Reminder System Model for Automated Text Messaging Appointment: A Study of Ampath Centre of MOI Teaching and Referral Hospital – Eldoret, Kenya

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Abstract:- Missed appointments are common phenomena in practices worldwide. In healthcare set up, adherence to appointments and medication is quite crucial especially for chronic illnesses. Regular clinic visits enable patients to benefit from continuous education on secondary prevention, counselling and other ancillary services. Various studies have shown that the use of automated text message reminder system can be used to reduce non adherence to medical appointment. The general objective of this study was to examine existing appointment reminders for Ampath Centre of Moi teaching and Referral Hospital Eldoret, Kenya. A cross-sectional study was done at Ampath Centre of Moi Teaching and Referral Hospital in Eldoret-Kenya, from May to July, 2019. Information on the use of automated text message reminder system was obtained from 10 members of staff and 412 patients seeking HIV services in the hospital. Data analysis was done and the results were presented in frequency tables and graphs. The study findings showed that majority of the patients (98%) preferred the utilization of automated text messaging reminder mechanism for patient appointment. Most member of staff agreed that their skills and ICT infrastructure would support an automated text messaging appointment reminder system. The outcomes of this study further showed that majority of the respondents 295(71.43%) reported that they use appointment card to remind them of their clinic date, 91(22.03%) use phone call, 25(6.05%) use pill count and only 2 (0.48%) use calendars as a reminder of appointment date.

Keywords:- Appointment, Adherence, Chronic.

I. INTRODUCTION

World Health Organization (WHO), 2000, describes a health system as all organizations, individuals and activities whose main objective is to promote, re-establish and sustain health. The key target of health system is improving efficiency, improving healthcare level and equity in ways that are responsive, financially fair and make best use of available resources. WHO framework for action, 2000, describe the six building blocks (pillars) that together constitute a complete health system. These include governance, medical products vaccines and technologies, information and research, health workforce, healthcare funding and service delivery . Strengthening of the health system is one of the major concerns in World Health Organization (WHO) agenda. Achieving Millennium Development Goals on health matters are only possible if the existing gaps thoroughly addressed. Filling in the gaps would minimize premature death, ill health and suffering experienced today [1].

Future health systems must be designed in a dynamically functional framework. This will enhance application of system thinking perspective. "Many health systems' responses have been generally considered naïve and inadequate …a system failure requires a system solution not a temporary remedy" (WHO, 2008) (Alliance report, 2009). A study conducted by Sweeny, 1996 showed that effective utilization of facility's properties is vital in a time of quickly rising care costs and demands for better health care[2] . Administrators of these health facilities are faced with a lot of pressure especially while controlling cost[3]. Adoption of modern technologies in hospitals would help in effective utilization of resources to provide better services for patients" [4]

Computers and mobile devices have become very essential to the healthcare sector, the devices are mainly use in financial, marketing and clinical issues. Globally, mobile health applications for patient care are increasing worldwide. Organizations have started investing into the advancement of mobile health devices and patient engagement applications are launched every day. United States lead in mobile Health growth thus according to a new research by Accenture Company (2014), 64 % of hospitals in the United States are expected to book medical appointments online by the end of 2019. The system is expected to divert 80% of their appointment volume on average, through self –scheduling. An estimate of 38% of total appointments will be booked using self-scheduling tools. Asia pacific is predicted to grow at rate of 35% making it faster–growing mobile health market. According to Market Research press release, France, United Kingdom and Germany collectively account for 45% share in Europe mobile health device market in 2014; this shows how mobile technologies are growing in acceptance worldwide thus transforming the face of health sector. Regionally, mobile appointment booking technology is emerging as a

powerful ally in medical innovation particularly in sub-Saharan Africa. Access to health facilities has always been a problem due to poor roads especially in rural setup .As a result, several appointment booking systems have been launched that bring medical advances directly into home or smart phones [5].

In the recent past, there has been a lot of advancement with regard to mobile technologies. Studies have shown that the use of short messaging commonly known as "messaging" has been widely adopted in both developing and developed countries[6]. According to Kenya Communication Authority (2015), 88% of the Kenyans human population have access to a cell phone. The Authority further revealed that about 28.3 billion text messages were sent in the same year (2015). Use of Short Messages Services has many advantages including ability to reach a large population within a short time, quick delivery and safety issues, less expensive and reduced intrusiveness compared to phone calls. Studies have indicated that, the Short messages can be saved for future references; this feature is not available with phone calls. The use of SMS is efficient, simple and cost effective; it is therefore the most effective way to improve service delivery for improved health outcome in Kenya and other sub Saharan Africa[7].

