



An Roinn Sláinte
Department of Health



Irish Government Economic & Evaluation Service

Using SMS Reminders to Reduce Non-attendance at Hospital Appointments: an Umbrella Review of Key Issues

A Department of Health Research Paper, 2019

Robert Murphy and Carol Taaffe, Research Services and Policy Unit, R&D and Health Analytics Division, Department of Health

Contents

Executive Summary.....	i
1. Introduction	1
2. Are reminders an effective way of reducing DNAs?.....	4
3. Are SMS reminders as effective as other types of reminders?.....	6
4. Are SMS messages more cost-effective than phone calls?.....	6
5. When is the best time to send a reminder?	7
6. Can the content of an SMS further increase its effectiveness?.....	8
7. What factors should be considered in using SMS reminders?	8
8. Conclusions	10
References	11

Please cite this report as: Murphy, R., & Taaffe, C. (2019). *Using SMS Reminders to Reduce Non-attendance at Hospital Appointments: an Umbrella Review of Key Issues*, Department of Health Research Paper

EXECUTIVE SUMMARY

This review synthesizes information on key issues in using reminders to reduce non-attendance at hospital and healthcare appointments. In Ireland, one in six patients did not attend (DNA) outpatient appointments in 2015, costing the HSE over €20 million and compounding the waiting list problem.

1. Sending reminders in advance of hospital appointments reduces non-attendance. In one systematic review, 28 of 29 studies found that reminders reduced DNAs and that sending a reminder reduced DNAs by 34% on average (Hasvold and Wootton, 2011). Another systematic review found evidence from eight RCTs that the use of SMS reminders increases the likelihood of attendance at clinical appointments by 50%, compared to no reminder. The effect was similar in both primary care and outpatient settings (Guy et al., 2012).
2. It appears that SMS reminders are as effective as phone reminders in increasing attendance. While one review concluded that voice reminders are slightly more effective than SMS reminders (Robotham et al., 2016), one review found SMS messages are as effective as phone call reminders (Gorul-Urganci et al., 2013), and another review found no differential effectiveness between different reminder technologies, e.g. SMS reminders, phone call reminders or other reminders (McLean et al., 2016).
3. SMS messages are more cost-effective than phone calls, at an estimated mean cost of €0.14 per SMS compared to €0.90 per phone call (Hasvold and Wootton, 2011).
4. There is no conclusive evidence on the best time to send an SMS reminder. All studies in the systematic reviews consulted sent reminders within 3-4 days of the appointment.
5. The specific content of SMS reminders (in addition to basic time and date information) is likely to be important.
6. Issues to consider when using SMS reminders include confidentiality; data accuracy; patients not understanding information given; patients ignoring paper-based communications with key information; and additional monetary and time cost in providing back-up systems (Gorul-Urganci et al., 2013).

7. Strategies to optimise reminder systems include maintaining accurate patient records; targeting reminder technologies to the needs of the population; providing additional information; sending reminders 2-3 days in advance; asking patients to cancel or reschedule; having robust cancellation and rescheduling systems; monitoring groups that may be disadvantaged by the system; employing personalised strategies for high-risk groups; and building in administrative time for clinicians to manage tasks previously carried out when patients missed appointments (McLean et al., 2016).

1. INTRODUCTION

1.1 BACKGROUND

Non-attendance at appointments (DNAs) is a significant issue for health services internationally. In 2012-13, the UK Department of Health reported that 6.9m hospital outpatient appointments were missed in England and Wales, equating to £750m in direct costs. The rate of missed hospital appointments in the UK is 10% (Aggarwal et al. 2016). In Ireland, one in six patients did not attend outpatient appointments in 2015. 'Did not attend' rates ran at 15%, costing the HSE over €20 million and compounding the waiting list problem (Cullen, 2016).

Reducing the rate of non-attendance can improve access for patients and allow better use of hospital resources. This review presents evidence on key issues in using reminders to reduce DNAs at hospital appointments.

