Attitude Towards Electronic-Prescription and Associated Factors Among Physicians at University of Gondar Referral Hospital: Institution Based Cross-Sectional Study

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**ATTITUDE TOWARDS ELECTRONIC-PRESCRIPTION AND ASSOCIATED FACTORS
AMONG PHYSICIANS AT UNIVERSITY OF GONDAR REFERRAL HOSPITAL:
INSTITUTION BASED CROSS-SECTIONAL STUDY**

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Short running title: Attitude towards electronic-prescription and associated factors among physicians

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ABSTRACT

Background: Electronic prescription is described by the United States Centers for Medicare and Medicaid Services as the broadcast utilizing electronic medium, of prescription or prescription-related information between prescriber, distributor, pharmacy benefit manager, or health plan, either openly or through an agent, including an electronic prescribing system. the aim of this study was designed to assess attitudes towards electronic prescription and associated factors among physicians at the University of Gondar referral hospital 2021. Gondar, Ethiopia.

Methods: Hospital-based Cross-sectional study was used among (n=152) physicians who have involved with a response rate of 88.8%. Data were collected using structured self-administered questionnaires from August 1 to September 1/2021. The collected data were entered into Epi-info Version 7.2 and exported to SPSS version 23 software for analysis. Descriptive statistics using frequency and other summary statistics were using present socio-demographic and clinical characteristics of participants. Bivariate and multivariable logistic regression was employed to identify factors associated with dependent variables. Odds ratio (OR), with 95% CI and p value< 0.05 were computed to determine the level of significance.

Results: Based on the operational definition the overall score of attitudes to an electronic prescription of physicians from the University of Gondar referral hospital was 76.8% [95% CI: 66.7-84.2]. Among the applicant variables for multivariable analysis two variables like age of the respondents [AOR: 2.48 (95% CL:1.055-5.830)], and the monthly salary of the respondents [AOR: 8.29(95%CL: 3.002-22.89)] had to have a significant association with electronic-prescription.

Conclusion and recommendation: The overall score of attitudes to the electronic prescription of physicians from the University of Gondar referral hospital was good. Age and a monthly salary of the respondents were significantly associated with an electronic prescription from the working organization university of Gondar referral hospital, and health care policymakers and hospital managers need to develop and institutionalize evidence-based widespread preparation of stakeholders especially prescribers and communications development earlier than its acceptance to build it doing well and victorious.

Keywords: Attitude, Ethiopia, Gondar, Physician, Prescription

INTRODUCTION

Background of the study

For several years, the written prescription has been the technique excellent for physicians to communicate decisions on drug treatment, and pharmacists to dispense medicine, while at the same time being a source for the patient about how to use the medication to increase its benefit. currently, the medical prescription is at the transitional stage between paper and electronic state. When adopting an old-style process to the new electronic period, unique opportunities and challenges are offered to the involved performers like prescribers, patients, pharmacists, and also health care and EHR-system providers, and other stockholders(1). The traditional way of communication was by Prescription which is a written order by the doctor to the pharmacist. It has a status of a legal document. Re dispensing with repeated use of the same prescription is illegal.

Electronic prescribing is defined by the US Centers for Medicare and Medicaid Services (CMS) as the transmission using electronic media, of prescription or prescription-related information between prescriber, dispenser, pharmacy benefit manager, or health plan, either directly or through an intermediary, including an e-prescribing network(2).

Electronic prescribing is the advancement of a traditional technique to technological advancement. It is an integral component of the health information technology (HIT) system, an inter-operational platform, joining communication gaps among doctors, patients, nurses & pharmacists. It has the potential to augment the safety of pharmacological treatment to reduce the morbidity associated with medication errors by reducing illegible handwriting, providing alerts by drug-drug interaction and drug allergy. The time spends handling the prescription renewal requests was considerably reduced. Electronic prescribing for controlled substances curbs the abuse and diversion of prescription drugs. This is by substantially reducing prescription fraud associated with paper prescriptions like falsifying prescriptions, prescription pad theft, and forgery. (3)

E-prescription is a tool for prescribers to electronically send an accurate, error-free, and understandable prescription directly to a pharmacy from the point of care. It allows the patient to improve safety through electronically checking patient allergies contraindication etc security and accuracy of his prescriptions, saving his time during handling prescription renewals by making it electronically with his pharmacy(4).

