) were senior medical officers, and most were medical officers 62% (n = 70). The years of experience of the respondents varied from greater than 15 years (4.5%, n =5), 11-15 years 4.5%, n = 5), 6-10 years (21%, n = 23), 1-5 years (55%, n = 62), and less than 1 year (15%, n =17).

eHealth Knowledge
Of 112 Doctors, 24% had poor knowledge, 50% had average knowledge, and 26% had good knowledge of eHealth. Most gained their knowledge of eHealth from professional training, the medical literature, or colleagues (total 82%), with very few having received any formal eHealth training (4%). (Table 2)

The primary barriers to improving their eHealth knowledge were lack of time (33%) and lack of available education/training opportunities (32%). (Table 3)

eHealth Attitude
The study questionnaire posed various statements about eHealth, and the responses (using a Likert scale) were scored to gauge the attitude of doctors to eHealth. (Table 4) Most 'agreed' (i.e., 'agree' plus 'strongly agree') that eHealth was useful in their job

Table 2. Distribution of the respondents according to the source of eHealth knowledge (n=112).

Source	n =	%
Colleagues	25	22
Medical literature	28	25
Formal eHealth training	4	4
Professional training	39	35
Electronic media	10	9
Others	6	5

Table 3. Distribution of the respondents according to barriers to improve knowledge.

Barriers	n =	%
Lack of time	37	33
Lack of education/training	36	32
Lack of exposure to technology	25	22
Lack of direction and guidance	12	11
Other	2	2

(84%), although fewer 'agreed' that the eHealth system was easy to use (69%), or that they found it easy to learn how to use it (69%), and still fewer 'agreed' that they can use eHealth system successfully each time (52%). Despite this, most 'agreed' that eHealth can improve the productivity of the workplace (78%), would decrease the burden of outpatient visits to hospitals (82%), and that eHealth could be used for prevention and treatment of communicable diseases (85%). Just over 70% 'agreed' it saved them time when they use it, with only 6% 'disagreeing' with this statement. The majority of respondents agreed that eHealth should be implemented in all the hospitals (90%), with many indicating interest in receiving more training (76%). Overall, Doctors were considered to have a favourable attitude (78%; n = 87), or moderately favourable attitude (22%; n = 25), with no unfavourable attitudes present.

eHealth Use, Application Areas, and Modality
eHealth was used often in regular practice (4 or more times per week - 44%; 2-3 times per week – 18%; and once per week – 38%). The most common uses of eHealth were patient follow-up (42%) and diagnostics (28%), followed by disease management (15%) and providing second opinions (12%). Other uses constituted just 3%. The mobile phone was the most frequently used modality (64%), with computers

(26%), and videoconferencing (9%) being less commonly used. Only 1% had used eHealth related software

Associations among socio-demographic information of the respondents
Possible associations between data were explored. These were between knowledge level and age, sex, rank, and length of service. (Table 5)

The results shows that 60% of respondents, over the age of 43 years have good knowledgeable. Whereas, 56% respondents aged between 34-43 years had average knowledge, which is statistically significant. Only 18.8% of male doctors had poor knowledge of eHealth as opposed to 37.5% of female doctors, which is statistically significant. The majority of the respondents who had good knowledge

Table 4. Response of doctors to questions gauging their attitude to eHealth (N=112).

Statements	Strongly Agree (%)	Agree (%)	Uncertain (%)	Disagree (%)	Strongly Disagree (%)
I find eHealth useful in my job	30.4	53.6	9.8	6.3	0
I find the eHealth system easy to use	10.7	58.0	29.9	5.4	0
I found it easy to learn how to use this system	11.6	57.1	27.7	3.6	0
eHealth can improve the productivity of the workplace	20.5	57.1	18.8	3.6	0
I can use it successfully at every time	8.0	43.8	36.6	8.9	2.7
It saves my time when I use it	11.6	58.9	23.2	5.4	0.9
eHealth would decrease the burden of out-patient visit	23.2	58.9	11.6	6.3	0
It should be implemented in all the hospitals	26.8	63.4	6.3	3.6	0
e-Health can be used for prevention and treatment of communicable diseases	25.9	58.9	9.8	5.4	0
I am interested in getting training on telemedicine	11.6	64.3	19.6	3.6	0.9

Table 5. Association between knowledge level and age, gender, rank, service length and attitude of the respondents.