In Kenya, several private hospitals have adopted the use of mobile system for instance Aga Khan Hospital in Nairobi, Kenya. Appointment booking are done online on basis of date, time, department, doctor and At present, Ampath appointment mechanisms are based mainly on paper records, which are outmoded, ineffective, and undependable. In an age of electronic record keeping and communication, paper work should be minimal and if possible not used at all. There is need for assessing Ampath appointment system, improve on it by setting objectives and targets for future and measuring its progress and development so as to fix a substantial gap that exist between the demand for information by patients and the ability of the program to routinely provide it [8].

Adherence to appointments and medication is quite crucial for chronic illnesses and regular clinic visits enable patients to benefit from continuous education on secondary prevention, counselling and other ancillary services, when patients do not adhere to appointments and treatment, they are most likely to develop drug resistance, become ill and sometimes die. A review on Ampath retention rate by Greensweig *et al.* (2014), showed that less than 50% of patients have been in HIV care following HIV diagnosis while retention of patients decreased from 86% at 12 months to 72% at 60 months. Currently, retention rate at Ampath centre MTRH site stands at 67 % (Ampath work group meeting, 2019) and forgetfulness has been singled out as one of the contributing factor for poor retention, therefore there's need for Ampath and other chronic disease centres to automate appointment through a text messaging strategy to enhance adherence and retention in various clinics thereby greatly reducing stigma, drug resistance and a common problem of forgetfulness. This study aimed to model an automated text messaging appointment reminder system for Ampath Centre of Moi teaching and Referral Hospital Eldoret, Kenya.

II. METHODS

➢ *Research Design*

This study used a hospital based cross-sectional survey that took place from May to July, 2019. The study examined the existing appointment techniques and established the requirements for an effective model of an automated appointment system reminder for Ampath program, MTRH in Eldoret, Kenya. Patients' information were obtained to help in modelling an effective automated text message reminder system.

➢ *Study Area*

This study took place at Ampath Centre, MTRH in Eldoret, Kenya. Moi teaching and Referral Hospital is the second National Referral Hospital in Kenya after Kenyatta National Hospital (KNH). The Hospital is located along Nandi Road in Eldoret town (310 kilometres Northwest of Nairobi the capital city of Kenya), Uasin Gishu County, in the North Rift region of Western Kenya.

➢ *Study Population*

The study was done among 9 staffs and 412 patients who were 18 years and above. The sample were taken from about 13400 HIV patients seeking HIV services at Ampath centre in MTRH outpatient clinic and 50 member of staff working at the clinic.

➢ *Sampling Technique*

The study adopted a systematic sampling technique in obtaining the sample from the total population of the patients seeking HIV care from the hospital. A sample was chosen from the target population by selecting a random starting point and selecting the other individuals after a fixed sampling interval. The study used a sampling interval of 32. This means that for every 32 patients seeking treatments at Ampath Centre of Moi Teaching and Referral Hospital one patient was selected to participate in the study. Ten members of staff handling patients at the clinic were selected one from each department and Key Informant Interview technique applied to obtain data.

Ampath Clinic	Number of participants	Sample Size Taken
Clients(patients)	13400	422
Medical Officer/Consultant	4	1
Clinicians	12	1
Nursing officers	7	1
Medical records and IT staff	4	1
Psychosocial support staff	3	1
Ccc assistant	4	1
Outreach workers	6	1
Social worker	3	1
Nutrition officer	3	1
Partner Notification Services(PNS)Staff	4	1
Total	**13450**	**432**

Table 1:- Study Population.

➢ Data Collection

The researcher proceeded to collection data after receiving permission from Rongo University, IREC and NACOSTI. Data were collected by use of semi structured interview schedules and structured interview schedules for staff and patients respectively. The questionnaires were administered by the principle investigator only.

➢ Data Analysis

After data collection, quantitative information gathered from patients and member of staff were checked for completeness, coded and data analysis was conducted using Statistical Package for Social Science (SPSS) version 21.0 software to represent specific responses to specific questions. The results of this study were presented using tables, percentages, graphs and charts.

➢ Quality Assurance

The data was collected by the principal investigator thus consistency and accuracy in data collection process. The interview schedules were pre-exposed to participants before the actual data collection process to ensure the questions were well captured.

