Can we use SMS-surveys in general practice research to engage with people from low-income groups? A multi-methods study

Elizabeth Sturgiss, Jenny Advocat, Chris Barton, Emma N Walker, Suzanne Nielsen, Annemarie Wright, Tina Lam, Nilakshi Gunatillaka, Symrin Oad, Chris Wood

Table of Contents

Can we use SMS-surveys in general practice research to engage with people from low-income groups? A multi-methods study

Elizabeth Sturgiss[1] BMed, MPH, PhD; Jenny Advocat[1] BA, MSW, GDipBA, PhD; Chris Barton[2] MMedSc, BSc, PhD; Emma N Walker[2] BMedSci, MD, BA, BSci; Suzanne Nielsen[3] BPharm(Hons), PhD, MPS; Annemarie Wright[4, 5] BAppSc, MMedSc, PhD; Tina Lam[3] BPsych(Hons), PhD; Nilakshi Gunatillaka[1] BSc(Hons), MIPH; Symrin Oad[6] BBmedSci; Chris Wood[7] LLB/BActS (Hons)

[1]EPIC Research Unit School of Primary and Allied Health Care Monash University Frankston AU
[2]Department of General Practice School of Public Health and Preventive Medicine Monash University Melbourne AU
[3]Monash Addiction Research Centre Eastern Health Clinical School Monash University Melbourne AU
[4]Department of Health Victorian State Government Melbourne AU
[5]Australia and Melbourne School of Global and Population Health University of Melbourne Melbourne AU
[6]School of Primary and Allied Health Care Monash University Melbourne AU
[7]Capital Health Network Canberra AU

Corresponding Author:
Elizabeth Sturgiss BMed, MPH, PhD
EPIC Research Unit
School of Primary and Allied Health Care
Monash University
PENINSULA CAMPUS
MOOROODUC HIGHWAY
Frankston
AU

Abstract

Background: Short Message Service (SMS) via mobile phones are a common means of interpersonal communication. SMS surveys are gaining traction in healthcare and research due to their feasibility and patient acceptability. However, challenges arise in implementing SMS surveys, especially when targeting marginalised populations, due to barriers with accessing phone, data as well as communication difficulties. In primary care, traditional surveys (paper and online) often face low response rates that are particularly pronounced among disadvantaged groups due to financial limitations, language barriers, and time constraints. Addressing these obstacles demands innovative strategies to ensure equitable participation.

Objective: This study investigates the potential of SMS-based patient recruitment and surveys within the general practice setting with a focus on socioeconomically disadvantaged patients. This study was nested within the REACH project that aimed to reduce alcohol-related harm through screening in Australian general practice. Several general practices in lower-income communities participated in SMS-based surveys.

Methods: This study follows a two-step SMS data collection process. An initial SMS with an online survey link was sent to patients, followed by subsequent surveys every three months for consenting participants. Interviews were conducted with local primary health network organisation staff and participating practice staff and clinicians. The qualitative data was analysed using constructs from the Consolidated Framework for Implementation Research (CFIR).

Results: While initial SMS responses were limited, later surveys showed improved engagement, highlighting the effectiveness of two-way SMS communication for sustained interaction. There were barriers to engaging marginalised groups including limited smartphone access, language barriers, literacy issues, mental health conditions, and physical limitations. Practice managers and clinicians suggested strategies to overcome these barriers, including using paper-based surveys in trusted spaces and offering assistance during survey completion.

Conclusions: SMS-based surveys offer a feasible and cost-effective approach to research data collection. Yet, reaching marginalised populations necessitates a tailored approach. While SMS surveys are apt for the broader population, additional efforts are required to ensure representation and involvement of marginalised groups. Clinical Trial: Australian New Zealand

Clinical Trials Registry ACTRN12622000959774; retrospectively registered; 7 July 2022.

Preprint Settings

1) Would you like to publish your submitted manuscript as preprint?

    Please make my preprint PDF available to anyone at any time (recommended).

    Please make my preprint PDF available only to logged-in users; I understand that my title and abstract will remain visible to all users.

✔ **Only make the preprint title and abstract visible.**

    No, I do not wish to publish my submitted manuscript as a preprint.

2) If accepted for publication in a JMIR journal, would you like the PDF to be visible to the public?

✔ **Yes, please make my accepted manuscript PDF available to anyone at any time (Recommended).**

    Yes, but please make my accepted manuscript PDF available only to logged-in users; I understand that the title and abstract will remain v

    Yes, but only make the title and abstract visible (see Important note, above). I understand that if I later pay to participate in <a href="http

Original Manuscript

Can we use SMS-surveys in general practice research to engage with people from low-income groups? A multi-methods study

Abstract

*Background***:** Short Message Services (SMSs) via mobile phones are a common means of interpersonal communication. SMS surveys are gaining traction in healthcare and research due to their feasibility and patient acceptability. However, challenges arise in implementing SMS surveys, especially when targeting marginalised populations, due to barriers with accessing phones and data as well as communication difficulties. In primary care, traditional surveys (paper and online) often face low response rates that are particularly pronounced among disadvantaged groups due to financial limitations, language barriers, and time constraints.

*Objective***:** This study investigates the potential of SMS-based patient recruitment and surveys within general practices situated in lower socioeconomic areas. This study was nested within the REACH project that aimed to reduce alcohol-related harm through screening in Australian general practice.

Method: This study follows a two-step SMS data collection process. An initial SMS with an online survey link was sent to patients, followed by subsequent surveys every three months for consenting participants. Interviews were conducted with local primary health network organisation staff and participating practice staff and clinicians. The qualitative data was analysed using constructs from the Consolidated Framework for Implementation Research.