Mistakes with e-prescribing are seen to be on the rise soon after its implementation. It could be attributed to technology factors like poor user interface design like auto-populate features and dropdown menus, end-user factors like poor knowledge of the e-prescribing platforms or unintentionally entering improper information, and environmental factors such as lack of time or poor location of the computer(3).

gap between physicians perceived value of e-prescribing and their intent adopt this practice.(8) Their reluctance to embrace the changeover from paper to computerized systems was based in large part on the perception that e-prescribing is time efficient.

E-prescribing system has the potential to greatly reduce adverse pharmaceutical effects driving from transcription, drug- drug interaction, allergies and dosage errors, to name a few indeed studies show significant improvements associated with e-prescribing implementation, including an 86% in decrease serious medication errors and increase in Medicare formulary adherence from 14% to 88%.(8)Despite this evidence, however, providers have been slow to adopt e- prescribing technology due mainly to cost and regulatory constraints in the health industry.

Therefore, this study is designed to assess the perceptions of health care professionals towards e prescriptions, to identify possible barriers and to provide recommendation based on the results obtained. This may be helpful to know the current status of physician attitude and perceptions and to take action for the improvement.

METHODS AND MATERIALS

Study Setting

The study was conducted in University of Gondar referral hospital, which is found in Gondar town, Amara region of North West Ethiopia far from Addis Ababa and Bahirdar 772km and 168km respectively. UoG comprehensive specialized hospital has 1049 health professionals and 653 beds were available. Patients are referred from primary health unit to this hospital that provides specialized healthcare services. UoG referral hospital currently offers a wide spectrum of services both preventive and curative as well as serving as a primary, district and tertiary hospital. Some of the services offered by the hospital are surgical, pharmaceutical, medicinal, social work, laboratory, dental, occupational therapy and intensive care services to mention but a few. It has a staff complement of 1915 distributed across different departments. There are about 450 nurses and 171 physicians including 67 GP.

Study Design and Period

An institutional based cross-sectional study was conducted to assess the Attitude of e-prescription among physicians at UoG referral hospital. The study was conduct from August 1/2013 to September 1/2014 E/C.

Source Population

All Physicians working in University of Gondar referral Hospital were taken as source population.

Study Population

The study subjects were all physicians working in university of Gondar referral hospital for six (6) months and above during the study period.

Inclusion and Exclusion Criteria.

Inclusion Criteria

All physicians who are working at university of Gondar referral hospital were included in the study.

Exclusion Criteria

Study participants who are seriously ill and absent from work during the data collection period were excluded from this study.

sample size determination

The desired sample size is calculated using single population proportion formula.

Formula:

$$n = \frac{(Z\alpha/2)^2 p(1-p)}{d^2}$$

However, because of the absence of previous similar studies in Ethiopia for p-values well as small number of study population we have, all physicians working in UOGCSH were participated in the study.

Sampling technique and procedure

The study participants were selected by using census method which is the method of statistical enumeration where all members of the study population are studied. Based on the above assumption for our study the participants were all physicians working in university of Gondar referral hospital.

So, study population=171, study participant also 171.

Study Variables

Dependent Variable

- Attitude towards e-prescription (positive or negative)

Independent Variables

- **Socio-demographic factors:** Age, sex, experience, profession, monthly income
- **Behavioral factors:** Attitude, by preparing question and ask who scores mean and above have good attitude, who scores less than the mean have poor attitude.
- **Technical factors:** EPS training, past EPS experience, computer skill (literacy), computer at home
- **Organizational factors:** Computer access at office, internet access at office, presence of IT department in the organization, availability of IT technical person.

Operational Definition

- **Attitude:** is persistent disposition to act either positive or negative towards e-prescription Score will categorized < 50%”negative”,and>= 50% positive attitude(14).
- **Electronic prescription:** defined as a technology applies on drug prescription either online or offline used to computer, tablet, and hand phone systems used to prescribing by physicians(15).