	Knowledge level			
Age (yr)	**Poor**	**Average**	**Good**	**p =**
24-33	19 (26.4%)	39 (54.2%)	14 (19.4%)	
34-43	5 (20.0%)	14 (56.0%)	6 (24.0%)	0.022
>43	3 (20.0%)	3 (20.0%)	9 (60.0%)	
Gender				
Male	15 (18.8%)	40 (50.0%)	25 (31.3%)	0.04
Female	12 (37.5%)	16 (50.0%)	4 (12.5%)	
Rank				
Consultant	0	6 (37.5%)	10 (62.5%)	
Registrar	1 (7.1%)	10 (71.4%)	3 (21.4%)	0.002
Senior medical officer	3 (7.1%)	5 (41.7%)	4 (33.3%)	
medical officer	23 (32.9%)	35 (50%)	12 (17.1%)	
Service length (yr)				
< 1	6 (35.3%)	8 (47.1%)	3 (17.6%)	
1-5	15 (24.2%)	36 (58.1%)	11 (17.7%)	
6-10	6 (26.1%)	10 (43.5%)	7 (30.4%)	0.012
11-15	0	1 (20.0%)	4 (80.0%)	
> 15	0	1 (20.0%)	4 (80.0%)	
Attitude				
Moderately favourable	9 (36.0%)	9 (36.0%)	7 (28.0%)	0.201
Favourable	18 (20.7%)	47 (54.0%)	22 (25.3%)	

of eHealth were consultants 62.5% compared to only 17.1% of medical officers, which is statistically significant. Good knowledge was shown in 80% of those who have worked for more than 10 years (p<0.05). A favourable attitude was expressed by 66.6% of doctors with a poor level of knowledge, 83.9% of those with an average knowledge and 75.9% of those with a good knowledge of eHealth.

Discussion

This cross-sectional study was conducted at four randomly selected private hospitals in Dhaka city within the time period of November 2013 to April 2014. The respondents were Physicians between the age of 24 and 60 years with a mean of 34 ± 8 years. Most respondents were male (71%), and were medical officers (63%), with 1-15 years of professional practice. The preponderance of males in this study is similar to two other studies; the study of LAUTECH Teaching Hospital, Osogbo, Nigeria[8] and the study on awareness and practice of telemedicine among staff at the Federal Medical Centre at Birnin Kebbi, Nigeria.[9]

Out of the 112 respondents, only 26% had good knowledge of eHealth. Many respondents (35%) gained their information about eHealth from professional training, but very few from formal eHealth training (4%). This result is similar to a study conducted in Nigeria to access the knowledge and perception of eHealth and telemedicine among health professionals where 52% of respondents had average knowledge of eHealth, but their main source of knowledge was interacting with colleagues (67%).[10] In contrast, the results of this study differ from a Sri Lankan study to assess the knowledge and perceptions of eHealth of medical students, where 51% of the respondents rated their knowledge of eHealth applications as minimal.[11] In another Polish study good knowledge was indicated by the majority of respondents (82%).[12]

The results of this study show that, demographic characteristics such as age and gender, of the respondents were significantly related with their knowledge level. It has been observed that, the level of knowledge of the respondent increases with age. In this study respondents over 43 years were significantly more knowledgeable than the younger age group of 23-33 years, and males were more knowledgeable than females.

Rank and service length of the respondents was also related with the knowledge level. The majority (62.5%) of the respondents who had good knowledge of eHealth were consultants who tended to be older with longer work experience. Lack in the scope of gaining knowledge, training programs or proper guidance on eHealth in the early stage of service might be a cause for this. However, this cause was not evaluated also.

This study showed the most important barriers to implementing eHealth were lack of time (33%), lack of education/training opportunities (32%), and lack of exposure of technology (25%). In the UK another study identified "lack of education/training" as the most important barrier to implementing eHealth,[13] while in Sri Lanka absence of formal education in eHealth was identified as a serious barrier.[11]

In the attitude scores, all doctors had either a favourable attitude (78%) or moderately favourable attitude (22%) towards eHealth. It was interesting to find out that there was no unfavourable attitude, suggesting eHealth is accepted and welcomed by the doctors, and future implementations will be successful. Several studies have been conducted to determine the attitude of medical practitioners as well as patients towards eHealth. Results of the studies are almost similar to the results of this study. Studies in UK, India, Sweden, Norway and Nigeria and South Africa indicated that the eHealth system is well accepted among the medical professionals, and one of these studies found that eHealth is more popular among the patients than the practitioners.[9,14-20] Similarly eHealth and telemedicine are well accepted by medical students and other health practitioners such as nurses, medical staff, etc.[11,21] In this study, eHealth applications were frequently used (44% at least four or more per week), most commonly for follow up (42%) and diagnosis (28%), and mobile phone and computers were most widely used to provide eHealth services. These findings are similar to a US study that found eHealth was used mostly for 'diagnostic' (58%) and 'follow up' (53%) purposes.[22] Video conferencing was also a common modality. In another studies eHealth was rated more positively for education, research purposes and use of health related software.[8,21]

Conclusion

This study has shown the knowledge of eHealth of Doctors in the private sector in Bangladesh is average,

and that most have a favourable attitude towards eHealth. Mobile phones are the most frequently modality used, and applications are mostly commonly used for patient follow-up and diagnostic purposes. There was a statistically significant relationship between the age, sex, rank and service length of the doctors and level of knowledge among the doctors observed in this study, with knowledge level increasing with age and experience. No significant association was found between the knowledge level and attitude of the respondents in this study. When planning further implementation of eHealth initiatives in hospitals in Bangladesh, it is important that these findings and perceptions are taken into account.

