

Review



The effect of patient reminders in reducing missed appointment in medical settings: a systematic review

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The effect of patient reminders in reducing missed appointment in medical settings: a systematic review

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Abstract

Missed appointments are a problem to healthcare professionals worldwide. There is up to nearly 42% missed appointment rate in medical setting globally. Reducing missed appointment rates improves the efficiency of health services and health outcomes of patients. Missed appointment rates can be reduced by reminding patients about their medical appointments in advance. A simple way of doing this is via electronic notification to the patients' phones. The aim of this paper is to review the effect of patient reminders in reducing missed appointment rates. The methodology was

conducted based on the PRISMA guidelines for systematic reviews. Literature search was conducted extensively using Google Scholar and PubMed databases based on terms such as cell phone reminders, electronic notification reminders, missed appointment rates, clinic attendance and SMS reminders. Geographical and publication biases were assessed. The result of the review showed that 95% studies reviewed reported a positive effect of patient reminders on appointment rates, with an average of 41% reduction in missed appointment rates and 34% increase in clinic attendance rates in all the studies. The review revealed that patient reminders reduce missed appointment rates and improve clinic attendance rates. Multiple reminders produce better outcomes. Reducing missed appointment rates also improve the efficiency of health care facilities.

Introduction

Missed appointment rates is the number of unattended appointments over the number of all scheduled appointments. Missed appointments are a problem to healthcare professionals worldwide. Missed appointment rates in healthcare settings could be up to about 42% [1]. Reducing missed appointment rates improves the efficiency of health services and health outcomes of patients. Missing appointments without cancelling in advance results in a vacant appointment slot that cannot be used by others [1]. The UK Secretary of State for Health, in 2015, estimated that missed hospital and general practitioner (GP) appointments cost the National Health Service (NHS) about 912m annually, and that these appointments were mostly missed for simple reasons like forgetfulness [2]. Missed appointments are more prevalent in certain areas of healthcare than others. For instance, there is a higher rate of missed appointments in community mental health settings than in other areas, with resultant effect on care [3]. Missed appointment rates can be reduced by reminding patients about their medical appointments in advance [3]. A

simple way of doing this is via electronic notification to the patients' phones.

The International Telecommunication Union, in 2017, estimated that there were nearly up to 7.7 billion mobile phones used in the world. It further stated that mobile phones have quickly changed the way people communicate and the way health providers think about service delivery [4]. Research on phone interventions in healthcare has been focused mainly on reminders and behavior change intervention. Both interventions fall under the umbrella of mobile health (mHealth), which is the use of mobile communication and computing technologies in public health and health care [4]. While most studies in mHealth are focused on behavior change, it can also be pivotal in reminding patients about their appointments. In the last two decades, sending text messages from mobile phones has dramatically changed the way in which people communicate [5]. This is an acceptable form of communication to the public and has been harnessed by healthcare providers to remind patients about their appointments. In this review, electronic notifications refer to text sent via short message service (SMS) to a patient from a service provider to help them remember, reschedule, or cancel their hospital appointments.

Notifications are used across healthcare settings throughout the world. Patient reminder notifications can be sent by email, text message or instant messaging applications to patients' phones. These notifications cost little and are delivered almost instantly. Patients can also read and refer back to these notifications at their own time and are less intrusive [6]. Reviews and studies have demonstrated a positive effect on clinic attendance and appointment rates. A systematic review indicated a 50% improvement in clinic attendance compared to when there was no notification provided [7]. Most studies available on the effectiveness of the reminder interventions allow for exploration of other potential predictive variables like geographical region and year of publication. Similarly, there is minimal evidence on how to enhance electronic notifications, especially,

whether the impact of several notification is greater than single notification, and whether the phone call notifications are as effective as text notifications [8]. This paper systematically reviews and appraises the recent evidence for electronic notifications and determines the effectiveness of reminders in reducing missed appointment rates.

Broad objective: to review the effect of patient reminders in reducing missed appointment rates. Specific objectives; to review the effect of phone call reminders in reducing missed appointment rates; to review the effect of SMS reminders in reducing missed appointment rates; to identify the health workers who were involved in calling and sending SMS reminders? In order to achieve these specific objectives, the literature was categorized into two in the process of review. The titles and abstracts were reviewed for relevance and checked if they met the inclusion criteria. The studies were also categorized in terms of their outcome measure and nature of intervention.

