

Short message service (SMS) appointment reminders: A Rapid Review

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Executive Summary

Background and Objective

A working group at Monash Health has been formed to undertake the piloting of a new, customised short message service (SMS) system in an outpatient clinic at two sites. As a result, evidence to inform the working group regarding effective timing and contents of the SMS appointment reminders including follow-up reminder messages magnitude and frequency was sought

The objective of this report is to review the current evidence regarding SMS messaging services that are used to remind patients to attend medical appointments. The specific aims of this review are to determine:

- What is provided in the content of the SMS messages, and is there best practice?
- What is the timing that the SMS messages are sent to patients, and is there best practice?
- What is the frequency that the SMS messages are sent, and is there best practice?
- What is the patient satisfaction levels regarding SMS reminder messages for appointments?

Summary

Overall, moderate quality evidence from reviews shows that SMS reminders improved appointment attendance^{1,2,3}, and 'no show' rates.¹ There is no difference in appointment attendance when controlling for the timing, rate and type (generic or personalised) of SMS reminder that was sent.² The following table summarises the finding in relation to the aims of this review.

Area of interest	Findings
SMS content	80% of messages contained generic, non-personalised messages. ² Non-personalised messages included: <ul style="list-style-type: none"> • date and time of appointment • a phone number to call to cancel or reschedule⁶ • content relating to any fasting or procedural information⁴ Other messages included instructions on how to respond for appointment cancellations. ⁵
SMS timing	The majority of studies sent an SMS at 48 hours prior to the appointment time. ^{1,2} <ul style="list-style-type: none"> • 75% of studies sent an SMS 48 hours prior to the appointment time.² 25% sent a reminder at 24 hours, 25% at 24-48 hours, and 25% at 48 hours.² When healthcare users were asked about their preference for SMS timing they preferred their initial reminder sent within 2 weeks, and most preferred within 1-6 days. ⁸ Only one single study reported specifically time of day for sending messages which was 10am. ⁴
SMS frequency	The majority of studies send only one SMS reminder prior to the appointment time. ^{1,2} 70-75% of studies sent one SMS reminder prior to the appointment time, ^{2,3} 11% sent two, 7% send three, and 4% sent more than three. ² Multiple reminders improved patients attending appointments, but did not make a difference in reducing 'no shows' (i.e. appointments that were not attended and not cancelled prior). ¹ When healthcare users were asked about their preference for reminder frequency they reported a preference to have only one reminder (Table 4). ⁸
Satisfaction	Patients reported that SMS messages were easy to use, patients were willing to receive text messages, and they were satisfied with the text messages. ³

Conclusions

A SMS used for outpatient appointment reminders improves appointment attendance and no-show rates. The majority of studies sent one, non-personalised reminder message within 48 hours of the appointment. Patients are satisfied with SMS appointment reminder services. It is unclear however, what is 'best' regarding the timing, frequency and content of SMS messages because no comparative studies testing which was more effective were identified.

Background

The care a patient receives and efficiency of a healthcare service is greatly diminished due to missed healthcare appointments. As a result, it is critical that appointments are not missed and the necessary tools are used to improve appointment attendance.

A working group at Monash Health has been formed to undertake the piloting of a new, customised short message service (SMS) system in an outpatient clinic at two sites.

As a result, evidence to inform the working group regarding effective timing and contents of SMS appointment reminders including follow-up reminder messages magnitude and frequency was sought.

Objectives

The objective of this report is to review the current evidence regarding SMS messaging services that are used to remind patients to attend medical appointments. The specific aims of this review are to determine:

What is the general consensus about effective:

- Content of the SMS messages, and is there best practice?
- Timing that the SMS messages are sent to patients, and is there best practice?
- Frequency that the SMS messages are sent, and is there best practice?
- What is the patient satisfaction levels regarding SMS reminder messages for appointments?

Search strategy

Inclusion/Exclusion Criteria

An outline of the inclusion/exclusion criteria is in Table 1.

Table 1. Inclusion/Exclusion criteria

Population	Include: Adult outpatient clinics and primary care settings. Exclude: Mental health, HIV, paediatric.
Interventions	Include: SMS reminders.
Outcomes	Include: Did not attend, no-show, non-attendance, attendance rate, cancellation/reschedule rate. Exclude: Medication reminders, education messages, informational reminders, supportive messages, and diary data collection.
Context	Include: All. Exclude: None.
Types of evidence	Include: Systematic reviews, all quantitative experimental and observational studies. Exclude: Abstracts, conference proceedings, letters to the editor, case reports.
Limits	Date: 2013 – current.