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Corresponding author:
Rehana Parvin,
School of Health Sciences,
Department of Public Health,
State University of Bangladesh,
Dhaka,
Bangladesh
Email: mistu11physio@gmail.com

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Appendix 1.

Questionnaire used for evaluating the knowledge, attitude, and practice of e-health among doctors working at selected private hospitals in Dhaka, Bangladesh

QUESTIONNAIRE   Date: …………………

Section- A
1. Socio-demographic information

1.1. Age in years ………….
1.2. Sex
    1.   Male   [   ]
    2.   Female   [   ]
1.3. What is your religion?
    1.   Islam   [   ]
    2.   Hindu   [   ]
    3.   Christianity   [   ]
    4.   Others   [   ]
1.4. Rank
    1.   Consultant   [   ]
    2.   Registrar   [   ]
    3.   SMO   [   ]
    4.   Medical officer   [   ]
    5.   Other   …………………..
1.5. Length of service
    1.   Less than 1 year   [   ]
    2.   1-5 years   [   ]
    3.   6-10 years   [   ]
    4.   11-15 years   [   ]
    5.   More than 15 years   [   ]

Section- B
2. Knowledge Related Questions

2.1: What does e-health mean? (Choose Yes/No and mark (X) according to your opinion)

Statement	Yes	No
Health care through the Internet		
Use of Internet and other electronic technologies to enhance health		
Patients management with drugs through the Internet or electronic media		
Patients' examination communicated through the Internet		
Management of patients including surgical procedure through the Internet		
Electronic medical record of patients' registration and consultation with doctors.		
Follow-up of patients through the electronic technologies		
Education of physicians through online sources		
Health information exchange and communication in a standardised way		
Direct full consultation of patients through video conferencing		

2.2. Which of the following areas are mainly associated with e-health?
1. Clinical   [   ]
2. Educational   [   ]
3. Managerial   [   ]
4. Administrative   [   ]
5. Research   [   ]
6. Videogame   [   ]

2.3. Which of the following communication techniques are used in e-health?
1. Email   [   ]
2. Telephone   [   ]
3. Internet   [   ]
4. Videoconference   [   ]
5. Post   [   ]
6. Fax   [   ]

2.4. Which one is your main Source of knowledge?
1. Colleagues   [   ]
2. Medical literature   [   ]
3. Formal e-health training   [   ]
4. Professional training/conference   [   ]
5. Electronic media   [   ]
6. Others………………………………………………………………………

2.5. What are the main barriers to improving your eHealth knowledge?
1. Lack of time   [   ]
2. Lack of education and training   [   ]
3. Lack of exposure to technology   [   ]
4. Lack of direction and guidance   [   ]
5. Other ……………………………………………………………………

2.6. Have you ever attended any orientation training program on e-health after your appointment in the hospital?
1. Yes   [   ]
2. No   [   ]

2.7. If yes then what was the duration of that training program?
1. Less than 3 days   [   ]
2. 3-7 days   [   ]
3. 8-12 days   [   ]
4. More than 12 days   [   ]

Section- C
3. Assessment of Attitude

Please read the statement and mark (√) on the best answer according to your opinion

Statements	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
I find e-health useful in my job					
I find the e-health system easy to use					
I found it easy to learn how to use this system					
e-health can improve the productivity of the workplace					
I can use it successfully at every time					
It saves my time when I use it					
e-health would decrease the burden of out patients visiting of hospitals					
It should be implemented in all the hospitals					
E-health can be used for prevention and treatment of communicable diseases					
I am interested in getting training on telemedicine					

Section – D
4. Practices Related Questions regarding e-health among Doctors

4.1. Which is the most common field of use of e-health in your practice?
1. Diagnostic   [   ]
2. Follow-up   [   ]
3. Second opinion   [   ]
4. Diseases management   [   ]
5. Other   …………………..

4.2. Which type of e-health modality do you use in your practice?
1. Mobile phone   [   ]
2. Computer   [   ]
3. Video conference   [   ]
4. Health related software   [   ]
5. Others   ……………………

4.3. What is the Regularity of use of e-health in your practice?
1. Once/week   [   ]
2. 3/week   [   ]
3. 4 and more   [   ]

4.4. What is the effectiveness of use of e-health with patients in your practice?
1. Not at all   [   ]
2. Somewhat satisfactory   [   ]
3. Satisfactory   [   ]
4. Very satisfactory   [   ]

THANK YOU FOR TAKING TIME TO ANSWER TO OUR QUESTIONS, WE APPRECIATE YOUR HELP!