Methods

This review was conducted based on the PRISMA guidelines for systematic reviews [7] as shown in figure 1.

Data sources and search strategy: a comprehensive literature search was conducted extensively using Google Scholar and PubMed databases. The search terms were selected to examine the effectiveness of cell phone reminders on reducing missed appointment rates. Titles and abstracts of the selected studies were reviewed to check if they were relevant for the review. The following keywords were used: cell phone reminders, electronic notification reminders, missed appointment rates, clinic attendance and SMS reminders. These keywords were restricted to limit the number of studies, and to identify studies that meet the inclusion criteria. The studies were not limited by geographical area of publication but limited by publication dates as stated in the

inclusion criteria. The search was conducted last on 10th March 2019.

Inclusion and exclusion criteria: a study was included in the review if it met the following criteria: published between January 2010 and March 2019, had a reminder as their topic of focus, intervention involved electronic or phone call reminders aimed at reducing missed appointments, the reminder was sent directly to the patient, study was peer-reviewed, study was published in English, and study design was randomized controlled trial or a controlled clinical trial. The rationale for the study design was to review the effect of reminders against the control groups. Therefore, only studies which had an intervention group and a control group were included. While other studies could be useful, the inclusion criteria were set to limit the number of studies to fit the scope of the review. Studies that used historical controls were excluded to avoid possible bias due to factors that may have changed over time. Studies where health providers had personal contacts with the patients were excluded. Articles which examined feelings of patients towards patient reminders for non-clinical purposes were excluded. There was no limitation on patient diagnosis or population age.

Study selection and data extraction: as stated in the inclusion criteria, this review was limited to peer-reviewed articles published between 2010 and 2019 with an available abstract online. The starting date was arrived at because most mHealth research occurred during this time, and the rate of cell phone ownership, especially smart phones, has increased since 2010. The titles and abstracts of the identified studies were reviewed, and the inclusion criteria above applied. Data was collected from all eligible studies including but not limited to description of sample, used technology, frequency of delivery, duration, intervention, outcome and process measures, and statistical significance. Information on country, design of the study and clinical areas were abstracted from the selected studies. For this systematic review, a significant outcome was set at $p < 0.05$ for a successful trial for

the intervention group compared to the control group. The abstracts and titles of the selected studies were screened for inclusion after which full texts were examined based on the criteria for inclusion.

Classification of data and outcome: the studies were included and interpreted based on the outcome measures. The primary outcomes that were assessed in the studies were missed appointment rates and clinic attendance rates. Additionally, the review investigated whether variables such as year of publication, study quality or geographical region affected the results, how effective SMS reminders were compared with phone call reminders, and whether the timing and number of notifications affected the outcome. The principle summary measure was the risk difference between those who missed their appointments compared to those who attended their appointments. The groups in which patients received no reminders were also compared with those that received the reminders. The results of patients who received reminders, the intervention, from all the included studies were combined, and compared against the control groups who did not receive any reminders. The percentages of the outcome measures (missed appointment rates) for all intervention groups were extracted. In cases where some studies presented data from multiple intervention groups, the intervention groups were used as the unit of analysis. For example, some studies were comparing the use of electronic notifications (SMS reminders) against phone call reminder notifications.

Current status of knowledge

The procedure used for searching literature and the process of review as shown in Figure 1. The original search listed 94 articles and another seven from the reference lists of the articles. After excluding duplicates and screening both the abstracts and the full texts for eligibility, 20 articles that ultimately met the inclusion criteria were obtained. The characteristics of the study were determined by the

author, year of publication, region, sample size, intervention, outcome measure, and frequency of reminder. These have been described and shown in Table 1. All the studies were randomized control trials (RCTs). Of all the articles included in the systematic review, 15(75%) studies used appointment rate as the outcome measure and 5(15%) measured clinic attendance rate. Out of all the studies included, 9766 patients received reminder notifications and 5970 received no notifications. The randomized studies compared missed appointment rates or clinic attendance rates of those who received reminders and those who did not receive any form of reminders. In 16 (80%) of the studies included, both phone calls and SMS reminders were sent by health record officers. In 4 (20%) of the studies, reminders were done by front desk officers and receptionists.