Search strategy

Pubmed, Medline and TRIP databases were searched on 7/5/2018. Database search terms were replicated from a previous review that was known to the authors.¹ One modification was made to the search terms and any terms related to electronic mail were excluded as this is not within the scope of this review (Table 2). Furthermore, the following grey literature sources were also searched using the term “SMS”; Advisory Board, Health Foundation, Kings Fund, and AHRQ

Table 2. Database search terms

1. cellular phone/
2. ((cell* or mobile or wireless) adj (phone* or telephon*)).tw.
3. (cellphone* or mobiles or mhealth or m-health).tw.
4. ((mobile or handheld or hand-held) adj2 (device* or technolog* or app* or health*)).tw.
5. (smart phone* or smartphone* or blackberry or iphone* or android phone* or google android or ipod touch or personal digital assistant* or pda or pdas).tw.
6. 1 or 2 or 3 or 4 or 5
7. (text* or messag* or multimedia or multi-media or imag* or mms or data or input* or application* or app?).tw.
8. 6 and 7
9. text messaging/
10. ((text or short or multimedia or multi-media) adj1 messag*).tw.
11. sms.tw.
12. (texting* or texted or texter*).tw.
13. (mms and (multimedia or multi-media or messag*)).mp.
14. (noti* adj6 (patient* or client* or service-user* or people)).ti,ab,kw.
15. ((remind* or alert* or return* or fail*) adj2 (patient* or client* or service-user* or people)).tw.
16. ((appointment* or attend* or arriv* or consul*) adj2 (patient* or client* or service-user* or people)).tw.
17. (non?attend or non attend* or no show).ti,ab,kw.
18. ((appointment* or attend*) adj6 (complacance or fail* or keep* or miss* or prompt*)).ti,ab,kw.
19. exp Reminder Systems/
20. exp "Appointments and Schedules"/
21. exp Patient Compliance/
22. Outpatients/
23. Outpatient Clinics, Hospital/ut [Utilization]
24. Case Management/
25. Office Visits/
26. 8 or 9 or 10 or 11 or 12 or 13 or 14
27. 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25
28. 26 and 27
29. exp animals/ not humans.sh.
30. 28 not 29

Study Selection

Titles and abstracts identified were exported to EndNote X7 (Thompson, Reuters, Carlsbad, California, USA). Papers identified were screened using inclusion and exclusion criteria established *a priori*. Searches of Medline, the internet (using Google) and guideline websites were screened by one reviewer in consultation with colleagues as necessary. Literature was included based on the above criteria.

Results

Search results

A total of 606 studies were identified through searching. All titles and abstracts were screened by one reviewer (CJ) and 22 results were shortlisted for further assessment. Following obtaining the full-texts of these 22 studies, the studies were explored which resulted in 8 results to be included in this review (Figure 1).¹⁻⁶ Two of the studies were high level evidence systematic reviews with meta-analysis,^{1,2} one was a narrative review,³ three were randomised controlled trials,⁴⁻⁶ one was a case-control study⁷ and one was a survey.⁸ No studies were found that reported best practice for the timing, content or frequency of SMS messages.