Data collection tools and techniques

Quantitative data was collected using self-administered questionnaire, Socio-demographic, behavioral, technical and organizational variables was included in the questionnaire. Questionnaire was prepared in English this is because the study participants is well educated and they can easily understand English and if the questioner translated in to local language (Amharic) it was create some difficulty to understand.

Data quality control

Data collection were supervised for correct implementation of procedures by supervisors and the investigator. Completeness and consistency of the questionnaire was also be checked at the end of data collection.

Data analysis and processing

After the data collection, the response was code and enter in to computer by using EPI-info data version 7 statistical packages, and 10% of the response were randomly selected and checked for the consistency of the data entry. SPSS version 20 also was used for data analysis. Frequency and Percentage were calculated to all variables which are related to objective of the study, and Bivariate and multivariable logistic regression was employed to identify factors associated with dependent variables. Odds ratio (OR), with 95% CI and p value < 0.05 were computed to determine the level of significance.

Data Dissemination Plan

A copy of the report will be given to UoG referral hospital, CHMS Department of Health informatics and other concerned bodies. It is also expected that the result of this study will be disseminated to the public through media. Additionally, the result may be presented on scientific conferences and published in scientific journals.

Ethical Consideration

Ethical clearance was obtained from institutional review board (IRB) of the University of Gondar. A written letter of permission from the research coordination committee were submitted to UGCSH Administration to grant permission for conducting the study. The study participants were provided with clear information about the purpose of the study and asked if they are willing to participate in the study. Data was collected after receiving verbal consent from those who are willing to participate in the study. Anonymity of the respondents was preserved and their information were kept secret and were not be disclosed to anyone except for the purpose of the study.

RESULT

Socio demographic characteristics of respondents

Out of 171 study participants, 152(88.8%) were involved in this study and it produces a response rate of 88.8 %. The mean age of the study participants was 34.5($\pm$ SD) years which ranges from (23-56).

The majority of respondents, 95(62.5%) were male, and more than half of the respondents, 75 (49.3%) were aged between (20-35), and nearly half of the respondents, 65 (42.8%) had degree holders. Regarding the profession, 59(38.8%) were General practitioners (GP), and the mean monthly salary of the respondents was 12,214.43(305.36\$) Ethiopian birr. Concerning work experience 71(46.7% were working 1-5years at the University of Gondar referral hospital (Table1).

Figure 1: Number of physicians with different speciality in university of Gondar referral hospital Gondar, Ethiopia, 2021

Table 1: socio-demographic characteristics of physicians working in university of Gondar referral hospital Gondar, Ethiopia, 2021, (n=152)

Variable	Category	(n=152)	%
Age	20-35	83	54.6%
	36-45	57	37.5%
	45+	12	7.9%
Sex	Male	95	62.5%
	Female	57	37.5%
Education status	Degree	65	42.8%
	MSc and above	87	57.2%
Profession	General practitioner (GP)	59	38.8%
	Internist	13	9.2%
	Physiotherapist	2	1.3%
	Nutritionist	3	1.97%
	Emergency physician	3	1.97%
	Pediatrician	18	11.8%
	General surgeon	15	9.86%
	Emergency & critical care specialists	2	1.97%
	Gynecology & obstetrics	14	9.2%
	Radiologist	4	2.63%
	Orthopedics	4	2.63%
	Other	16	10.5%
Working Experience	<5	80	52.6%
	6-10	51	33.6%
	10+	21	13.8%
Work practicing at this hospital	<1 year	18	11.9%
	1-5 year	71	46.7%
	5+ year	63	41.4%
Monthly salary	<9056	41	27%
	9056-11305	43	28.3%
	11305+	68	44.7%

Attitudes of Physicians towards e-prescription

Based on the operational definition the overall score of attitudes to e-prescription of physicians from the University of Gondar referral hospital was 76.8% [95% CI: 66.7-84.2]. The findings of physicians to e-prescription were consistent with the operational definition. The findings of e-prescription of physicians showed that physicians expressed a high level of satisfaction with improving quality of care and reducing error 150 (98.6%), Improve the quality of work-life 150(98.6%), give benefits outweigh the cost 152(100%). On the other hand, Administrative rigidity is a possible barrier 38 (25%), Not feasible 82(53.9%), Improve patient's satisfaction 20 (13.2 %) were reported as unsatisfied (**Table 2**).