A broad range of interventions is available to reduce non-attendance. Since there are many different reasons why patients miss appointments, a number of different actions may be taken in response. A useful list of interventions to reduce DNAs is included in an NHS guide on releasing capacity in GP practices (NHS England). Reducing DNAs is one of the guide's ten 'High Impact Actions' and the interventions recommended are:

- *Easy cancellation*: providing rapid access for patients who wish to cancel an appointment, e.g. a dedicated phone number, text message service or online cancellation.
- *Appointment reminders*: sending text messages to remind patients about their appointments, with a prompt to cancel the appointment if it is no longer required.
- *Patient-recorded bookings*: asking the patient to repeat the details of the appointment back, to check that he/ she has remembered it correctly.
- *Reporting attendance*: publishing information, for example in the waiting room, on the proportion of patients who keep appointments, with an encouragement to cancel unwanted appointments.
- *Reducing 'just in case' booking*: creating a booking system which is straightforward and responsive, giving patients confidence that they can get help when they need it. This can reduce patients booking appointments far in advance.

A literature review from the NHS Scotland Outpatient Services UK - Quality Improvement Hub identifies strategies that were used to improve productivity and efficiency of existing services, three of which can reduce DNAs. These strategies include telephone and SMS reminders, as discussed above, but also two additional strategies:

- *Patient booking systems*: for example, the 'choose and book' system is an online national electronic referral and booking system in England which allows patients a choice of place, date and time for their first outpatient appointment.
- *Enhanced patient letter*: the focus of these types of patient letters is to improve understanding and achieve better communication.

While a number of these interventions might be used concurrently, this review focuses particularly on the use of appointment reminders.

1.2 PURPOSE

The purpose of this report is to briefly synthesize the available evidence on the following questions regarding hospital appointments:

- Are reminders an effective way of reducing DNAs?
- Are some forms of reminders more effective than others?
- Are SMS messages more cost-effective than phone calls?
- When is the best time to send an SMS reminder?
- Can the content of an SMS further increase its effectiveness?
- What factors should be considered in using SMS reminders?

1.3 METHOD

This is an umbrella review which focuses on evidence contained in systematic reviews and meta-analyses. A systematic review is a special type of literature review which was undertaken with a detailed and comprehensive plan and search strategy derived *a priori* and with the goal of reducing bias by identifying, appraising, and synthesizing all relevant studies on a particular topic (Uman, 2011). A meta-analysis is a systematic review which synthesizes the data from several studies into a single quantitative estimate or summary effect size. Searches were carried out in PubMed, Google Scholar and the Cochrane Library. Search phrases used are listed in Table 1. Further papers were sourced through searches of bibliographies.

Table 1: Search Phrases Used

non-attend* OR attendance AND reminder*
non-attend* OR missed appointment* OR DNAs AND (intervention* OR reminder*)
outpatient OR OPD OR hospital AND non-attend*
outpatient OR OPD OR hospital AND reminder*
non-attend* AND reminder* NOT primary care
attendance AND reminder* NOT primary care

Reviews were excluded if they focused on only one health condition. Six reviews were included in the synthesis and these are described below.

Study/Year	Sector	Type	Included studies	Description
Free et al. 2013	Healthcare appointments^	SR & MA	8 trials	Reviewed all controlled trials using any mobile technology interventions for health care providers and health care consumers. Relevant sections concerned trials of interventions targeting communication between health services and health care consumers; 8 trials were of SMS appointment reminders.
Guroi-Urganci et al. 2013	Healthcare appointments^	SR	8 RCTs	Searched studies published since 1993 as the first commercial SMS message was sent in December 1992 (Wikipedia 2007). There were no language restrictions. Reviewed 8 RCTs involving 6,615 people that assessed SMS reminders for healthcare appointments. Excluded studies where SMS reminders were part of a multi-faceted intervention.
Guy et al. 2012	Healthcare appointments^	SR & MA	18 studies: 8 RCTs and 10 controlled observational studies	Reviewed studies comparing appointment rates between patients who did and did not receive SMS reminders published prior to June 2010. Conference presentations were included if the corresponding full report was not available. 53 articles were identified; 18 papers were included in the review, 10 of these involved outpatient clinics.
Hasvold & Wootton 2011	Hospital appointments^	SR	29 studies	Included only papers published in 2000 or later (the search was conducted on 21 February 2011) in English or any of the Scandinavian languages (Danish,