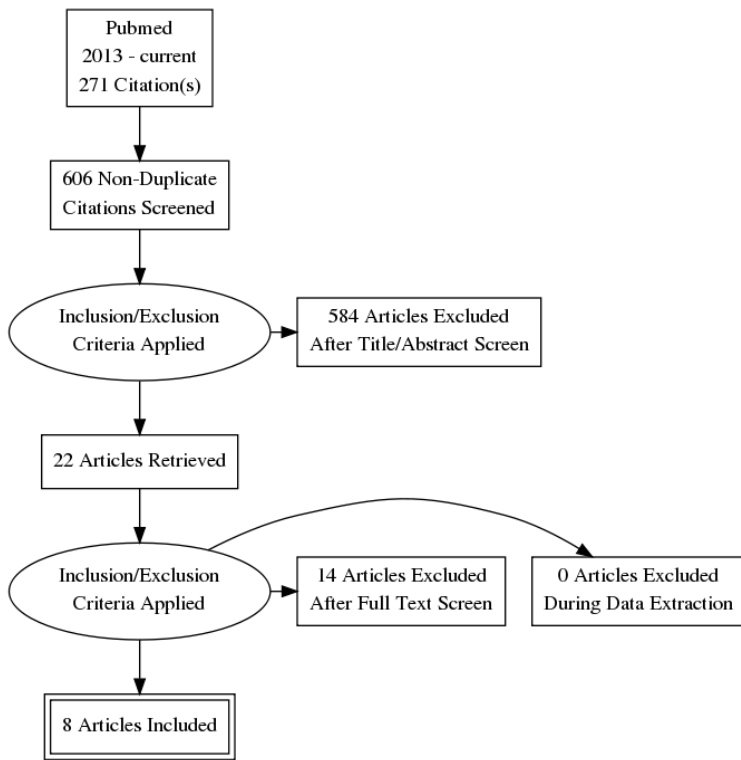


Figure 1. PRISMA flow chart for study selection

Summary of Findings

Overall

A summary of study information can be found in Table 3. Moderate quality evidence from reviews shows that SMS reminders improved appointment attendance (Figures 2 & 3)^{1,2,3}, and 'no show' rates (Figure 4).¹ When a sensitivity analysis was performed there was no difference in appointment attendance when controlling for the timing, rate and type (generic or personalised) of SMS reminder that was sent.²

One recent single study showed that phone reminders plus an SMS reminder did not alter no-show rate for a primary care medical practice when assessing under intention-to-treat constraints compared to those who only received a phone call reminder. However, matched control analysis revealed that SMS reminders improved 'no-show' rates by 6.4%.⁵ Another recent single study showed that SMS reminders reduced 'Did Not Attend' rates 12% compared to the previous time period when SMS reminders were not sent.⁶ Rate of cancellation was also reported to be reduced by 40% following SMS reminders when compared to patients who only received a pamphlet that contained the same information as the SMS.⁴