Table 2:- Level of attitudes of physicians towards e-prescription by different dimensions among physicians in university Gondar referral hospital Gondar, Ethiopia, 2021 (n=152).

Variable	Category	(n=152)	%
Improve quality of care and reduce error	Satisfied	150	98.6%
	Dissatisfied	2	1.3%
Improve quality of work life	Satisfied	150	98.6%
	Dissatisfied	2	1.3%
Improve patients' satisfaction	Satisfied	132	86.8%
	Dissatisfied	20	13.2%
The benefits outweigh the cost	Satisfied	152	100%
	Dissatisfied	0	0%
Decrease burden on physicians	Satisfied	149	98%
	Dissatisfied	3	1.97%
Feasible of electronic system	Satisfied	70	46.05%
	Dissatisfied	82	53.9%
Administrative rigidity is possible barrier	Satisfied	114	75%
	Dissatisfied	38	25%
Cannot be used without the availability of skilled resources and support	Satisfied	146	96.05%
	Dissatisfied	6	3.9%
Proper training would be required	Satisfied	149	98%
	Dissatisfied	3	1.97%

I would devote time to training for its implementation	Satisfied	150	98.6%
	Dissatisfied	2	1.3%
An e prescribing system should be implemented in UOGCSH hospital	Satisfied	143	94.04%
	Dissatisfied	9	5.92%

Organizational and technical characteristics of respondents

The majority of respondents 111(73.02%) were had their personal computer, half of the respondents 67 (44.07%) of them reported that they have a computer at their office, 35 (23.02%) respondents had internet at the office,36(23.6%) respond that have a computer at home, 8(5.2%)were a response that organization has to stand by generator, 117(76.9%)were reported organization has active or functional IT department, and 90(59.2%) were Organization have IT, technical person, on the other hand, 152 (100%) of respondents were not taking training on e-prescription and working with e-prescribing ever before, and the study subjects were used computer for data recording, report generating, reading, and video accessing are 142(93.4%),147(96.7%),69(45.4%), and 118(77.6%)respectively(**Table 3**).

Figure 2: Number of physicians having computer and internet service at their home and office university of Gondar referral hospital, Gondar, Ethiopia, 2021

Table 3:Organizational and technical characteristics of respondents at university of Gondar referral hospital Gondar, Ethiopia,2021(n=152).

Variable	Category	(n=152)	%
Computer at your office	Yes	67	44.07%
	No	85	55.9%
How use it	I have my own computer	111	73.02%
	I shared one computer with one other staff	37	24.34%
	I shared one computer with two other staff	4	2.6%
Internet at your office	Yes	35	23.02%
	No	117	76.9%
Organization has active or functional IT department	Yes	117	76.9%
	No	1	0.65%
	I don't know	34	22.3%
Organization have IT technical person	Yes	90	59.2%
	No	8	5.26%
	I don't know	54	35.5%
Organization have stand by generator	Yes	8	5.2%
	No	98	64.4%
	I don't know	46	30.26%
Computer at home	Yes	36	23.6%
	No	116	76.3%
Computer literate performing office and basic internet	Yes	32	21.05%
	No	120	78.9%
Working with e-prescribing ever before	Yes	0	0.00%
	No	152	100%
e-prescription training before	Yes	0	0.00%
	No	152	100%
	I don't know	1	0.65%
Data recording	Yes	142	93.4%

	No	10	6.5%
Report generating	Yes	147	96.7%
	No	5	3.28%
Reading	Yes	69	45.4%
	No	83	54.6%
Video accessing	Yes	118	77.6%
	No	34	22.36%
Other's purpose	Yes	137	90.13%
	No	15	9.86%