In all the included studies, patient reminders were used as a method to reduce missed appointment rates 15 (75%) and increase clinic attendance rate 5 (15%). Majority of studies 13 (65%) used SMS reminders, while the rest 7 (35%) used phone call and SMS reminders. Across the studies, it was determined that the timing and number of messages or phone calls were customized based on the scheduled appointments or clinic. Many studies sent weekly reminders. However, some studies did not report much about timings of the reminders. Some studies only mentioned the number of reminders sent, while others sent reminders based on patients' preferences. 14 (70%) the studies reported detailed timings of the reminders. Appointment reminders were generally sent one week before the appointment day and the morning of the appointment day. There was a difference in the number of the reminders in many studies. 12 (60%) of the studies only sent one reminder while 8 (40%) sent an average of two reminder notifications. In the studies that sent more than one reminder notification, there was nearly up to 25% more increase in clinic attendance and about 14% more reduction in missed appointment rates. A typical reminder notification informed the patient of the date and time of the appointment and made

a provision of cancelling the appointment if they could not make it. For example, “You have a clinic appointment on (DATE) at (TIME) with (Doctor’s Name) Please answer with N if you wish to cancel and Y to confirm attendance.” Patients who did not answer were deemed to have confirmed attendance in all the studies.

In all the studies included, appointment reminders were found to reduce missed appointment rates by 41% on average and increase clinic attendance rates by 34% on average in all medical settings. Of the studies that used both phone calls and SMS reminders, 4 (57%) found SMS reminders more effective while 2 (29%) had better outcomes with phone call reminders. 1 (14%) could not find significant differences in outcome between phone call and SMS reminders. However, all the studies had significant improvement in outcome when both SMS and phone call reminders were used. In all the studies included, the results showed that missed appointments reduces efficiency in health care settings. However, the authors suggest that further studies need to be done to improve appointment reminder systems. In 16 (80%) studies, the authors suggested a continued investigation on the effectiveness of patient chosen reminder systems on reducing missed appointment rates. While 4 (57%), out of 7 articles that used both SMS and phone calls, found that SMS reminders were more effective than phone call reminders, all the studies suggested a continued use of SMS reminders for appointment reminders because of the ease to use and relatively affordable. Also, in all the studies included, the authors strongly suggested the use of multiple reminders for better outcome. In all the studies included in the review, multiple notifications had significant effect on reducing missed appointment rates and increasing clinic attendance. The pooled attendance rate for studies that sent multiple reminders was at 88% after the intervention. While the risk difference was in favor of phone call reminders, SMS reminders still yielded better outcome in all studies. The pooled missed appointment rates were 13% for SMS reminders and 19% for phone call reminders.

However, 19 (95%) studies showed a positive effect of patient reminders on appointment rates, with an average of 41% reduction in missed appointment rates and 34% increase in clinic attendance rates in all the studies.

This systematic review reveals that patient reminders reduce missed appointment rates and increase clinic attendance rates. Reminder notifications reduce missed appointments and improve clinic attendance rates [9]. These results are similar to earlier studies and reviews conducted. For instance, some studies revealed that sending two or more reminders have greater outcome in terms of reducing missed appointment rates [10-12]. This review agrees with the past studies because it has established that sending multiple reminders reduced missed appointment rates and improved attendance by 14% and 25% respectively. These improvements translate to an improved efficiency in healthcare. According to the UK Secretary of State, even a 5% reduction in missed appointment would save up to 45 million of the National Health Service [2]. Since there are text notification reminders that already exists, an extra notification can be adapted to improve the outcome. The results this systematic review shows that SMS can easily be implemented in a variety of settings to improve health services delivery [13]. It is relatively less expensive. This review found that 19 (95%) included studies reported positive results of phone call and SMS reminders. The reminders helped improve clinic attendance rates and reduced missed appointment rates. Through improving clinic attendance and reducing missed appointment rates, health care providers are able to save money and time, allow other patients who need medical attention to receive care and keep uninterrupted care [14].