Results: Four of the six general practices were able to send SMSs to their patients. The initial SMS was sent to 8333 patients and 702 responses (8.2%) and most were not from a low-income group. This low initial response was in contrast to the improved response rate to the ongoing 3 month SMS surveys (51.4% at 3 months, 43.3% at 6 months, 43.1% at 9 months). We interviewed four general practitioners, four nurses and four administrative staff from five of the different practices. Qualitative data uncovered barriers to engaging marginalised groups including limited smartphone access, limited financial capacity (telephone, internet and WiFi credit), language barriers, literacy issues, mental health conditions, and physical limitations such as manual dexterity and vision issues. Practice managers and clinicians suggested strategies to overcome these barriers, including using paper-based surveys in trusted spaces, offering assistance during survey completion and offering honoraria to support participation.

Conclusion: While SMS surveys for primary care research may be useful for the broader population, additional efforts are required to ensure representation and involvement of marginalised groups. More intensive methods such as in-person data collection may be more appropriate to capture the

voice of low-income groups in primary care research.

Introduction

Mobile phone ownership in countries with advanced economies is almost universal [1, 2], and most phone users regularly send text messages via Short Message Service (SMS). [3] An SMS, or text message, is one of the most frequently used channels of interpersonal mobile communication which enables real-time exchange of alphanumeric messages, commonly in packages of up to 160 characters [4] and may be delivered manually or via an automated system.

SMSs have been used for clinical and research purposes with promising results in terms of patient feasibility and acceptability. While the standard route for collecting patient data in health research has traditionally been paper-based surveys [5], text message methods may offer equivalent, if not higher response rates than paper-based methods [6, 7] and patients express a preference for SMS based surveys over paper-based alternatives [8] including in low income settings [9]. When information from multiple time points is requested (as in the case of daily or weekly surveys), SMS methods may offer a greater chance of obtaining more reliable, complete data as recall bias can be minimized [6]. Additionally, SMS may assist in collecting data on stigmatised topics, with some evidence suggesting participants are more likely to disclose issues such as mental health and substance use information when asked by non-paper-based methods (e.g. SMS and internet surveys) rather than face-to-face interviews [10, 11].

Surveys of patients in primary care often have low response rates, and this rate is even lower amongst disadvantaged groups [12]. This reduced participation in research occurs for a variety of reasons including financial barriers to participation, language barriers and lack of discretionary time [12]. A recent case study conducted in Australia found that SMS surveys of Arabic-literate participants recruited via a community group was successful for data collection, while recognising difficulties with translating materials into readily understandable Arabic resources [13].

Digital inclusion is an important consideration for improving research participation [14]. Digital technologies have been highlighted as a potential option for low-cost, scalable solutions for survey participation that could allow adequate representation from participants from disadvantaged groups. There is variation in access to digital technology via device type, and disadvantaged communities may find the Internet most accessible via mobile phone[15]. A recent Australian study of surveys of a culturally and linguistically diverse group using SMSs recommended further research on using SMS surveys with people from low-income groups [13]. There continues to be disparities in smartphone

ownership, limited access to data or Wi-Fi, and language barriers can impede participation in digital health initiatives [16]. While SMS surveys appear to be an attractive option for research data collection, more research is needed to determine if this would allow equitable participation to achieve digital inclusion [16].

Our aim was to explore using SMS for recruitment and data collection in general practice research with a focus on socioeconomically disadvantaged patients.

Methods

Recruitment

This sub-study was nested within an implementation trial of the REACH (Reducing Alcohol-Harm in General Practice) project [17, 18]. The overall objective of the study was to explore the feasibility and acceptability of a toolkit to support the use of alcohol brief interventions in general practice. This paper focuses exclusively on the use of SMS to collect data from patients via general practice. The study was approved by [blinded] Human Research Ethics Committee.

This study was set in Melbourne, Australia. Within Australia, 83.6% of the population is estimated to visit a GP at least once a year [19], and smartphone ownership is estimated to be 91% [20]. The general practices were located within the state of Victoria which is Australia's second largest jurisdiction by population. To be eligible for this study, the general practice had to be situated in a lower socioeconomic area [18]. There were six general practices located in lower income communities that participated in the REACH trial that were recruited for the implementation trial via the local Primary Health Network [18]. Primary Health Networks (PHNs) are independent, primarily federally funded organisations across Australia that support primary health care providers including general practices and commission services based on local unmet needs. They are similar in function to other primary care commissioning bodies in the UK and Canada [21].

SMS data collection

Each practice had their own process for sending the initial SMS, details of which are outlined in the results section. Practices were paid an honorarium of $1000AUD to cover some of the costs

associated with sending the SMSs, including administrative time. The research program manager and PHN staff were also available to discuss any issues the practice had with sending the SMS and followed up practices that were having technological difficulties. This approach meant that the research team did not have access to patient names or phone numbers at any time.

There were two main steps to the SMS surveys. For the first step, a staff member in each practice was asked to send an SMS to all current patients over the age of 18 years via an SMS blast (where an SMS is sent out to a large group of numbers at one time). This initial email contained a link to an online Qualtrics survey (Box 1). Patients needed a smartphone to accept the SMS as well as mobile data or access to a Wi-Fi connection to complete the survey online. All surveys were in English.

In order to capture patients who attended when the REACH project was implemented, patients were eligible to complete the online survey if they had visited the general practice in the last three months. At the end of the online survey, patients could elect to give their details (name and mobile phone number) for further SMS surveys to be sent 3, 6 and 9 months to capture data about their alcohol use and whether they had recently consulted with their GP (supplementary file). We did not have formal checks to assess the authenticity of responses or remove duplicates within Qualtrics. However, the recruitment process (direct SMS from the patients' GP clinic) and lack of an incentive to provide multiple responses makes it unlikely that we had bot-generated or multiple responses.

