The effectiveness of a text message reminder which participants can respond to, compared with a 'no reply' text message on questionnaire response rates in the Articular Pilon fracture trial (ACTIVE): Study Within A trial (SWAT)

Name and title of SWAT lead applicant

Dr Adwoa Parker[1]

Names and titles of SWAT Co-applicants

Dr Stephen Brealey[1], Prof Hemant K. Sharma[2], Mr Alex Mitchell[1], Ms. Ada Keding[1], Ms. Lydia Flett[1], Ms. Debbie Hunkins[1], Ms. Grace O'Carroll[1], Dr. Catriona McDaid[1]

Applicant affiliations

Department of Health Sciences, University of York

SWAT Registration

This SWAT has been submitted for registration on the MRC SWATs repository.

Trial Registration

The ACTIVE trial has been registered on the following databases:

- UKCRN Portfolio: CPMS 36103
- ISRCTN: ISRCTN98152560
- IRAS: 224065

Funder and funding period

NIHR Health Technology Assessment, from September 2017 to August 2022.

UK Clinical Research Network Portfolio

ACTIVE has been adopted by the CRN and is on the portfolio

Parts of trial pathway being targeted

Retention

Additional material available:

1. This SWAT protocol.

2. Example text for ethics amendment submission.

Background: the text messaging intervention

Many trials struggle with participant retention and completion of follow-up questionnaires. Text messaging is a simple and cost effective form of communication that has been shown to be effective for improving trial recruitment [1], increasing return rates of postal questionnaires in trials [2], and increasing payment of delinquent fines [3]. However, messages are often sent from automated services that are issued 'one-way' only, which means participants are either not able to reply to messages, or if participants do respond, messages can go unchecked. There is some evidence to suggest that text messages can be used to support trial participants [4]. Sending messages to participants from a 'two-way' messaging service allows participants to reply and interact with the trial team and seek support for trial related queries. This may improve retention rates, completion of questionnaires and/or participant attendance at trial appointments.

Background: The Articular Pilon Fracture Trial (ACTIVE) host trial

A pilon fracture is a severe break of the shin bone where it forms the ankle joint. It is usually caused by a high-energy impact such as a fall from a height. These injuries are very difficult to treat, and can have substantial negative impact on a person's quality of life. Surgery is needed to fix the broken bone, which can lead to serious infections, meaning more treatment is needed, including on occasion amputation. Even where the fracture heals well, most patients develop arthritis in the joint. The injury is usually fixed by orthopaedic surgeons from the inside (under the skin) using a plate and screws (internal fixation) or fixed from the outside using a ring frame or cage (external fixation). The internal plate is cheaper than the external ring but the internal plate may increase the chance of the patient getting a deep infection. There is genuine uncertainty among surgeons as to which is the preferred surgical option. National Institute for Health and Care Excellence and Consultant Orthopaedic Surgeons have recommended that high-quality research is needed to find out whether internal or external fixation is best for treating pilon fractures and which is the better use of NHS money.

ACTIVE aims to investigate the clinical and cost-effectiveness of internal plate fixation versus external fine wire fixation for the management of Type C pilon fractures. Participant will be aged 16 or older with a closed type C pilon fracture of the tibia. Participants are randomly allocated to undergo either internal plate fixation or external fine wire fixation. Participants are followed up at 3, 6, 12 and 24 months post randomisation; with only those patients recruited during the first two years of the recruitment being followed up at 24 months. The primary outcome is patient reported disability/function at 12 months, measured using the Disability Rating Index.

At the recruitment appointment, all participants in ACTIVE are provided with the contact details of the study site/hospital team, as well as contact details of the trial-coordinating centre, based at York Trials Unit.