				Swedish, Norwegian). 29 papers were selected for full analysis.
McLean et al. 2016	Healthcare appointments^	SR	11 SRs and 31 RCTs	The review incorporated three components including a systematic review of reminder effectiveness literature regarding healthcare appointments. 466 potentially relevant papers were identified (date limits 1 January, 2000 to 15 February, 2012); 11 SRs met the inclusion criteria; 31 RCTs met the criteria.
Robotham et al. 2016	Healthcare appointments^	SR & MA	26 articles	Reviewed experimental studies published in the past ten years (January 2005 to April 2015), including data from conference publications where full published studies were unavailable. 26 articles were included in the systematic review.
^ Included hospital outpatient clinics				

In preparing this report, the authors followed the Irish Government Economic and Evaluation Service (IGEES) quality assurance process, seeking feedback on: the analysis format (structure), clarity (quality of writing), accuracy (reliability of data), robustness (methodological rigour), and consistency (between evidence and conclusions). The report was circulated for review to the following:

- Internal/ Departmental
 - Line management – Research Services and Policy Unit, Scheduled and Unscheduled Care Unit
- External
 - Outpatients Communications Improvement Project Group, representatives from the Health Service Executive (HSE) and the National Treatment Purchase Fund (NTPF).

2. ARE REMINDERS AN EFFECTIVE WAY OF REDUCING DNAS?

Sending reminders in advance of hospital appointments is shown to reduce non-attendance. One systematic review consulted here focused solely on hospital appointments; others covered healthcare appointments across all settings.

A systematic review of the effect of reminders on hospital attendance reported that 28 of 29 studies found that reminders reduced DNAs - whether in the form of manual phone calls; automated phone calls; SMS messaging or voice messaging; email or other (visit, open access scheduling) (Hasvold and Wootton, 2011). On average, sending a reminder reduced DNAs by 34% (based on an average DNA rate of 23% for those who received no reminders, compared to 13% for those who did).

A systematic review assessing SMS reminders for healthcare appointments found that SMS or phone call reminders improved the rate of attendance compared to no reminders (based on moderate quality evidence from seven randomised-controlled trials) (Gurol-Urganci et al. 2013). It found a 67.8% attendance rate in the control group versus 77.9%-80.3% in the intervention group. Overall, with reminders there was a 15% to 18.5% increase in attendance.

A systematic review of SMS reminders in healthcare settings found evidence from eight RCTs that the use of SMS reminders increases the likelihood of attendance at clinical appointments by 50%, compared to no reminder. The summary effect was 1.48 (95% CI: 1.23-1.72). The effect was similar in both primary care and outpatient settings (Guy et al., 2012).

A systematic review of eight studies of attendance at healthcare appointments, including six randomised-controlled trials, found that attendance increased with an SMS reminder or phone call message compared to none (Free et al., 2013). The probability ratio of attendance (pooled relative risk – RR) was 1.06 for a reminder versus no reminder.

An evidence synthesis of eleven systematic reviews and thirty-one randomised-controlled trials compared no reminders to SMS messages, manual phone calls and automated phone calls (McLean et al., 2016). It found that a simple reminder and a 'reminder plus' (with added information, e.g. location directions) were both effective at reducing non-attendance. Only one of the thirty-one randomised-controlled trials did not show a reduction in non-attendance. In the randomised trials, the attendance of the intervention group ranged from 5% to 44% higher than that of the control group. The systematic reviews also showed an increase in attendance, with a pooled simple reminder RR ranging from 1.06 to 1.10.