Box 1 – Initial SMS sent to patients by their general practice

"Hello, you are receiving this message as you recently visited <<Practice Name>>. We and Monash University are inviting you to complete a survey on alcohol and your health via <<Survey link>>. The survey is confidential, voluntary, and will help us improve the service we deliver to you. Thanks!"

The second step involved 2-way SMS surveys sent to patients who submitted their details in the online Qualtrics survey that was then downloaded and stored in a password-protected secure drive. In a 2-way SMS survey, it is only possible to ask closed questions that can be answered with a number (Box 2). The 2-way SMS survey had five questions in total and each question had five possible responses that were indicated by the patient selecting a number between 1 and 5. It should

be noted that patients did not have any contact with the research team in between the 3-monthly, 2-way SMS surveys.

Box 2 – 2-way SMS surveys sent to patients from the research team who agreed to receive the surveys in Step 1

Q1

Hello! This is the REACH team.

Thank you for agreeing to take part in our survey when you last visited your doctor.

Text STOP to opt-out of this survey *(Note – the respondent answers the SMS with the number that corresponds to their answer)*

How often do you have a drink containing alcohol?

o   Never (1)

o   Monthly or less (2)

o   Two to four times a month (3)

o   Two to three times a week (4)

o   Four or more times a week (5)

Skip To: Q4 If answer is (1), Never

Q2 How many standard drinks do you have on a typical day when you are drinking?

o   One or two (1)

o   Three or four (2)

o   Five or six (3)

o   Seven to nine (4)

o   Ten or more (5)

Q3 How often do you have six or more standard drinks on one occasion?

o   Never (1)

o   Less than monthly (2)

o   Monthly (3)

o   Weekly (4)

o   Daily or almost daily (5)

Q4 Have you spoken with your GP in the last 3 months?

o   No (1)

o   Yes, and we spoke about alcohol (2)

o   Yes, but we didn't talk about alcohol (3)

o   I can't remember (4)

Q5 Which of the following describes you?

o   I'm drinking within safe limits (1)

o   I plan to cut down in the next 3 months (2)

o   I want to cut down but haven't decided when (3)

o   I should cut down but really don't want to (4)

o   I don't want to cut down (5)

Interviews and qualitative analysis

Towards the end of the REACH trial (May to August 2021), JA, an experienced qualitative research fellow interviewed PHN staff, clinicians and practice staff at each of the general practices about their experience of participating in the REACH project, including the SMS sub-study reported here. JA is a qualitative researcher and allied health clinician, with more than a decade of experience in primary care research. All staff and clinicians of the practices who were involved with REACH were invited to participate. Data collection concluded when the authors had interviewed participants from each practice and had sufficient data to explain the process of implementation.

The semi-structured interview guide included questions about the benefits and barriers of using SMSs to communicate with patients. The interviews were conducted remotely due to COVID restrictions (phone or videoconference), and lasted from 18-60 minutes, with most approximately 30 minutes. They were audio-recorded and professionally transcribed. The excerpts of the interviews pertaining to SMSs were used in the analysis of this specific study. The elements related to SMSs were coded inductively using NVivo software (Version 14, QSR International, Melbourne Australia) and then organised according to constructs from the Consolidated Framework for Implementation Research (CFIR) [22]codebook to understand the findings in relationship to implementation factors, both in the inner and outer contexts of the practices.

JA verified the transcripts, coded the data, and a subset of investigators formed an analysis team who met regularly (JA, ES, SN, TL, NG and CB) to discuss findings based on the CFIR factors.

Results

The practices involved in the REACH project were all located in lower socioeconomic areas and most practices estimated that >50% of their patients lived in low-income households [18]. Only four of the six participating practices were able to send the initial survey link by SMS to their patient cohort. One practice reported that IT problems meant they were unable to SMS their patients at all, and they did not use SMS to communicate with their patient group. A second practice felt that the SMS was inappropriate as their patient group was highly culturally and linguistically diverse. The practice preferred a poster in their waiting room with a QR code to the online survey and then they could assist patients to complete the survey, or explain the survey, as needed. However, no patients from this practice completed the survey via the QR code.

Each of the four general practices that were able to send SMSs to their patients had very different internal processes and thus ended up sending the SMS to vastly different numbers of patients. One practice could send the SMS to each current patient mobile number in their system and a total of 5286 SMSs were sent, with 506 commencing the survey (9.6%). Another practice could only send the SMS to patients attending on the actual day due to an IT system issue, so they sent it to 500 patients over three days with 8 responses (1.6%). The third practice had software that didn't allow any past patients to be contacted (usually not seen within two years). This practice sent the SMS to 2500 patients with 172 initial responses (6.9%). The final practice required patients to give their specific consent to receive the SMS so they asked patients as they presented to the practice and only sent it to those who agreed, with a total of 50 sent across two days with 16 responses (32%).