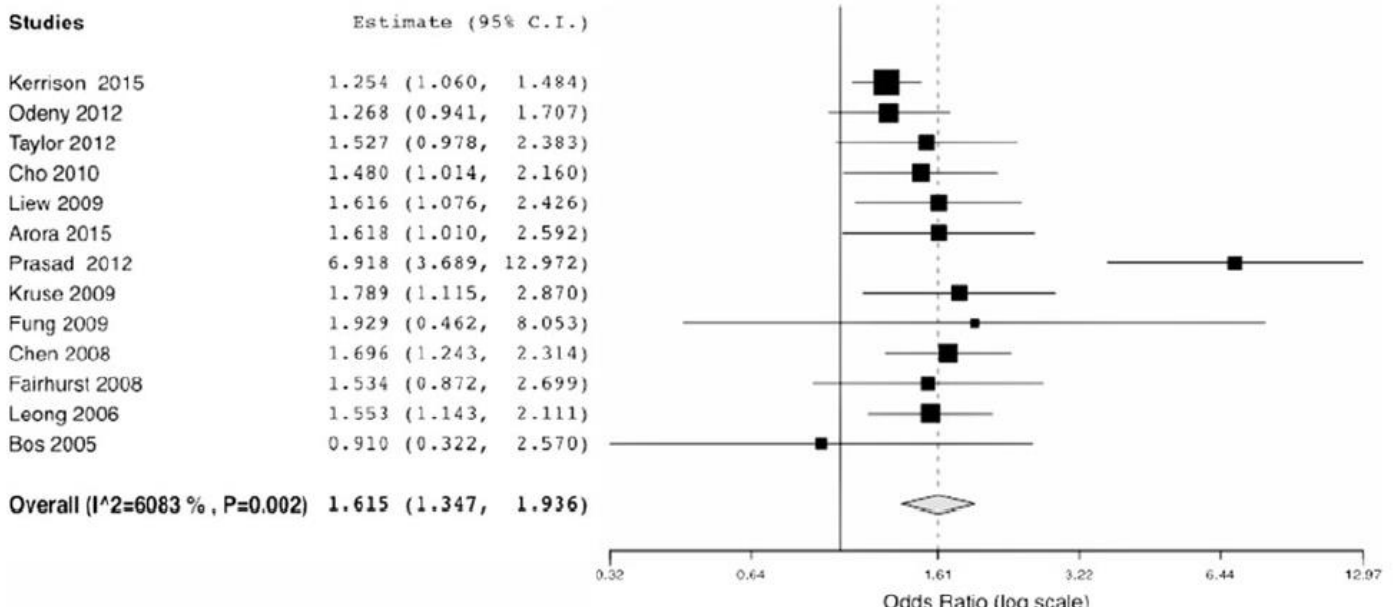


Figure 2. The effect of SMS reminders on appointment attendance.²

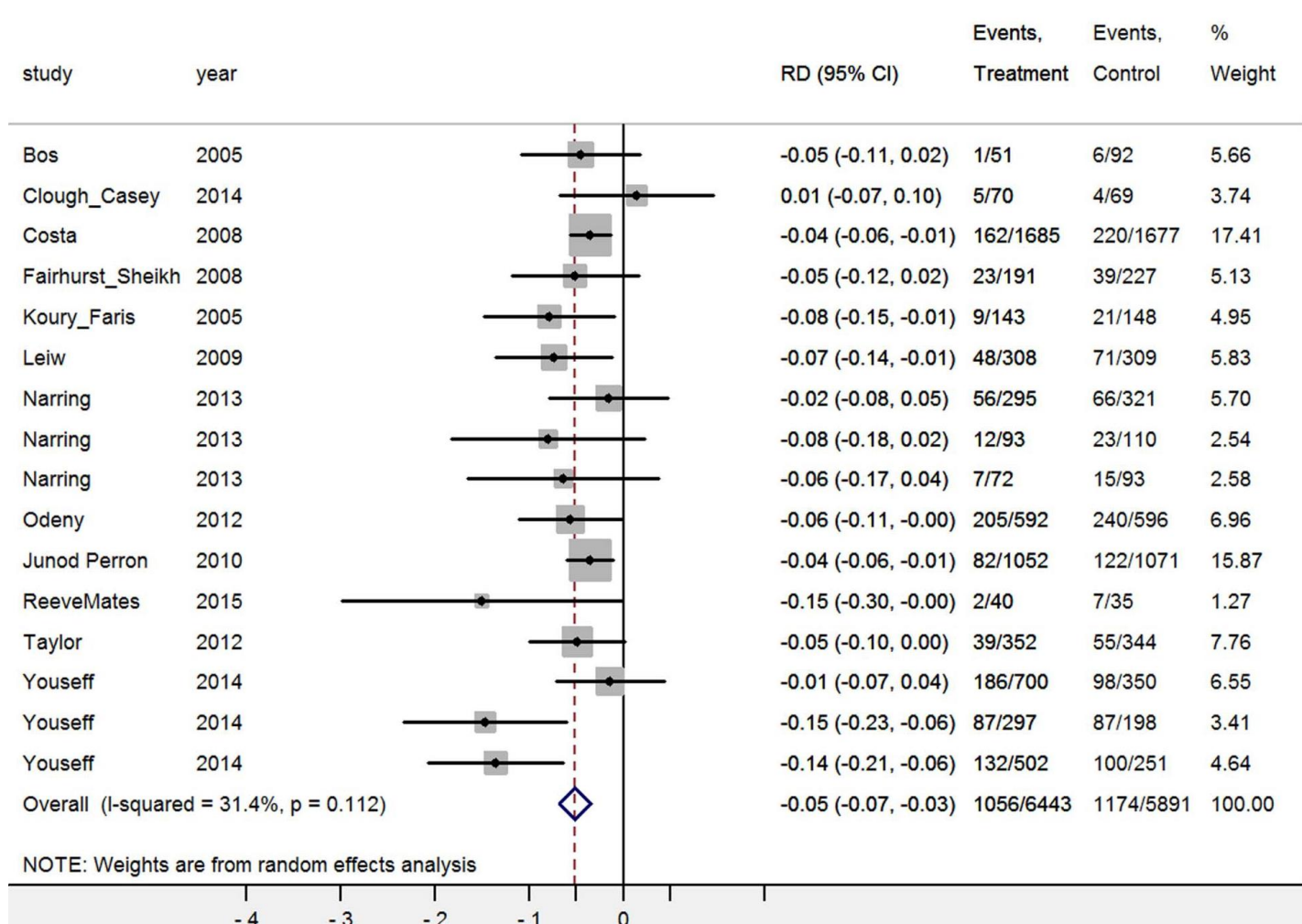


Figure 3. The effect of SMS reminders on attendance rates. RD = risk difference; CI = confidence interval.¹