Objective of this Study Within a Trial (SWAT)

The objective of this SWAT is to evaluate the effectiveness of sending a two-way text message reminder at the three-month follow-up, compared with a standard one-way text message with no option to reply on completion of follow-up postal questionnaires in the ACTIVE trial. Once the results of this SWAT are available, participants in the ACTIVE trial will receive the text that demonstrated the highest questionnaire response rate, at subsequent follow-up time-points at 6, 12 and 24 months.

SWAT Interventions and Comparators

For the SWAT, participants will be sent the text messages at the same time as they are expected to receive their postal follow-up questionnaire (i.e., two to four days after the questionnaire is sent). Text messages will be sent from York Trials Unit using secure UK-based text message gateway software such as that provided by Intelli Software (https://www.intellisoftware.co.uk). In the event that a message is not delivered, the sender will receive a notification, which will be used to classify the text message as "delivered" or "not delivered".

Control group

Participants will receive a standard text message, similar to that used in other trials at York Trials Unit. Participants will not be able to reply to this message. The wording on the standard 'no-reply' text will read: *"ACTIVE Trial: you should have received a questionnaire in the post by now. Your answers are important; so please help by returning it as soon as you can. Thanks".*

Intervention group

The wording for the text with the reply option will read: *"ACTIVE Trial: you should have received a questionnaire in the post by now. Your answers are important; so please help by returning it as soon as you can. To get in touch with us you can reply to this message. Thanks"*.

Outcome measures

Primary Outcome

Questionnaire completion rate, which we define as the proportion of questionnaires completed at the three-month follow-up. The cut-off for return of three-month follow-up questionnaires will be the

same as that of the host trial, which is defined as 8 weeks after participants are due their three-month follow-up.

Secondary Outcomes

1. Time to completion, defined as days elapsed between randomisation and date of completion.
2. Time to questionnaire return (number of days between the questionnaire being mailed out to participants and it being recorded as returned)
3. The proportion of patients requiring at least one return reminder notice (a letter at 2 and 4 weeks and a telephone call 6 weeks following non--return).
4. If possible, we will use qualitative methods to interrogate the text message responses sent by participants to explore topics and reasons for contacting the trial team.
5. If possible, we will explore descriptively whether the content of messages sent by participants is associated with return/non-return of the 3 month follow up CRF.

Randomisation

Participants will be randomised in a 1:1 ratio to receive either a text message with a reply option or the York Trials Unit standard text with no reply option with their 3-month follow-up questionnaires. Randomisation for the SWAT will be stratified by treatment allocation.

Sample size calculations

As is common with SWATs, we are limited to the host trial sample size and the proportion of this sample that are willing to be contacted by text messaging. ACTIVE aims to recruit 334 participants. We expect an analysable sample size of approximately 300 participants for the embedded trial (150 per text message group), which is the number who are likely to consent to receive text message reminders. Analysed independently, this sample would give approximately around 86% to detect a difference in response rates of 80% in the control group to 92% in the intervention group.

Analysis plans

Statistical analyses will be guided by a pre-specified analysis plan and will be undertaken by a statistician blind to group allocation on an intention-to-treat basis, using two-sided statistical significance at the 5% level. All statistical analyses will be conducted in Stata (StataCorp). We will summarise baseline characteristics of consenting participants by text messaging trial arm. For the primary outcome of the proportion of participants who returned a valid questionnaire to the trial team, we will first present the data in a contingency table and compare the two groups using

unadjusted odds ratio, relative risk and absolute risk reduction/increase. We will then fit the logistic regression as the primary analysis model, and base the test of the primary effectiveness endpoint on the results of this and present the chi-squared test as an additional analysis of the primary outcome to assess statistical significance. Since we have information on the baseline characteristics and treatment allocation (the stratification factor), the primary analysis will adjust for these. Tests for difference between the two groups will be based on the coefficient of the effect of treatment group and associated odds ratio. The secondary outcomes of time to completion and time to questionnaire return will be assessed by a Kaplan Meier curve and the text message interventions compared by log rank test. Cox regression will be applied adjusting for age, gender and ACTVE treatment allocation, and the effect of the intervention reported. The requirement for any questionnaire return reminder will be analysed in the same way as the primary outcome.