Figure 1 shows the overall response rate at each step of the SMS study. In total, 8333 SMSs were sent by the practices, and 8.4% of SMSs received a response. To record a response, the patient had to click on the online link for the survey. This would require the mobile phone number for the patient on record to be current, and the mobile phone to have data or Wi-Fi to enable a response if they did click on the external link.
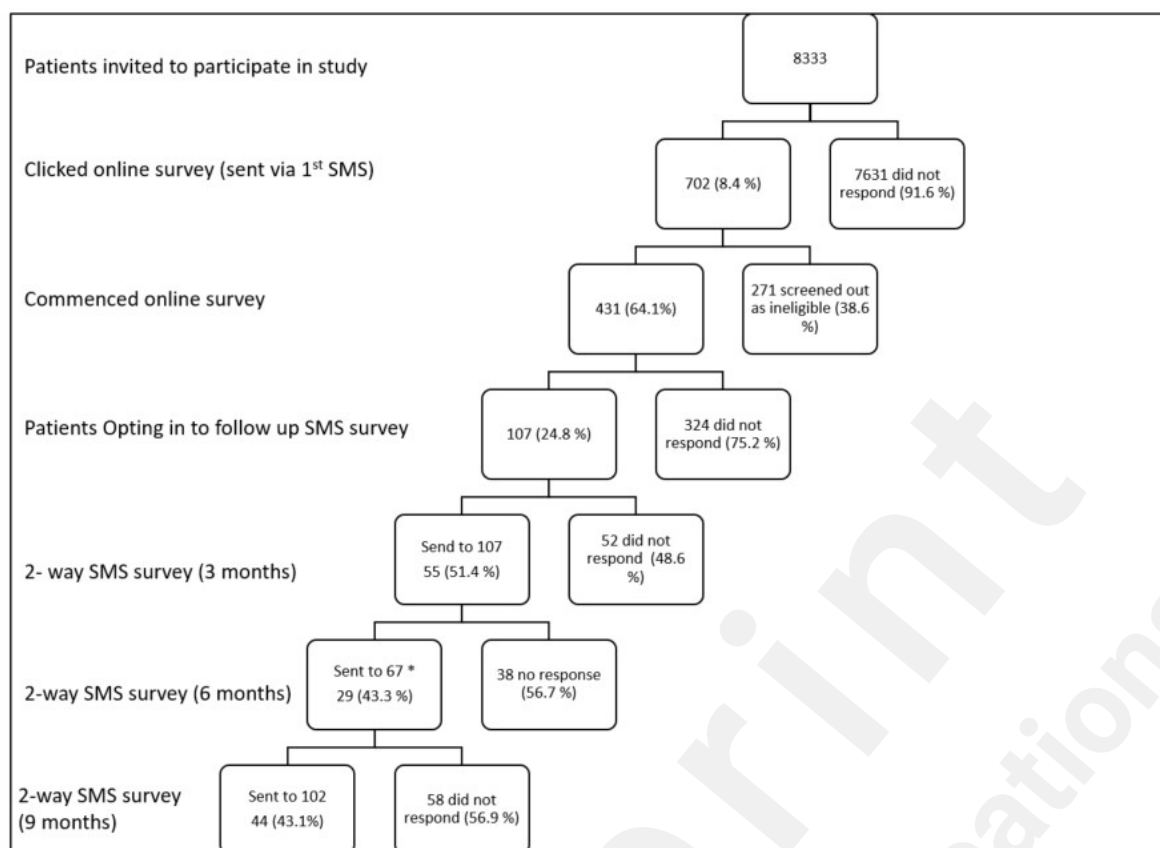
Figure 1: Number of SMSs sent and response rate at each step of the SMS survey

*the 6-month 2-way SMS was sent to 67 participants; 40 participants only received the 2-way SMS survey at 3 and 9 months.

A total of 431 patients completed at least some of the online survey with a majority of the survey respondents being women, aged 45 years or over, and were not from a low-income group (Table 1).

Table 1: Respondents in the online survey; survey link was sent via initial SMS from the general practice (n= 431)

	N (%)
Age (n = 340 responses)	
18-24 years	15 (4.4)
25-34 years	27 (7.9)
35-44 years	50 (14.7)
45 – 54 years	86 (25.3)
55 – 64 years	70 (20.6)
65 – 74 years	74 (21.8)
75 – 84 years	16 (4.7)
85+ years	2 (0.6)
Gender (n = 340)	
Woman	227 (66.8)
Man	105 (30.9)

Non-binary/third gender	3 (0.9)
Prefer to self-describe Transgender male (2) Non-binary trans	4 (1.2)
Prefer not to answer	1 (0.3)
Low-income status (n=335; multiple choices possible)	
Unemployed and looking for work	17 (5.1)
Receive a govt pension	50 (14.9)
Healthcare card holder	16 (4.8
Live in a low-income household	8 (2.4)
None of these apply to me	236 (70.4)
Prefer not to say	8 (2.4)
Do you have a chronic disease? (n = 344)	
Yes	141 (41.0)
No	195 (56.7)
Prefer not to say	8 (2.3)
Did you talk to your doctor or nurse about your alcohol intake during your last visit ? (n = 377)	
Yes	58 (15.4)
No	303 (80.4)
Don't recall	15 (4.0)
Prefer not to say	1 (0.3)
How often do you have a drink containing alcohol? (n = 344)	
Never	60 (17.4)
Monthly or less	77 (22.4)
2-4 times a month	138 (40.1)
4 times a week or more	69 (20.1)

Of the 431 survey respondents, 107 (24.8%) agreed to receive an SMS survey every three months. For the second step of the study using 2-way SMS, the response rate improved to approximately 50% for each survey (Figure 1).

Qualitative findings

We interviewed 12 representatives from the five practices. At least two staff members were interviewed from each practice. Our sample included four general practitioners, four practice nurses and four administrative staff members including practice managers. Table 2 summarises the demographic and professional characteristics of participants.

Table 2: Interviewees from each of the five general practices

Practice	Participant	Professional background

1	1	General Practitioner
	2	Practice Manager
	3	Practice Nurse
2	1	General Practitioner
	2	Practice Nurse
	3	CEO
3	1	General Practitioner
	2	Administrative staff member
4	1	General Practitioner
	2	Practice Nurse
5	1	Practice Manager
	2	Nurse/Care Coordinator

Seven PHN staff were interviewed, detailed in Table 3.