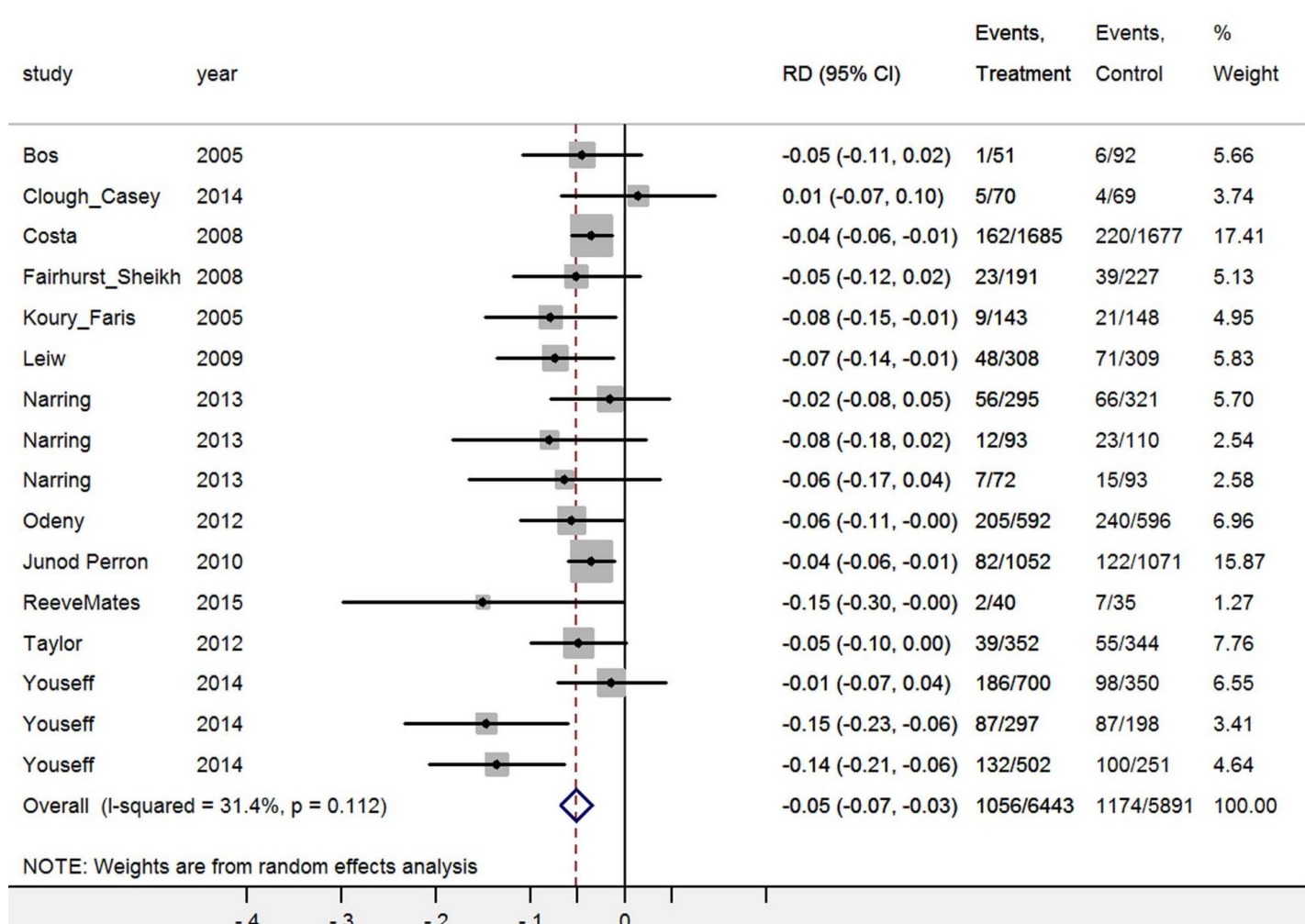


Figure 4. The effect of notifications on 'no show' rates. RD = risk difference; CI = confidence interval.¹