A meta-analysis (Robotham et al., 2016) of 21 papers (8,345 patients receiving electronic text notifications; 7,731 patients receiving no notifications – outcomes were measured as either 'no shows' or 'attendance') found that patients who received text notifications were 25% less likely to 'no show' for appointments (Risk Ratio=.75, 15% vs 21%). Those who received notifications were 23% more likely to attend clinic than those who received no notification (Risk Ratio=1.23, 67% vs 54%). Results were similar when accounting for risk of bias, region and publication year. The same study indicated that two or more notifications increased attendance by as much as 19% over and above a single notification (Robotham et al., 2016).

3. ARE SMS REMINDERS AS EFFECTIVE AS OTHER TYPES OF REMINDERS?

The reviews consulted compared the effectiveness of SMS reminders, phone calls, automated phone messages and postal reminders. One review found that voice reminders appeared to be more effective than text reminders, whereas two reviews found no difference in the effectiveness of voice or text reminders in increasing attendance. Robotham et al. (2016) report: 'Voice notifications appeared more effective than text notifications at improving attendance'; the risk difference was 8% in favour of voice notifications (95% CI -16% to 0.1%; N=3, p=0.05, I²=6%). On the other hand, a Cochrane Review found 'moderate quality evidence' from three studies (2,509 participants) that SMS reminders had a similar impact on attendance to phone call reminders (Gorul-Urganci et al., 2013). Both reminder types increased attendance rates, which were '67.8% for the no reminders group, 78.6% for the mobile phone messaging reminders group and 80.3% for the phone call reminders group' (RR 0.99 (95% CI 0.95 to 1.02)).¹ A realist review found 'strong evidence' from systematic reviews and RCTs that 'there is no differential effectiveness between different reminder technologies, e.g. SMS reminders, phone call reminders or other reminders' (McLean et al., 2016).

4. ARE SMS MESSAGES MORE COST-EFFECTIVE THAN PHONE CALLS?

A systematic review of hospital appointments noted that while cost and savings were not formally measured in any of the papers, fourteen of the twenty-nine papers included cost estimates (Hasvold and Wootton, 2011). The review calculated the mean cost of phone reminders as €0.90 compared to a mean cost of €0.14 for SMS or automated phone messages. It concluded: 'Although formal evidence of cost-effectiveness is lacking, the implication of the review is that all hospitals should consider using automated reminders to reduce non-attendance at appointments.'

A Cochrane systematic review of SMS reminders for healthcare appointments noted that two studies reported that the costs per text message per attendance were 55% and 65% lower respectively than costs per phone call reminder (Gorul-Urganci et al. 2013).

¹ One systematic review of hospital appointments found that automated reminders – a classification which groups together SMS messaging and automated phone messages - were less effective than manual phone calls (29% vs 39% of baseline value) (Hasvold and Wootton, 2011). However, that review did not compare individual reminder types (SMS reminders, phone calls, postal reminders, etc.).

5. WHEN IS THE BEST TIME TO SEND A REMINDER?

There is no conclusive evidence on the best time to send an SMS reminder. All studies in the systematic reviews consulted sent reminders within three to four days of the appointment, except for one that sent a reminder eight weeks prior to the appointment. This SMS was also used to remind the patient about medication adherence (Guy et al, 2012).

A systematic review of studies where all reminders were sent within a week of the appointment found that the number of days between the reminder and the appointment did not seem to have any strong effect on the DNA rate (Hasvold and Wootton, 2011). Another systematic review did not comment on the effect of timing on reminders, but the authors collated the timing of SMS reminders from eight randomised-controlled trials (GuroI-Urganci et al. 2013). These are shown in Table 2 below. In this sample of studies, all reminders were sent within four days of the appointment. This was similar to the hospital review where reminders (SMS or postal) were typically sent within three days (20 of 28 papers) or four days (24 of 28 papers) of appointments. In two further reviews, SMS reminders were typically sent within two days of the appointment in five of six studies (Free, 2013) and nine of thirteen studies (Robotham et al., 2016) for which timing was reported.