Table 3: Interviewees from the Primary Health Networks

Number	Staff role
1	Practice relationship manager
2	Practice relationship manager
3	Continuous quality improvement programme officer
4	Project coordinator
5	Continuous quality improvement programme officer
6	Continuous quality improvement programme officer
7	Manager

In the interviews, the practice managers and clinicians gave details about their experience of using SMSs in their own practice. PHN staff described any issues that came up with practices they supported that were relevant to the SMS sub-study. Qualitative results are organised with reference to CFIR, to assist in understanding factors that effected implementation both internal and external to the practices (Box 3).

Outer Setting

Needs and Resources of Those Served by the Organisation.

Patient demographics came up often during interviews with clinicians and practice staff, including language spoken, age, cultural background and mental health status. Concerns about patient literacy were reported, especially by staff at clinics serving more diverse communities:

"I think from the patient's perspective, there were some struggling, because we have 80% non-English speaking people here, so I think they struggled with the text messages. (P1GP)

For patients whose primary language was one other than English, it was common that they were not able read words written in their primary language, nor in English.

"...they're not translated at all, even the SMS messages we were able to send out to the patients, we didn't use them because it would just be them ringing us up saying, "We received a text message and we don't know what it is." So, it was just too much work, so we didn't go ahead with that either." (P1PM)

Patient characteristics also came up in relation to the patient population served at one of the practices which included people with dual diagnosis of complex mental illness and alcohol and other drug addictions. It was thought by the practice manager that patients in this practice would not respond to SMS and that they would not have technical skills to adapt to new systems.

"not everyone is tech-savvy. I have to say, some of my patients still have the flip-flop phones, not smartphones. So if we send - it definitely can receive a text message, but it's not adaptable to QR codes, to links, those things... So for us, a good old paper that they can take and read and not print out I think is still the best...." (P5PM)

If patients did have a suitable phone, they may not have a phone plan with data, or access to Wi-Fi. Practices did not report providing free access to Wi-Fi for patients within their practice. Low phone credit could also make returning an SMS survey problematic.

And the age of patients also came up as a relevant factor for two of the practices (P4 and P5):

For some, the younger ones prefer technological things, like SMS, QR codes. But the older ones prefer something to read that's actually printed. Yeah. It's a good thing that either way, you'll be available for that. (P5PM)

External Policy & Incentives.

External Policy & Incentives is a broad CFIR construct that is related here for the inclusion of policy and regulations from the governmental level, or external mandates. Given the timing of the study, one practice was rolling out the COVID vaccination at the direction of the government at the same time they were trying to troubleshoot IT issues and did not have the resources to participate (from PHN2).

Inner Setting

Structural Characteristics

The most prominent structural characteristic mentioned by participants was the size of one of the clinics. It's small size, having only one GP, meant that they had not set up the SMS component of the clinical software.

> *We don't have a big amount to do, if you know what I mean. So, it's just something that we never really set up, because we didn't really need to use it. Like, when we go through our recalls, I just give it to reception and they just call each patient individually.* (P4PN)

Networks & Communication

Another practice found that Networks & Communication within the practice were not strong enough to maintain a 'whole of team' approach. They were not, therefore, able to keep the SMS process in their institutional memory.

> *one of the other girls was involved, like organising the SMS' to be sent out, but she's actually left the clinic to take on another job.* (P2PN)

Implementation Climate

Here we examined the practices' capacity for change. Two practices had work processes that lacked Compatibility with the innovation. As one practice nurse put it, their "IT guy" provided an "ongoing battle" to getting it set up. (P4PN) The other practice noted that their clinical software was not compatible with what the study asked of them (P5PM)

Readiness for Implementation

Readiness for Implementation refers to "tangible and immediate indicators of organisational commitment to its decision to implement an innovation." The level of resources that an organisation allocates to implementation is an indication of readiness. The CFIR sub-code "available resources" came up in the data through discussion of Cost. One PHN participant noted that use of SMS costs more than email and might have been a barrier to practices participating in this sub-study.

> *"sometimes they're not too keen on doing huge campaigns on SMS, because it actually costs them money to send the information. Whereas, via email would have been better, but it's just difficult to pull that sort of information from the clinical software systems"* (PHN1)

Characteristics of Individuals

Individual Stage of Change which refers to individual attitudes toward the innovation. One PHN participant noted that GPs are sometimes hesitant about change.

> *But a lot of them can be a bit hesitant to sending patients out anything, "How will that look? Am I targeting my patients?" They're a bit anxious.* PHN6

Innovation Characteristics

One PHN worker noted that one of the practices found the complexity of the intervention a bit more than they were used to and it made participation difficult:

> *I did have a practice that was struggling a little bit with – because there was the SMS surveys to send out. So I had a practice that was – they weren't very used to using that sort of system. They just did phone recalls and reminders to patients, not SMS.*

Two 'Innovation Characteristics' were found to drive participation, including: Relative Advantage and another way of understanding Cost. One practice in particular understood the SMS sub-study offered them a couple of advantages over their usual practice. First, the SMS approach was thought to be "proactive and opportunistic", enabling them to use a flexible approach to engage their "really passive" patients. (P5PM). Secondly, the study was thought to provide improved access, giving the practice another alternative to offer patients:

> *"I could give you this, I could send this to you via email. I can send it to you by text." So that adds to what we can do, what we can provide.* (P5PM).