Factors associated with e-prescription

Findings based on the analytical part, which results variables such as sex of the respondents [OR:2.696(1.194-6.091)], age of the respondents [OR:0.421(0.073-2.437)], profession of the respondents [OR:3.7(.561-24.42)], educational status of the respondents [OR:1.878(.08744-0.033)], monthly salary [OR: 7.0(2.66-18.45)], working experience of the respondents [OR:1.82(.845-3.918)], working practice at this hospital of the respondents [OR:.245(.029-2.060)], Decrease burden on physicians [OR:.447(.783-3.513)] were having a p-value less than 0.2, but variables such as sex, the profession of the respondents, educational status of the respondents, work experience of the respondents, working practice at this hospital, and decrease burden on physicians were disappeared from the final stage of multivariable analysis. Regarding multivariable logistic analysis two variables like age of the respondents who have age <35 year old 2.48 times more likely practicing e-prescription than age >35 years old [AOR: 2.48 (95%CI:1.055-5.830 p:value=0.003)], and a monthly salary of the respondents who have monthly salary <9056.00 birrs 8.29 times more likely practicing electronic prescription than salary >9056.00 birrs [AOR: 8.29(3.002-22.89 p:value=0.001)] had to have a significant association with e-prescription. **(Table 4).**

Table 4: Factors associated with e-Prescription among physicians in university of Gondar referral hospital. Gondar, Ethiopia, 2021 (n=152).

Variables	Attitude towards e-prescription		COR (95% CI)	AOR (95%, CI)
	Yes	No		
Sex				
Male	43(28.2%)	36 (23.6%)	[OR:2.696(1.1946.091)]	-----
Female	51(41.8%)	22(18%)	1	
Age				
<35	32(26.23%)	25(20.5%)	[OR:0.49(0.231-1.042]	*[AOR:0.40349(.172.948]
36-45	47(38.5%)	18(14.8%)		
>45	25(16.4%)	5(3.2%)	1	1
Monthly salary				
<9056	17(11.2%)	18(11.8%)	[OR: 3.7(.561 -24.42]	*[AOR: 8.29(3.002-22.89]
9056-11305	40(32.9%)	25(20.5%)	[OR: 2.4(.374 -15.38]	
>11305	37(30.33%)	15(12.3%)	1	
Feasibility				
Satisfied	55(36.2%)	43(28.3%)	[OR:1.82(.845-3.918]	-----
Dissatisfied	39(31.97%)	15(12.3%)	1	
Improve patients' satisfaction				
Satisfied	72(59%)	42(34.43%)	[OR: .245(.029-2.060]	-----
Dissatisfied	22(14.5%)	16(10.5%)	1	
Decrease burden on physicians				
Satisfied	56(36.8%)	44(28.9%)	[OR: .447(.783-3.513]	-----
Dissatisfied	38(31.14%)	14(14.48%)	1	
Proper training would be required				
Satisfied	36(29.5%)	25(20.49%)	[OR: 1.659(.206-.972]	-----
Dissatisfied	43(35.25%)	18(14.75%)	1	

DISCUSSION

The current study tried to assess the magnitude of e-prescription among physicians and the overall score attitudes of physicians on e-prescription from the organization in the study area was 76.8% [95% CI: 66.7-84.2]. Also attitudes of physicians on e-prescription majority of professionals had high level of satisfaction with Improve quality of care and reduce error 150 (98.6%), Improve quality of work life 150(98.6%), give benefits outweigh the cost 152(100%). On the other hand, administrative rigidity is possible barrier 38 (25%), Not feasible 82(53.9%), Improve patients' satisfaction 20 (13.2 %) were reported as unsatisfied

The total magnitude of physicians for attitudes of e-prescription from their organization was 76.8% [95% CI: 66.7-84.2]. concurrent and similar study conducted in Sweden shows we demonstrated a relationship between the country of residence of physicians and their attitude towards e-prescribing for all the responses of Swedish physicians 82% regarded e-prescribing as time saving, 88.1% as being safer and 96% as providing a better service for patients.(16)