➢ Assumptions of the Study

The investigator in this study assumed that the study participants answered the interview questions objectively and accurately based on their own knowledge, perception and experience with appointment systems currently being used at Ampath, Eldoret.

➢ Ethical Approval

Ethical clearance was sought from Rongo University ethical committee, NACOSTI and Moi-Teaching, Referral Hospital regulatory and ethics committee (IREC) and Ampath before conducting the actual research. Confidentiality of the data was ensured by not exposing the names of the participants such that information would not be traced back to individuals. Safety of data collected was guaranteed by storing in principal investor's personal server accessed only by herself. The participants were reminded that their participation in this study was voluntary. Informed consent from the participants were signed and for those who were unable to read and write did thumb signing before interview. Participants were informed of their freedom to withdrawal from the study any time without suffering any consequences.

III.   RESULTS

Due to non-response the study only managed to recruit 412 patients. This was 97.6% of the total targeted sample size.

➢ Socio-Economic Characteristics of the Respondents

The table below shows the socio demographic characteristics of the participants in this study.

Variables	Categories	Total respondents (n)	% of respondents
Age	18-30	13	3.16
	31-40	64	15.53
	41-50	169	41.02
	51-60	130	31.55
	>60	36	8.74
Sex	Female	228	55.34
	Male	184	44.66
Marital status	Divorced	19	
	Married	265	64.32
	Single	42	10.19
	Widowed	86	20.87
Education level	None	69	16.75
	Primary	200	48.54
	Secondary	104	25.24
	Tertiary	39	9.47
Employment status	Employed	94	22.82
	Self employed	262	63.59
	Unemployed	56	13.59
Monthly income	KSH 0-5000	158	38.35
	KSH 5001-10000	79	19.17
	KSH 10001-30000	110	26.7
	KSH 30001-70000	37	8.98
	> KSH 70000	28	6.8
Religion	Christian	391	94.9
	Muslim	5	1.21
	None	16	3.88

Table 2:- Socio-economic characteristics of the respondents

According to the table above, participant's ages were categorised into five groups which included, 18 to 30 (3.16%), 31 to 40(15.53%), 41 to 50 (41.02%), 51 to 60(31.55%) and above 60 (8.74%). The result shows that majority of the study participants had ages between 41 and 50 years, while participants with ages between 18 and 30 years were the minority. In regards to sex, females (55.34%) were more than males (44.66%).

The study also indicated that majority of the participants were married (64.32%), while 4.61% were divorced, 10.19% were single and 20.87 were widows or widowers. The study found that 16.75% of the participant did not go to school at any level, 48.54% had primary level as their highest level of education, 25.24% attained secondary level as their highest level of education and 9.4%

of the participants had tertiary level as their highest level of education. The study indicated that, those who had primary level as their highest level of education were the majority. The study result shows that, the majority of the participants were self-employed (63.59%), while 22.82% employed and 13.59% were unemployed. In regards to monthly income, participants whose monthly incomes were ranging from KSH 0 to KSH 5000 were the majority (38.35%). On the other hand, 19.17% had their monthly income ranging from KSH 5001 to KSH10000, 26.7% had their monthly income between KSH 10001 and KSH30000, 8.98% of the participants' monthly incomes were between KSH 30001 and KSH 70000 and 6.8% of the participants had a monthly income greater than KSH 70000.