For one PHN worker, the SMS study was a more modern and cost-effective approach to communicating with their patients:

I think they realised that it's another way of communicating with the patients that they really should have been using for a long time. So that's been quite a good benefit for that practice certainly, just getting them on board with a more modern way of working with their patients. (PHN1)

Suggestions for future implementation

Practice managers and clinicians had several suggestions for how researchers could more successfully engage with patients who are from disadvantaged groups. These included preferentially using paper-based surveys that were administered at a place that patients already knew and trusted; having researchers available to assist patients to complete surveys if literacy, manual dexterity or vision was a problem; vouchers for patients who complete surveys (suggested $AUD10).

Box 3: Findings from qualitative data mapped to the Consolidated Framework for Implementation Research (CFIR) constructs

Outer Setting • Needs and resources of the patient population, including language, tech ability, Wifi access • Competing demands from external policy including those related to COVID vaccination roll out		
Inner Setting • Size of the general practice • Networks and Communication between team members • Implementation climate • Readiness for Implementation of the SMS surveys	**Characteristics of Individuals** • Individual attitudes towards the SMS surveys	**Innovation Characteristics** • Complexity of the SMS process • Relative advantage compared to usual ways of communicating with patients • Cost-effective • Modern form of communication

Discussion

Principal Results

We found that sending an SMS via general practice did not lead to a high response rate from patients, but a 2-way SMS survey to patients who had answered the first SMS had a higher response rate. Our approach did not capture participants from more marginalised groups due to constraints related to the technology and human factors.

We used two processes to explore the use of SMSs for data collection in general practice research: 1) an SMS from the patient's own general practice that contained an external link to an online survey; 2) a 2-way SMS survey that was sent from the research team to patients who agreed to be contacted. We found most general practices experienced technical constraints in sending the SMSs, such as limited software infrastructure. A researcher needed to be proactive in communicating with the clinic's professional and administrative staff to adapt each clinic's unique practice processes to the SMS survey procedure. We also used a poster in the waiting room of one practice at the practice's request, however no patients used this QR code and it did not prove to be a practical strategy in this culturally and linguistically diverse patient group.

Only a small number of participants clicked the external link to the online survey within the initial SMS, but it was a comparable percentage to primary care surveys in general[12]. The ongoing 2-way SMS surveys were more successful as the patients had agreed to be contacted again and were able to answer questions within the SMS environment. Response rates remained over 50% for the 3-monthly SMSs, with no additional contact from the research team or the general practice.

CFIR provided a structure to tease out characteristics that influenced successful uptake of the SMS study from the qualitative data[22]. The most relevant outer setting factors that impacted participation included the needs and resources of the patient populations, notably English language proficiency, age and one practice which worked primarily with addiction. The data further indicates that size, teamwork, capacity for change all influenced the uptake of the SMS study.

While SMS surveys are an attractive option for primary care research, there are constraints to consider. These include a restriction in the type of questions that can be asked due to the limits of

SMS length and closed question format. Further, the SMSs are unlikely to capture socioeconomically disadvantaged populations who have barriers including phone infrastructure and hesitancy around unknown contact numbers. With a recent increase in SMS use in scams, this hesitance may increase in the future[23]. Researchers should also be aware that practices are likely to have their own policies and/or software limitations in sending SMS to patients and this is likely to influence recruitment and response rates as seen in this study.

Comparison with Prior Work

The lower response rate in our study is still in line with the international literature where response rates for SMS data collection vary considerably, from 12.5%-100%, with the lowest uptake (12.5%) in a drug and alcohol clinic [24] while response rates beyond 90% were seen a decade ago in general practice, especially when youth were involved [25-27]. A patient's willingness is likely dependent on a number of factors, including familiarity with texting, relationship with the individual recruiting them, health-related motivation or interest in research, and the presence of incentives [28]. Most longitudinal SMS surveys also see response rates typically decline, by an estimated 2-13%, over the duration of the study which is comparable to our study's decline of 8% from baseline to 9-month follow-up. [24, 29-31]. In studies where participants did not respond to an initial text, high responsiveness was seen after reminder messages were sent [5, 32]. Other studies have called participants who did not respond to prompts, which was an effective method of retaining participants in the study, although this does increase the research staff time required and requires consent to be contacted by phone call [8].

We kept our 2-way SMS survey as short as possible to improve response and completion rates [10]. Among patients who ceased surveys before completion or stated they would not be willing to complete a future text survey, a commonly cited reason was that the initial survey had too many questions [29, 33]. More than half (52%) of patients in a Singaporean study stated they preferred surveys with 1-10 questions, and only 12% stated they would be willing to complete an SMS survey with more than 30 questions [29]. In one study, participants were asked what they would consider an acceptable number of SMS messages to receive in one week from researchers, with a mean response of four (Standard Deviation = 3.7) [24] while most participants in another study felt two text message questions per day was sufficient [9].

This study included about one-third of participants from a low-income group. The digital divide recognises the easier digital health access for the more advantaged patients [34] and patients have

reported cost of texting as a reason not to participate in an SMS trial [24]. The type of phone a patient uses also may influence completion, with patients who use smartphones more likely to complete text-message surveys than those using older, more basic phones [33]. With these recognised barriers, this study also highlighted the additional research effort that should be afforded to capturing data from the most marginalised patients.

Limitations

A key limitation of this study is the absence of qualitative data from patients about their experience of SMS surveys. Although clinicians and practice managers could draw on their broader experience, they may have made some assumptions about patient preferences that we could not verify with patients themselves. Our low response rate, while a finding in itself, limited what we were able to learn about SMS surveys in lower income populations. We used the general practice as a trusted source to deliver the initial SMS, with the assumption that this would increase the response rate, but this did not appear to facilitate SMS responses. We are also unable to report if SMSs were actually received which may artificially lower the response rate, for example if the patient had changed their phone number since they were last at the practice. Our quantitative data could not make direct comparisons with those from other groups and further work is required to determine if other strategies may make SMS survey work feasible in lower income primary care populations.

