



Text Message Intervention to Reduce Repeat Self-harm in Patients Presenting to the Emergency Department-A Study Protocol

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Authors' contributions

This work was carried out in collaboration between all authors. Author VIOA conceived the study, wrote the protocol and the first draft of the manuscript. Author SM participated in the trial design. All authors are participating in the trial, read and approved the final manuscript.

Study Protocol

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ABSTRACT

Aims: To assess the feasibility of using supportive interactive text messages to reduce repeat self-harm, and to reduce the frequency and intensity of suicidal ideation and suicidal behaviour in patients discharged from an Emergency Department (ED) after an episode of self-harm.

Study Design: Prospective rater blinded randomised trial.

Place and Duration of Study: Sample: ED of Beaumont Hospital, Dublin, Ireland.

Methodology: 100 patients presenting with self-harm to the ED will be randomised to receive treatment as usual plus supportive and interactive text messages for three months or to receive treatment as usual. Patients in both groups will be followed up at 1, 3 and 6 months to ascertain frequency and intensity of thoughts of self-harm and self-harming behaviour. Data will be analysed on an intention-to-treat basis using SPSS version 20 for Windows with descriptive statistics, student's t-test, ANOVA analysis and chi-square tests.

Results: We hypothesize that supportive, informative and interactive text messages

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delivered to patients discharged from an ED after an episode of self-harm will significantly reduce the frequency and intensity of thoughts of self-harm and self-harming behaviour in patients compared with those receiving only follow-up treatment as usual. A secondary hypothesis is that patients receiving the text messages will report an overall satisfaction with the text messaging system.

Conclusion: This is a low cost, simple strategy which, if shown to have a significant impact on reducing rates of self-harming thoughts and behaviours in patients who have self-harmed, will allow progress in an area of great clinical importance. Further larger studies could then progress to clarify the potential impact on suicide rates.

Keywords: Self-harm; text message; emergency department; repetition; suicide.

1. INTRODUCTION

1.1 Brief Interventions after Self-harm

Repetition of self-harm is common, with an estimated median risk of repetition of 16% within one year and 23% over four years of follow-up [1,2]. A UK multicentre study showed a repetition rate of 19% within one year of an index case but analysis based on all observed self-harm presentations gave a much higher rate of 33% for repeated self-harm [3]. Subsequent repeated self-harm often occurs within days of a self-harm act [4-6]. Repetition is strongly associated with subsequent suicide and has important implications for healthcare resources [2,7]. In every country including Ireland, fatal suicide attempts rank among the top ten causes of death for individual of all ages and one of the three leading causes of death in the 15 -35 years age group [8].

Only a few non-pharmacological interventions have been reported to be effective in reducing repetition in selected subsets of populations with self-harm including; partial hospitalization, dialectical behaviour therapy, psychodynamic interpersonal therapy and the OPAC programme (outreach, problem solving, adherence, continuity) [9-12]. These interventions are all resource intensive and therefore may only be applicable to carefully selected patients especially those with an emotionally unstable personality disorder.

Given the recent global financial crisis with consequent diminution of health care resources, interventions are needed that could be delivered economically to entire populations of patients who self-harm. In light of the growing interest in using text messages as an intervention in healthcare, we will focus in this study on exploring the potential for using text messages to reduce repeat self-harm in patients presenting to the Emergency Department (ED).

1.2 Potential for Using Mobile Phone Text Messages as an Intervention for Patients Presenting with Self-harm

Mobile telephones have become integrated into virtually all aspects of society [13], with high penetration across all age groups, incomes and cultures [14,15]. By the end of 2008, there were more than four billion mobile phone subscribers worldwide [16]. In countries with established economies, more than 70% of households own at least one mobile phone [17,18]. In Europe, where individuals increasingly use more than one mobile phone, the average penetration rate for mobile phone subscriptions now exceeds 100% [16]. This may

provide an opportunity to improve health related outcomes including reduction/prevention of repeat self-harm and suicide, in particular through the use of Short Message Service (SMS) text messaging [19], which in the past decade has witnessed an exponential increase in its use with an estimated 2.5 trillion text messages sent in 2008 [20]. The use of text messaging offers potential advantages over telephone calls, particularly with young people who have led the uptake of this technology. While individuals may immediately notice a text message, they can choose a convenient time to reply [21]. Furthermore, a number of text messages to can be sent simultaneously which has the benefit of reducing labour expenditure and costs.

There is established research evidence for using text messages to remind patients of scheduled medical appointments [22, 23], to coordinate medical staff [24], to deliver medical test results [25,26] and to monitor patient side effects following treatment [27].

In a review of the literature on the use of text messaging for clinical and healthy behaviour interventions, Wei et al. [28] found that among 16 randomized controlled trials, 10 reported significant improvement with interventions and six reported differences suggesting positive trends [28]. In one meta-analysis of four randomised trials of mobile phone-based interventions for smoking cessation [29], it was reported that text message interventions resulted in a significant increase in short-term self-reported quitting (RR of 2.18, 95% CI 1.80 to 2.65). In the same review, when data from an internet and a mobile phone programme were pooled and meta-analysed, they found significant increases in both short-, and long-term, self-reported quitting (RR of 2.03, 95% CI 1.40 to 2.94).