Table 3. Summary table of each study included in this review

Author	Year	Country	Type	Setting	SMS frequency	SMS timing	SMS content	Outcome	Results
Boksmati et al. (2)	2016	N/A	Meta	Healthcare				Attendance	Half of the studies reviewed sent the reminder within 48 h prior to the appointment time, yet no significant subgroups differences with respect to participant age, SMS timing, rate or type, setting or specialty was detectable. All studies, except one with a small sample size, demonstrated a positive OR, indicating SMS reminders were an effective means of improving appointment attendance. There was no significant difference in OR when controlling for when the SMS was sent, the frequency of the reminders or the content of the reminder. SMS appointment reminders are an effective and operative method in improving appointment attendance in a health care setting and this effectiveness has improved over the past 5 years.
Crutchfield et al. (8)	2017	USA	Survey	Anyone	1 message	2 weeks, and within 1-6 days most preferred	Non-personal. Clinic information	Reminder preferences	Two primary reasons given for missing an appointment include transportation problems (28%) and forgetfulness (26%). Participants indicated the initial reminder type (21%) was the most important attribute, followed by the number of reminders (10%). Overall, individuals indicated a preference for a single reminder, arriving via email, phone call, or text message, delivered less than 2 weeks prior to an appointment. Preferences for reminder content were less clear.
Deng et al. (4)	2015	China	RCT	Gastro	9 messages over the time period.	10am	Non-personalised	Cancellations	There was a significant reduction in the rate of cancellations for patients in the SMS group (4.8 %) compared with patients in the control group (8.0 %) (P<0.001). Patients in the SMS group were 40 % less likely to be cancelled by medical staff than patients in the control group. The compliance score of the two groups based on demographic and clinic characteristic distribution showed that for both male and female patients, the compliance score was higher in the SMS group than that in the control group (P= 0.023, P<0.001, respectively). Additionally, the compliance score was also significantly higher in the SMS group among patients who were under 50 years old, less than an undergraduate education level, experiencing their first time for procedure, or whose procedures were gastroscopy, waiting time was between 4 and 15 days, and schedules were in morning (P≤ 0.032).
Kannisto et al. (3)	2014	N/A	Narr Rev	Healthcare	Detail not stated	Detail not stated		Non-attendance, attendance	See appendix. Mobile phone text message reminders were used to remind patients about their medication or treatment in 63% (38/60) of the studies, and both to increase the attendance to clinical appointments and to decrease the non-attendance to clinical appointments with patients from different patient groups in 37% (22/60) of the studies
Percac-Lima et al. (6)	2016	USA	RCT	Medical practice	2 to 4 messages	Between 7-1 days prior		No-show rate	The proportion of no- shows in the intervention was 18.0% vs. 19.8% in control (p = .106). Among intervention appointments, 1,431 did not have a cell phone, 4,955 did not respond to the consent TM, and 231 declined TMs. The proportion of no- shows for the 1,309 appointments who received TM was 13.7% compared with 20.2% in a matched control group (p = .001). However, of 81 surveyed patients who did not respond to the consent TM, 64 (93%) wished to receive TMs.
Perron et al. (5)	2013	Switzerland	RCT	Primary care clinic	1 message	24 hours		Missed appointment	“You have an appointment on. . . (date) at . . . (time) with Dr. . . . (name) Please answer NO if you do not intend to come”. 160 character limited
Robotham et al. (1)	2016	N/A	Meta	Healthcare	1 message	48 hours	Non-personalised. Date, time, phone number to call.	Attendance rate & no-show rate	Patients who received notifications were 23% more likely to attend clinic than those who received no notification (risk ratio=1.23, 67% vs 54%). Those receiving notifications were 25% less likely to ‘no show’ for appointments (risk ratio=.75, 15% vs 21%). Results were similar when accounting for risk of bias, region and publication year. Multiple notifications were significantly more effective at improving attendance than single notifications. Voice notifications appeared more effective than text notifications at improving attendance.
Rohman et al. (7)	2015	UK	Case control	Ortho	1 message	1 week prior	Detail not stated	Did not attend rate	The overall Did Not Attend rate was reduced by 12% following the intervention (p<0.0001). The new appointment follow-up rate was reduced by 2% (p¼0.74) and the follow-up rate decreased by 13.7% (p<0.0001).