Qualitative content analysis methods will be adopted to interrogate the text message responses sent by participants to explore topics and reasons for contacting the trial team [5]. If there is sufficient data, we will look at the association between the content of text responses, and CRF return/non-return.

Reporting of results will follow the guidelines for reporting embedded recruitment trials [6].

Informed consent

Due to the nature and objective of the text messaging sub-study participants will not be asked to consent specifically to take part in this sub-study of ACTIVE. However, we do not consider this to be a major ethical issue as we consider this to be a low-risk sub-study and informing participants that we are looking at questionnaire response rates might impact the impartiality of our results. All participants that consented to be in the ACTIVE trial will be explicitly asked if they consent to being contacted by text and asked for permission for their mobile telephone number to be used; this will also be explained in the participant information sheet. Participants in the SWAT will have text messages sent using a secure UK-based text messaging service and messages will be directed via this third party messaging service.

Ethics approval

Ethics approval has already been obtained for the host trial and SWAT from Yorkshire & The Humber - Bradford Leeds Research Ethics Committee, 13/02/2018, ref: 18/YH/0014.

Project timetable

Date	Action
December 2019	Peer review of SWAT protocol
January 2020	Documentation for the SWAT agreed & signed off
June 2021	Recruitment to the SWAT ends
September 2021	Data cleaning and submission of data set to PROMETHEUS team
October 2021	Collation of results and analysis, begin write up of trial level paper

Estimated level of funding required

The host trial will absorb the cost of sending and responding to text messages, since this was already costed into the host trial grant. Total funding requested from PROMETHEUS for this SWAT is £1000, which is to fund conference fees, travel, and subsistence to attend and present SWAT findings at the International Clinical Trials Methodology Conference.

Expertise of team

Dr Adwoa Parker is Research Fellow, co-applicant for the ACTIVE trial and has significant in delivering SWATs. Dr Stephen Brealey is an experienced Trial Manager with extensive experience of surgical RCTs and SWATs. Prof Hemant K. Sharma is Chief Investigator of ACTIVE. Alex Mitchell is a Trainee Statistician and has experience of delivering several SWATs. Ada Keding has significant experience of SWATs and will oversee the statistical aspects of the SWATs. Debbie Hukins, Lydia Flett and Grace O'Carroll are Research Fellows on the ACTIVE trial and will implement the sending and, monitoring and responding to the text messages in the ACTIVE trial. Dr Catriona McDaid is Reader in Trials with extensive experience in trial design and evaluation.

They are supported by an experienced team of Data Management and administrative staff that are experienced in the practical implementation of SWATs.

References

1. Free, C., et al., *Three controlled trials of interventions to increase recruitment to a randomized controlled trial of mobile phone based smoking cessation support.* Clinical Trials, 2010. **7**(3): p. 265-273.
2. Clark, L., et al., *Electronic prompts significantly increase response rates to postal questionnaires: a randomized trial within a randomized trial and meta-analysis.* Journal of clinical epidemiology, 2015. **68**(12): p. 1446-1450.
3. Haynes, L.C., et al., *Collection of delinquent fines: An adaptive randomized trial to assess the effectiveness of alternative text messages.* Journal of Policy Analysis and Management, 2013. **32**(4): p. 718-730.

4. Grau, L.E., et al., *Smokers' perspectives on texting for tobacco dependence treatment: a qualitative analysis.* Nicotine & Tobacco Research, 2017. **19**(3): p. 307-313.
5. Hsieh, H.-F. and S.E. Shannon, *Three Approaches to Qualitative Content Analysis.* Qualitative Health Research, 2005. **15**(9): p. 1277-1288.
6. Madurasinghe, V.W., et al., *Guidelines for reporting embedded recruitment trials.* Trials, 2016. **17**(1): p. 27.