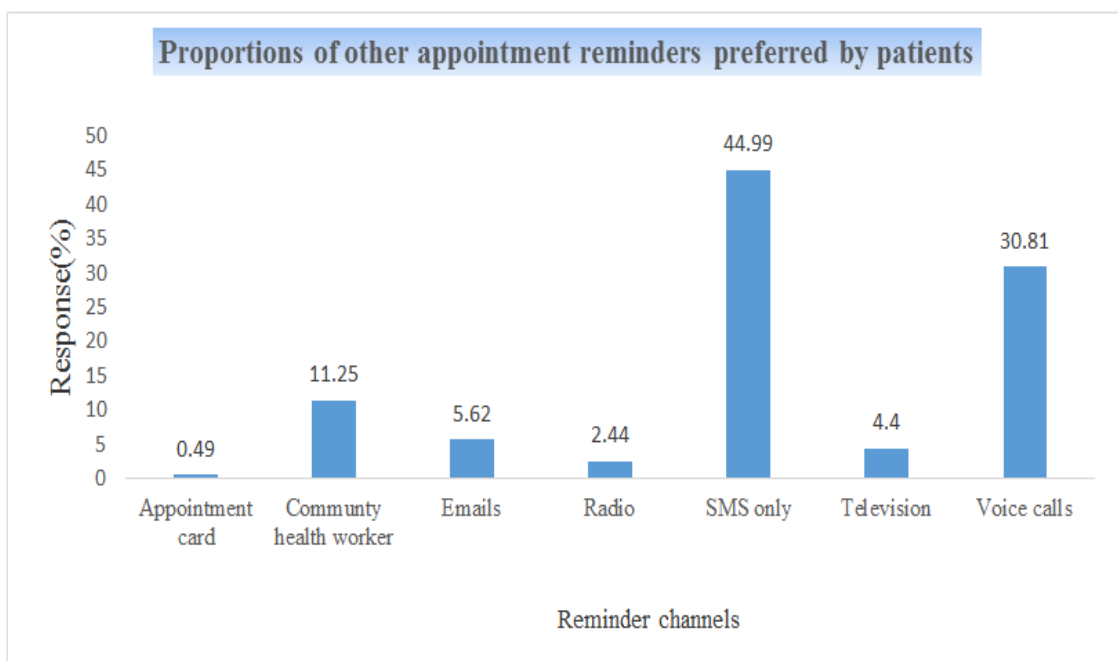➤ *Appointment Reminders Preferred by Patients*

Fig 1:- Proportions of other appointment reminders preferred by the patients

According to the result shown in the graph above, majority of the patients indicated that they only want to be reminded of appointment date via SMS 184(44.99%). Voice calls was the second highest preferred channel for reminding patient of their appointment dates 126(30.81%). Other channels preferred were, use of community health workers to convey the message to the patients 46(11.25%), use of emails 23(5.62%), television 18(4.4%), radio 10(2.44%) and use of appointment card 2(0.49%).

➤ *Examining Various Existing Appointment Reminder Technologies for Ampath Centre of MOI Teaching and Referral Hospital.*
This study intended to examine the various appointment reminder technologies at Ampath. To achieve this objective, participants were required to mention what reminds them of their clinic dates currently. The table below shows the proportions of the responses given by the participants.

Variable	Category	Total responses	% of responses
What reminds you of your clinic date?	Appointment card	295	71.43
	Calendar	2	0.48
	Phone call	91	22.03
	Pill count	25	6.05

Table 3:- Existing appointment reminder strategies in Ampath-MTRH

According to the table above, the study found that the patients had only four ways of reminding themselves about the clinic date. These methods included the use of appointment card (71.43%), phone call (22.03%), pill count (6.05%) and calendar (0.48%). The result indicates that, the mostly used method for reminding patients of their appointment date is the use appointment card, while the least used method is the use of calendar. The result further showed that phone call is the second mostly used method and pill count is the third.

➢ *Summary of Existing Appointment Reminder Technologies for Ampath Centre of MOI Teaching and Referral Hospital*

The findings of this study indicated that majority of the participants 295(71.43%) reported that they use appointment card to remind them of their clinic date, 91(22.03%) use phone call, 25(6.05%) use pill count and only 2 (0.48%) use calendars as a reminder of appointment date to the clinic. The study results shows that, a large number of patients uses appointment card as reminder for their medical appointments.

Studies have shown that the use of appointment card is not an effective method of reminding patients of their appointment and treatments. A study conducted by Mohan et al. (2018) on effectiveness of a reminder card system versus a mobile application to improve medication adherence among asthma patients in a tertiary care hospital showed that the mobile application was more effective compared to medical appointment card.

IV. CONCLUSION

The study findings showed clearly that, majority of the patients preferred the use of automated text messaging appointment reminder mechanism to any other method. Additionally, the use of automated reminders shows good tidings as far as medical adhering to medical appointments is concerned. SMS reminder was found to be useful not only for medical appointment but also for drug dosage timings, information on prevention of infectious chronic diseases and healthy diet intake and behaviour change.

RECOMMENDATION

This study focused on modelling an automated text messaging appointment system for Ampath Centre of MTRH-Eldoret, Kenya. This makes the research findings limited in the sense that the researcher cannot generalize the study findings to other healthcare institutions that are owned by the government. Therefore, the study recommends that future studies should be done in many public hospitals to enhance accuracy of the study findings.

Secondly, the objective of this study was to find out existing appointment reminder system for Ampath program. As a result, respondents were not required to evaluate a particular appointment system. This study recommends that future studies on topics related to this study topic should consider evaluating effective appointment reminder system.

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