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SMS Content

Of all studies reporting the content of SMS reminders, 80% of messages contained only generic, non-personalised messages.² Non-personalised messages that included date and time of appointment and a phone number to call to cancel or reschedule have also been reported,⁶ as well as content relating to any fasting or procedural information.⁴ Other messages have included instructions on how to respond to the text for appointment cancellations.⁵

SMS timing

The majority of studies sent an SMS at 48 hours.^{1,2} Of all studies reporting SMS timing, 75% sent an SMS 48 hours prior to the appointment time.² 25% of studies sent a reminder at 24 hours, 25% sent a reminder at 24-48 hours, and 25% sent a reminders at 48 hours.² When healthcare users were asked about their preference for SMS timing they reported to prefer to have their initial reminder sent within 2 weeks, and most preferred within 1-6 days.⁸ Only one single study reported specifically time of day for sending messages which was 10am.⁴

SMS frequency

The majority of studies send only one SMS.^{1,2} Of all studies that report SMS frequency, 70-75% send one SMS reminder prior to the appointment time,^{2,3} 11% sent two, 7% send three, and 4% sent more than three.² Multiple reminders improved patients attending appointments, but did not make a difference in reducing 'no shows' (i.e. appointments that were not attended and not cancelled prior).¹ When healthcare users were asked about their preference for reminder frequency they reported a preference to have only one reminder (Table 4).⁸

Table 4. Medical appointment reminder attributes and levels with corresponding utility scores, n=251.⁸

Attribute	Levels	Mean utilities	Lower 95% CI	Upper 95% CI	Mean attribute importance scores (CI)
Initial reminder type	Postal mail	-7.54	-14.4	-0.67	44% (42%–46%)
	Phone call (personal or automated)	32.88	26.26	39.5	
	Text message	21.24	14.86	27.62	
	Email (from provider's office or EHR)	36.9	31.48	42.32	
	Social media (Facebook, Twitter, etc.)	-78.91	-87.15	-70.68	
	Electronic calendar (Outlook, Gmail, etc.)	-4.57	-11.01	1.88	
Arrival of initial reminder	1–6 days prior to appointment	31.68	26.97	36.4	21% (19%–23%)
	1–2 weeks prior to appointment	11.53	8.42	14.65	
	3–4 weeks prior to appointment	-14.75	-18.73	-10.78	
	>1 month prior to appointment	-28.46	-32.52	-24.4	
Reminder content	Clinic location information (clinic address, directions and map)	5.43	1.22	9.64	24% (23%–26%)
	Rescheduling information (phone number or email)	-0.78	-5.04	3.48	
	Reason for visit	-4.19	-9.18	0.81	
	Clinic location information (clinic address, directions and map) and rescheduling information (phone number or email)	0.37	-3.63	4.37	
	Clinic location information (clinic address, directions and map) and reason for visit	-3.11	-7.42	1.19	
	Rescheduling information (phone number or email) and reason for visit	-0.62	-5.15	3.91	
	Clinic location information (clinic address, directions and map), rescheduling information (phone number or email) and reason for visit	2.9	-1.71	7.51	
Number of reminders	1 reminder	9.1	5.69	12.52	10% (9%–11%)
	2 or 3 reminders– same type	-5.34	-8.01	-2.68	
	2 or 3 reminders– different types	-3.76	-6.36	-1.16	

Abbreviations: CI, confidence interval; EHR, electronic health record.

Patient satisfaction regarding SMS reminders

Patients reported that SMS messages were easy to use, patients were willing to receive text messages, and they were satisfied with the text messages.³

Benefits and limitations of SMS reminders

There are limitations to using mobile phone text message reminders. Patients have reported privacy concerns about losing their mobile phones and other people possibly gaining access to the messages and their content.³ Patients may have changed their mobile phone numbers without informing staff which impacts the receipt of reminders.⁹ The proportion of undelivered text messages has also been reported as high.⁹ Incorrect data entry leading to patient's not receiving text message reminders has also been reported,¹⁰ and it is also possible that patients adapted to the messages and simply stopped reading them.¹¹

Conclusions

A short message service used for outpatient appointment reminding improves appointment attendance and no-show rates. The majority of studies send one, non-personalised reminder message within 48 hours of the appointment. Patients are satisfied with SMS appointment reminder services. It is unclear however, what best practice is regarding the timing, frequency and content of SMS messages for reminding patients of their appointments because no comparative studies testing which was more effective were identified.

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