The reminders showed positive results in studies of different conditions including diabetes, asthma, psychosis, breast cancer and skin problems in terms of medication adherence and non-medication treatment adherence. In all the studies included in this review, SMS reminders are preferred. This is similar to a study by [15] that illustrated that SMS

reminders are generally less expensive, customized easily and automatically sent to individual patients. It is not surprising that SMS was used in all those studies [16] also report huge financial savings after the intervention, and this is attributed to the reduced missed appointment rates and improved attendance [17] also cited reminders as being able to help people who need support to remember things. In addition, [18] agreed that medical professionals can now use reminders to guide their patients through treatment. These findings agree with what the review has documented. While patient confidentiality was cited in some studies as a risk of using SMS reminders, majority of the studies showed that patients accepted the reminders. Other studies have used generic reminders to curb these concerns. Some of these messages reminded the patients to use password protection on their phones or to open the messages in a private place. However, the studies acknowledged that SMS is inherently insecure and that it is possible for someone else to read the message other than the intended recipient [19] acknowledged the risk of some patients not reading the messages after receiving. However, [20] suggested a two-way messaging that requires a response from the receivers. Receiving multiple messages may also be annoying overtime, but none of the reviewed studies documented an adverse iatrogenic result. In fact, all the studies included in the review detailed that all the patients who received the reminders accepted the methods. Patient reminders indicate positive impact across the health care setting. This systematic review found patient reminders highly effective as both clinic attendance reminder and appointment reminder. It was also found that these reminders are effective in prompting health behaviors such as self-medical examinations. However, it is still unclear, from all the studies included in the review, what is the most effective dose of reminders in terms of frequency, timing and number of reminders and the conditions this dosage needs to be changed. It is highly likely that the dose would vary with individuals as well as the perceived relevance of the reminder system. In addition, it

has not yet been understood why SMS reminders are more effective than phone call reminders, and further research needs to be carried out to inform future interventions.

Strengths and limitations: the core strength of this systematic review is the fusion of the pool of large sets of data from different studies. The review was able to differentiate between two outcomes (missed appointments and clinic attendance). The review has showed that multiple reminders could have better outcome, however, more research is needed to determine why SMS is more effective than phone call reminders. Even though the systematic review pooled data from different sources, the review synthesized data by a narrative method, therefore, the findings cannot be used to suggest a preferred strategy for the use of the reminders in health care setting. The search terms were limited to certain terms and this may have limited literature search. Also, there could have been a biased interpretation of the studies based on different methodologies used by different studies. The review also limited the studies to only the peer-reviewed journals and published in English, a limitation that may restrict the findings.

Conclusion

Patient reminders reduce missed appointment rates and improve clinic attendance rates. Multiple reminder notifications have better outcomes. SMS reminders are more effective than phone call reminders. Multiple reminders produce better outcome. Reducing missed appointment rates also improve the efficiency of health care facilities. The value of using patient reminders have been demonstrated by many studies. SMS reminders, for example, have been shown to be less expensive and easy to implement.

What is known about this topic

- *Patient reminders reduce missed appointments rate in medical setting.*

What this study adds

- The use of multiple reminder options increases adherence to clinic appointments;
- Sending multiple reminders and notification increase adherence to clinic appointments;
- The content of patient reminders and notification preference are significant in reducing missed appointments.

Competing interests

The authors declare no competing interest.

Authors' contributions

Shadrack Ochieng Opon: the main author, research and manuscript development; Wanja Mwaura Tenambergen: Supervision and revision; Kezia Njoroge: Supervision and revision. All the authors have read and agreed to the final manuscript.