The current study conducted out of 171 study participants, Majority of respondents, 95(62.5%) were male and more than half of the respondents, 75 (49.3%) were those age between (20-35), with response rate of 88.8% were A cross sectional study conducted at Kottayam, Kerala, INDIA. Of Kerala has started the e-health initiative shows Two hundred and fifty seven prescribing doctors of age range 22-60 years participated of which 49% were females and 51% males with Response rate was 73% (257/350) (10). the current study is lower than study conducted at chain to assess attitudes of physicians on e-prescription Hundred physicians were approached with the help of the consultancy, out of which 90 physician responded the result shows that majority of the physicians (86%) had positive attitude towards e-prescription the experience of the physician and E-prescribing facility helps to spend lesser time on prescribing the drugs when compared to hand written prescribing ($P < 0.05$) (10). The two studies showed that to assess the attitudes of physicians on e-prescription of physicians among chain found to be this may be in the current study area absence of different initiatives to exercise e-health technologies ,lack of motives ,bad working environment.

From the current study Majority of respondents 111(73.02%) were having their own personal computer, half of respondents 67 (44.07%) of them reported that they have computer at their office, 35 (23.02%) respondents were have internet at office ,36(23.6%) respond that have computer at home, 8(5.2%) were response that organization have stand by generator,

117(76.9%) were reported organization have active or functional IT department, and 90(59.2%) were Organization have IT technical person, on the other hand 152 (100%) of respondents were not taking training on e-prescription and working with e-prescribing ever before, and the study subjects were used computer for the purpose of data recording, report generating, reading, and video accessing are 142(93.4%), 147(96.7%), 69(45.4%), and 118(77.6%) respectively.

The study analyzed e-prescription from the physicians' view in the public sector at University of Oulu user experience, acceptance of technology, success in implementing and using information system with the help of five themes forming a framework (information quality, service quality, system quality, perceived ease-of-use, perceived usefulness and intention to use) (12).

A survey was conducted in four hospitals in Nigeria to determine the economic, technical and organizational feasibility of adopting e-prescribing included 42 medical practitioners - doctors, pharmacists, pharmacy technicians and assistants - working at the hospitals at the time of the survey so, respondents felt that implementation of an EP system is economically feasible ($p=0.031$) and organizationally feasible ($p=0.032$). (13)

The current study revealed that higher numbers of physicians were dissatisfied than the above study. The possibility of dissatisfaction would be due to lack of computer at their office and home, absence of internet accesses at office as well as at their home, lack of training related to e-prescription those who perform better.

Factors like monthly salary of the respondents were significantly associated 8.29 times with physicians to adapt e-prescription. The findings of the current study are inversely related with above study that in Nigeria to determine the economic, technical and organizational feasibility of adopting e-prescribing so, respondents felt that implementation of an EP system is economically feasible ($p=0.031$) and organizationally feasible ($p=0.032$). (13) The possible difference may be due to inadequate funding by the government does not provide for the health sector to acquire the necessary resources and training to enhance the skills of physicians in health care industry.

Generally, the magnitude of attitudes of physicians on e-prescription from the current study is higher and influenced with factor like monthly salary, and age of respondents.

Limitation of the study

The current study has some limitations such as related kinds of literature and as data were collected based on self-reported information, the possibility of recording errors and recall biases.

Conclusion

the overall score attitudes of physicians on e-prescription from the organization in the study area was good in the university of Gondar referral hospital. variables for multivariable analysis variables like age and the monthly salary of the respondents had to have a significant association with e-prescription. monthly salary of the respondents was significantly associated with e-prescription of monthly salary less than 9,056.00 of the respondents from the University of Gondar referral hospital compared with those who had monthly salary more than 11,305.00 with attitudes ready to adapt e-prescription of the respondents from the working organization.

6.3. Recommendations

Recommendations were given for the responsible bodies based on the findings of the research and conclusions. The followings are the appropriate recommendations for different responsible bodies.

To Hospital Administrators

Recommendations were given for the responsible bodies based on the findings of the research and conclusions.

To Researchers

- Since there was no adequate research done in Ethiopia on this topic the findings of the research are expected to be used by another researcher who wants to conduct similar research.

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