Table 2: Sample of Timing of SMS Reminders for Healthcare Appointments

Study	Timing of SMS Reminder
Koury (2005)	24 hours before the appointment
Leong (2006)	24-48 hours before the appointment
Liew (2009)	24-48 hours before the appointment
Chen (2008)	72 hours before the appointment
Fairhurst (2008)	Sent between 8.00 and 9.00 on the morning preceding afternoon appointments; between 16.00 and 17.00 on the afternoon preceding morning appointments
Lin (2012)	Four reminders were sent for each appointment. Four days prior, two reminders were sent at 10am and 4pm; the day before the appointment, two more reminders were sent at 10am and 4pm.
Taylor (2012)	A reminder was sent two days before the appointment if it was booked more than three days in advance, otherwise a reminder was sent the day before.
Odeny (2012)	The patient received daily text messages post-procedure. Only the messages sent on days six and seven after the procedure contained the appointment reminder. Day six was the day before the check-up appointment, and day seven was the day of the appointment.
<i>Source: GuroI-Urganci et al., 2013</i>	

6. CAN THE CONTENT OF AN SMS FURTHER INCREASE ITS EFFECTIVENESS?

The systematic review of hospital appointments did not comment on SMS reminder contents; of the healthcare appointment reviews, one provided information on SMS content and one commented on the effect of reminder content. The realist review ‘found weak but consistent evidence’ from five studies that a ‘reminder plus’ (e.g. a reminder with a health promotion message or information about procedures and the importance of follow-up) is more effective than a simple reminder (this finding included both SMS and postal reminders). The systematic review of healthcare appointments collated the content of SMS reminders used in three trials, provided information on the content of a further three trials, and commented that more papers should report message content (Gurol-Urganci et al. 2013). This content is displayed in Table 3.

Table 3: Sample Content of SMS Reminders sent for Healthcare Appointments

Study	Text used
Fairhurst (2008)	‘You have an appointment at (name of practice) (today/ tomorrow) at (time). Please call (number) if you can’t make it.’
Taylor (2012)	‘Reminder: Physical therapy appointment at [site] on [day], [date] at [time]. Please call [number] ONLY if you cannot attend.’
Lin (2012)	‘Rigorous and regular follow-up is essential to timely and successful management of childhood cataract.’ [in addition to a basic appointment reminder]
	Some information provided
Odeny (2012)	Post-operative instructions in addition to a basic appointment reminder
Leong (2006)	SMS included participant’s name and appointment details
Chen (2008)	SMS included participant’s name and appointment details
<i>Source: Gurol-Urganci et al., 2013</i>	

7. WHAT FACTORS SHOULD BE CONSIDERED IN USING SMS REMINDERS?

7.1 ACCEPTABILITY AND RISKS OF THE INTERVENTION

In their discussion of the background to non-attendance, Gurol-Urganci et al. (2013) highlight a number of accessibility issues raised in individual papers. Some studies raise the problem of confidentiality when using SMS reminders, a concern which might be addressed by an ‘opt-in’ scheme. Another issue is the possible impact of SMS reminders on health inequalities if people in higher socio-economic groups are more likely to own a phone (though the spread of phone ownership has somewhat mitigated this risk). One paper highlights the possibility that patients who receive SMS reminders may ignore paper-based communications that include key information. Other possible

disadvantages and risks mentioned include the risk of inaccurate data input; difficulties in reading for those with poor literacy or vision; lack of understanding of the information; and additional monetary and time costs, as backup systems may be needed for SMS reminders.

7.2 OPTIMISING EFFECTIVENESS

McLean et al. (2016) points to a number of strategies to optimize the effectiveness of reminder systems. While reminders are generally shown to be effective, factors that can lead to sub-optimal performance include inaccurate patient records; reminders not being received (e.g. telephone reminders); a recipient's inability to understand the reminder; timing; patients not cancelling or rescheduling appointments (e.g. where patients have difficulty accessing booking lines); and neglecting to tailor reminders to high-risk groups. The strategies mentioned are listed in Table 4.