Conclusions

While SMS survey methods offer a low-intensity option for research data collection, a general SMS survey is unlikely to capture participants from more marginalised groups. When recruiting patients via general practice, researchers need to consider the different practice protocols that may be in place for contacting patients by SMS as this greatly influences the potential of the method. To promote research participation from the most socially disadvantaged groups, paper-based, and/or researcher facilitated surveys undertaken at a trusted location may yield more responses.

Acknowledgements

Conflicts of Interest

AMW was an employee at Victorian Health Promotion Foundation at the time of this research.

Abbreviations

AUD – Australian dollar

CFIR - Consolidated Framework for Implementation Research

GP – general practitioner

JMIR - Journal of Medical Internet Research

PHN – Primary Health Network

PM – practice manager

PN – practice nurse

RCT - randomised controlled trial

REACH - reducing alcohol-harm in general practice

SMS - short message service

UK – United Kingdom

References

1.   Silver L. Smartphone Ownership Is Growing Rapidly Around the World, but Not Always Equally. Pew Research Center, Technology I; 2019 5 Feburary 2019. Report No.

2.   Scott Ewing EvdN, Julian Thomas. CCi Digital Futures 2014: The Internet in Australia. ARC Centre of Excellence for Creative Industries and Innovation,: Swinburne Institute for Social Research, 2015 19 Feb 2015. Report No.

3.   Andrew Kohut RW, Juliana Menasce Horowitz, Katie Simmons, Jacob Poushter, Cathy Barker. GLOBAL DIGITAL COMMUNICATION: Texting, Social Networking Popular Worldwide Pew Research Center Project GA; 2011 20 December 2011. Report No.

4.   Hall AK, Cole-Lewis H, Bernhardt JM. Mobile text messaging for health: a systematic review of reviews. Annu Rev Public Health. 2015 Mar 18;36:393-415. PMID: 25785892. doi: 10.1146/annurev-publhealth-031914-122855.

5.   Duane S, Tandan M, Murphy AW, Vellinga A. Using Mobile Phones to Collect Patient Data: Lessons Learned From the SIMPle Study. JMIR Res Protoc. 2017 Apr 25;6(4):e61. PMID: 28442451. doi: 10.2196/resprot.6389.

6.   Shimoni N, Nippita S, Castano PM. Best practices for collecting repeated measures data using text messages. BMC Med Res Methodol. 2020 Jan 3;20(1):2. PMID: 31900108. doi: 10.1186/s12874-019-0891-9.

7.   Sammut R, Griscti O, Norman IJ. Strategies to improve response rates to web surveys: A literature review. Int J Nurs Stud. 2021 2021/11/01/;123:104058. doi: https://doi.org/10.1016/j.ijnurstu.2021.104058.

8.   Stockwell MS, Cano M, Jakob K, Broder KR, Gyamfi-Bannerman C, Castano PM, et al. Feasibility of Text Message Influenza Vaccine Safety Monitoring During Pregnancy. Am J Prev Med. 2017 Sep;53(3):282-9. PMID: 28495223. doi: 10.1016/j.amepre.2017.03.014.

9.   Chang T, Gossa W, Sharp A, Rowe Z, Kohatsu L, Cobb EM, et al. Text messaging as a community-based survey tool: a pilot study. BMC Public Health. 2014 Sep 8;14:936. PMID: 25201051. doi: 10.1186/1471-2458-14-936.

10.   West BT, Ghimire D, Axinn WG. Evaluating a Modular Design Approach to Collecting Survey Data Using Text Messages. Surv Res Methods. 2015;9(2):111-23. PMID: 26322137.

11.   Butler SF, Villapiano A, Malinow A. The effect of computer-mediated administration on self-disclosure of problems on the addiction severity index. J Addict Med. 2009 Dec;3(4):194-203. PMID: 20161486. doi: 10.1097/ADM.0b013e3181902844.

12.   Booker QS, Austin JD, Balasubramanian BA. Survey strategies to increase participant response rates in primary care research studies. Fam Pract. 2021 Sep 25;38(5):699-702. PMID: 34213547. doi: 10.1093/fampra/cmab070.

13.   Chan L, El-Haddad N, Freeman B, O'Hara BJ, Woodland L, Harris-Roxas B. A Case Study of an SMS Text Message Community Panel Survey and Its Potential for Use During the COVID-19 Pandemic. JMIR Form Res. 2021 Nov 3;5(11):e28929. PMID: 34612824. doi: 10.2196/28929.

14.   Wiley K, Goulding A, editors. The Conceptualization of Digital Inclusion in Government Policy: A Qualitative Content Analysis. 2023; Cham: Springer Nature Switzerland.

15.   Humphry J. 'Second-Class' Access: Smartphone Dependence and the Mobile Marketplace. In: Humphry J, editor. Homelessness and Mobile Communication: Precariously Connected. Singapore: Springer Nature Singapore; 2022. p. 65-91.

16.   Osmanlliu E, Paquette J, Grenier A-D, Lewis P, Bouthillier M-E, Bédard S, et al. Fantastic perspectives and where to find them: involving patients and citizens in digital health research. Research Involvement and Engagement. 2022 2022/08/02;8(1):37. doi: 10.1186/s40900-022-00374-6.