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Table and figure

Table 1: characteristics of included studies

Figure 1: procedure for sampling studies

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Table 1: characteristics of included studies

Study	Sample Size	Intervention	Region	Outcome Measure	Frequency of Reminders
Haji et al. (2019)	1116	SMS	Kenya	Appointment Reminder	2 messages
Gengiah et al. (2014)	4	SMS	South Africa	Clinic attendance	1 message
Georgette et al. (2017)	2920	SMS	South Africa	Appointment Reminder	1 message
Davey et al. (2016)	830	SMS	Mozambique	Clinic Attendance	1 message
Bangure et al. (2015)	304	SMS	Zimbabwe	Appointment Reminder	3 messages
Altuwaijiri et al. (2012)	Not Reported	SMS	Saudi Arabia	Appointment Reminder	2 messages
Arora et al. (2015)	324	SMS	United States	Appointment Reminder	3 messages
Baker et al. (2015)	185	SMS and Phone Call	United States	Clinic Attendance	1 message
Delgadillo et al. (2015)	254	SMS and Phone Call	England	Appointment Reminder	1 message
Farmer et al. (2014)	4000	SMS	United Kingdom	Appointment Reminder	1 message
Fang and Deng (2017)	350	SMS	China	Appointment Reminder	1 message
da Costa et al. (2012)	21	SMS	Brazil	Clinic Attendance	1 message
Clough and Casey (2014)	139	SMS and Phone Call	Australia	Appointment Reminder	1 message
Branson et al. (2013)	48	SMS and Phone Call	United States	Appointment Reminder	1 message
Burton et al. (2014)	539	SMS	United Kingdom	Appointment Reminder	2 message
Brannan et al. (2011)	201	SMS and Phone Call	United Kingdom	Appointment Reminder	1 message
Bourne et al. (2011)	3551	SMS	Australia	Appointment Reminder	1 message
Berenson et al. (2016)	877	SMS	United States	Appointment Reminder	3 messages
Boker et al. (2012)	33	SMS	United States	Clinic Attendance	2 messages
Balato et al. (2013)	40	SMS and Phone Call	Italy	Appointment Reminder	2 message

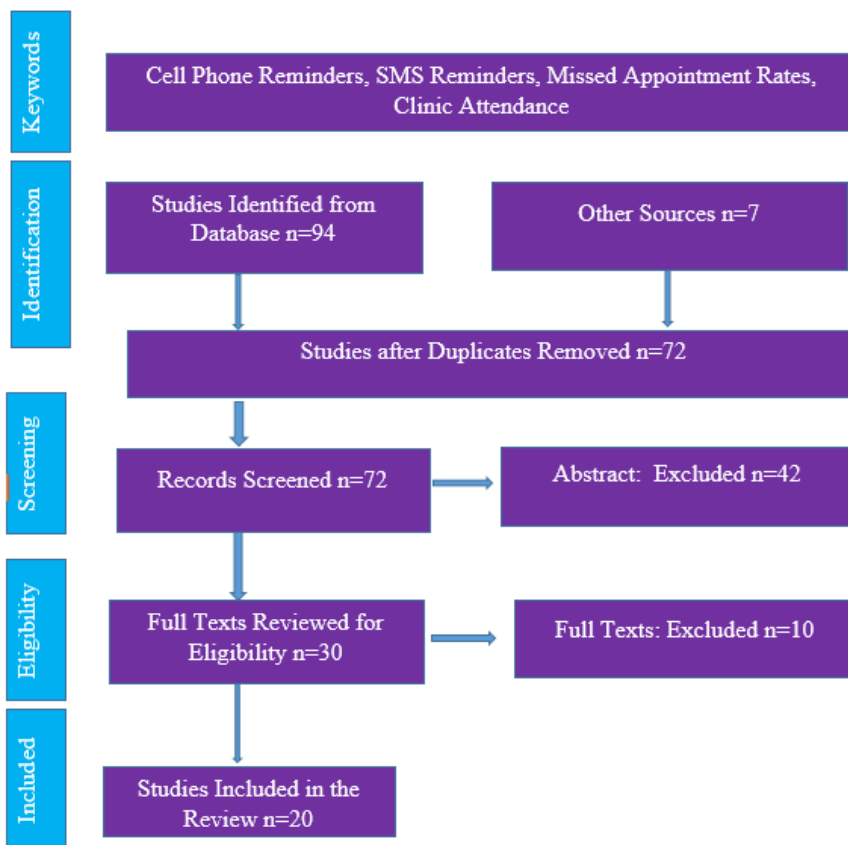


Figure 1: procedure for sampling studies