Table 4: Strategies to Optimize Reminder Systems

Maintain accurate patient contact details (including alternative contact details).
Select reminder technologies suitable to the needs of the target population.
Use 'Reminder Plus' technologies (e.g. additional information) to overcome barriers to attendance.
Send reminder a minimum of 2-3 days in advance.
Frame reminders to ask patients to cancel and reschedule unwanted appointments.
Employ multiple systems for cancellation which suit the needs of the patients.
Have robust rescheduling procedures in place to allow ease of rescheduling.
Monitor whether any specific groups are being disadvantaged by the chosen reminder system.
Employ personalized or intensive reminder strategies for groups of patients at high risk of non-attendance.
Build in administrative time for clinicians to manage tasks which were previously routinely carried out when a patient missed an appointment.

8. CONCLUSIONS

Reviewing the available evidence on the use of reminders to reduce DNAs at hospital and healthcare appointments suggests that

- sending reminders in advance of hospital appointments reduces non-attendance;
- it appears that SMS reminders are as effective as phone reminders in increasing attendance;
- SMS messages are more cost-effective than phone calls;
- there is no conclusive evidence on the best time to send an SMS reminder. Most studies in the systematic reviews consulted sent reminders within 3-4 days of the appointment;
- the specific content of SMS reminders (in addition to basic time and date information) is likely to be important;
- issues to consider when using SMS reminders include confidentiality; data accuracy; patients not understanding information given; patients ignoring paper-based communications with key information; and additional monetary and time cost in providing back-up systems;
- strategies to optimize reminder systems include maintaining accurate patient records; targeting reminder technologies to the needs of the population; providing additional information; sending reminders 2-3 days in advance; asking patients to cancel or reschedule; having robust cancellation and rescheduling systems; monitoring groups that may be disadvantaged by the system; employing personalized strategies for high-risk groups; and building in administrative time for clinicians to manage tasks previously carried out when patients missed appointments.

REFERENCES

Aggarwal, A., Davies, J. & Sullivan, R. 2016. "Nudge" and the epidemic of missed appointments: Can behavioural policies provide a solution for missed appointments in the health service? *Journal of Health Organization and Management*. 30(4):558-564.

Cullen, Paul. 2016. One in six patients fails to show for hospital clinics. *The Irish Times*. 15 August.

Free, Caroline et al. 2013. The effectiveness of mobile-health technologies to improve health care service delivery processes: a systematic review and meta-analysis. *PLoS Medicine*. 10(1).

GuroI-Urganci, I. et al. 2013. Mobile phone messaging reminders for attendance at healthcare appointments. *Cochrane Database of Systematic Reviews*. 12.

Guy, Rebecca et al. 2012. How effective are short message service reminders at increasing clinic attendance? A meta-analysis and systematic review. *Health Services Research*. 47(2): 614-32.

Hasvold, P.E. and R. Wootton. 2011. Use of telephone and SMS reminders to improve attendance at hospital appointments: a systematic review. *Journal of Telemedicine and Telecare*. 17(7):358-364.

McLean, Siannadh Mairi et al. 2016. Appointment reminder systems are effective but not optimal: results of a systematic review and evidence synthesis employing realist principles. *Patient Preference and Adherence*. 10: 479-499.

NHS England. *Ten High Impact Actions to Release Capacity in General Practice*.

NHS Scotland (2013), Outpatient Services: A literature search of evidence from the UK, <http://www.qihub.scot.nhs.uk/media/509057/his%20outpatient%20services%20uk%20literature%20review.docx>

Robotham, Dan, et al. 2016. Using digital notifications to improve attendance in clinic: systematic review and meta-analysis. *BMJ Open*. 6.

Uman, L. S. (2011). Systematic reviews and meta-analyses. *Journal of the Canadian Academy of Child and Adolescent Psychiatry*, 20(1): 57-59.