17.   Sturgiss E, Gunatillaka N, Ball L, Lam T, Nielsen S, O'Donnell R, et al. Embedding brief interventions for alcohol in general practice: a study protocol for the REACH Project feasibility trial. BJGP Open. 2021 Aug;5(4). PMID: 33910916. doi: 10.3399/bjgpo.2021.0037.

18.   Sturgiss E, Advocat J, Lam T, Nielsen S, Ball L, Gunatillaka N, et al. Multifaceted intervention to increase the delivery of alcohol brief interventions in primary care: a mixed-methods process analysis. Br J Gen Pract. 2023 Jun 6. PMID: 37666514. doi: 10.3399/BJGP.2022.0613.

19.   Statistics ABo. Patient Experiences, 2021-22 financial year 2022 [22 September 2023]; Available from: https://www.abs.gov.au/statistics/health/health-services/patient-experiences/latest-release.

20.   Australia D. Mobile Nation – 2022 Mobile nation - Deloitte Access Economics report, Technology. 2022 [22 September 2023]; Available from: https://www.deloitte.com/au/en/services/economics/perspectives/mobile-nation.html.

21.   Booth M, Boxall AM. Commissioning services and Primary Health Networks. Aust J Prim Health. 2016;22(1):3-4. PMID: 26907469. doi: 10.1071/py15167.

22.   Damschroder L, Hall C, Gillon L, Reardon C, Kelley C, Sparks J, et al. The Consolidated Framework for Implementation Research (CFIR): progress to date, tools and resources, and plans for the future. Implementation Science. 2015 2015/08/14;10(1):A12. doi: 10.1186/1748-5908-10-S1-A12.

23.   Lallie HS, Shepherd LA, Nurse JRC, Erola A, Epiphaniou G, Maple C, et al. Cyber security in the age of COVID-19: A timeline and analysis of cyber-crime and cyber-attacks during the pandemic. Comput Secur. 2021 Jun;105:102248. PMID: 36540648. doi: 10.1016/j.cose.2021.102248.

24.   Taylor HE, Deane FP, Blackman R. Feasibility of Using Short Message Service (SMS) to Collect Outcome Data in an Australian Residential Alcohol and Drug Treatment Service. Addictive Disorders & Their Treatment. 2018;17(2):65-75. PMID: 00132576-201806000-00002. doi: 10.1097/adt.0000000000000125.

25.   Haller DM, Sanci LA, Patton GC, Sawyer SM. Text message communication in primary care research: a randomized controlled trial. Fam Pract. 2009 Aug;26(4):325-30. PMID: 19542193. doi: 10.1093/fampra/cmp040.

26.   Cooper G, Walker J, Harris D, Stewart R, Nicol D, Ogg M. Use of text messaging to audit early clinical outcome following vasectomy in primary care. Br J Gen Pract. 2011 Apr;61(585):280-2. PMID: 21439186. doi: 10.3399/bjgp11X567135.

27.   Corrigan MA, McHugh SM, Murphy RK, Dhillon P, Shah A, Hennessy I, et al. Improving surgical outpatient efficiency through mobile phone text messaging. Surg Innov. 2011 Dec;18(4):354-7. PMID: 21521699. doi: 10.1177/1553350611403771.

28.   Brueton VC, Tierney J, Stenning S, Harding S, Meredith S, Nazareth I, et al. Strategies to improve retention in randomised trials. Cochrane Database Syst Rev. 2013 Dec 3(12):MR000032. PMID: 24297482. doi: 10.1002/14651858.MR000032.pub2.

29.   Lee SS, Xin X, Lee WP, Sim EJ, Tan B, Bien MP, et al. The feasibility of using SMS as a health survey tool: an exploratory study in patients with rheumatoid arthritis. Int J Med Inform. 2013 May;82(5):427-34. PMID: 23332386. doi: 10.1016/j.ijmedinf.2012.12.003.

30.   Richmond SJ, Keding A, Hover M, Gabe R, Cross B, Torgerson D, et al. Feasibility, acceptability and validity of SMS text messaging for measuring change in depression during a randomised controlled trial. BMC Psychiatry. 2015 Apr 3;15:68. PMID: 25886377. doi: 10.1186/s12888-015-0456-3.

31.   Rios-Bedoya CF, Hay C. Feasibility of using text messaging for unhealthy behaviors screening in a clinical setting: a case study on adolescent hazardous alcohol use. J Am Med Inform Assoc. 2013 Mar-Apr;20(2):373-6. PMID: 22759622. doi: 10.1136/amiajnl-2011-000688.

32.   Christie A, Dagfinrud H, Dale O, Schulz T, Hagen KB. Collection of patient-reported outcomes;--text messages on mobile phones provide valid scores and high response rates. BMC Med

Res Methodol. 2014 Apr 16;14:52. PMID: 24735061. doi: 10.1186/1471-2288-14-52.

33.   Rai M, Moniz MH, Blaszczak J, Richardson CR, Chang T. Real-Time Data Collection Using Text Messaging in a Primary Care Clinic. Telemed J E Health. 2017 Dec;23(12):955-63. PMID: 28537527. doi: 10.1089/tmj.2017.0022.

34.   Choy MA, Sturgiss E, Goodyear-Smith F, Smith GJ. Digital Health Tools and Patients With Drug Use Disorders: Qualitative Patient Experience Study of the Electronic Case-Finding and Help Assessment Tool (eCHAT). J Med Internet Res. 2020 Sep 14;22(9):e19256. PMID: 32924959. doi: 10.2196/19256.

Supplementary Files

Multimedia Appendixes

REACH Project Online Patient survey.
URL: http://asset.jmir.pub/assets/3a53f5b3bc5b616dbf20bc6c2c41b0ef.docx