In a study of text message services based on qualitative interviews with 12 young people, the aim of which was to provide young people with information on cannabis and help them to reduce their consumption of the drug, participants reported that they saw the messages as flexible and discrete, and as being personally meant for them. They paid more attention to the messages than they did to mass approaches such as public information broadcasts on TV. Along with other factors, the participants reported feeling motivated to decrease their level of cannabis abuse and to maintain a reduced level [30].

In another study, young adults in 3 urban EDs (n= 45; aged 18 to 24 years, 54% women) who were identified as hazardous drinkers by the Alcohol Use Disorders Identification Test-Consumption Score were randomly assigned by the researchers to weekly text message-based feedback with goal setting (Intervention), weekly text message-based drinking assessments without feedback (Assessment), or to a control who received no text messages. At 3 months, they found that participants who were exposed to the text message-based intervention had 3.4 (SD 5.4) fewer heavy drinking days in the last month and 2.1 (SD 1.5) fewer drinks per drinking day when compared to baseline [31].

In a recent randomised trial in Ireland of supportive text messages for patients with depression and comorbid alcohol use disorder [32], there was a trend towards finding a greater cumulative abstinence duration in the group that received twice daily supportive text messages compared to the control group who only received fortnightly thank you text messages: 88.3 (SD=6.2) vs. 79.3 (SD=24.1), $t=1.78$, $df=48$, $p=0.08$. In this trial, after adjusting for baseline scores, patients in the supportive text message group also had significantly lower Beck's Depression Inventory Scores compared to the control groups; 8.5 (SD=8.0) vs. 16.7 (SD=10.3) respectively, $F(1, 49) = 9.54$, $p=0.003$, $\eta_p^2=0.17$.

In a study to engage a group of self-harmers in the development of a text-messaging intervention to reduce repetition of self-harm, three broad categories of message emerged,

namely, those that affirmed or validated emotions (e.g. "it's ok to feel angry"), those that prescribed actions, distractions or cognitive strategies (e.g. "call Samaritans," "have a warm bath," "take it a minute at a time") and those that were interrogative or designed to initiate dialogue (e.g. "do you want to talk?"). They also found that the group were unable to reach an agreement on a set of messages that might work in all circumstances to reduce the urge to self-harm or to enable people to feel cared for, concluding instead that text messages may need to be individualised [33]. A major limitation of this study was its small sample size of only 8 people. Furthermore, participants in this study only reported how they envisaged they would respond to generic text messages rather than how they actually responded to such text messages which could vary significantly from what is reported. In the recent randomised trial in Ireland of generic supportive text messages for patients with depression and comorbid alcohol use disorder, 20 of the 24 patients (83%) reported that the text message intervention played a useful role in helping to improve their mental health [34].

Recently, the Samaritans, a not-for-profit organization in Ireland introduce a limited interactive text message programme for patients who experience suicidal ideation. This service allows clients to receive support when in crisis via an interactive text messaging programme from a trained volunteer.

After an extensive review of the literature using Google Scholar, MEDLINE, Pub Med, ERIC, Web of Science, Science Direct and PsychINFO, no published randomised trial was found on the use of text messages delivered via mobile phone as an intervention to address suicidal ideation and repeat self-harm in patients presenting with self-harm to the ED. Thus, we seek to determine if text messaging is a useful and effective strategy to help reduce the frequency and intensity of thoughts of self-harm and depressive symptoms after patients are discharged from an ED following a presentation with self-harm.

1.3 Aim of the Project

To assess the feasibility of using supportive interactive text messages to reduce repeat self-harm, and to reduce the frequency and intensity of suicidal ideation and suicidal behaviour in patients discharged from an ED after an episode of self-harm.

Given the aim, the objectives of the project include:

1. To compare the frequency and intensity of suicidal ideation and suicidal behaviour among patients discharged from an ED after an episode of self-harm who are offered interactive text message service in addition to usual follow-up treatment care, with patients who are discharged from an ED but not offered such text messages.
2. To compare global functioning amongst patients discharged from an ED after an episode of self-harm who are offered interactive text messages in addition to follow-up treatment as usual, with those who are discharged from an ED but not receiving such text messages.
3. To compare self-reported utilization of services provided by the Samaritans amongst patients discharged from an ED after an episode of self-harm who are receiving supportive and informative text messages in addition to follow-up treatment as usual, with those who are discharged from an ED but not receiving such text messages
4. To obtain feedback from those using the text message service about their experiences, expectations and satisfaction with the text message system and its

perceived impact in preventing repeat self-harm, managing suicidal ideation and coping with depressive symptoms.

2. MATERIALS AND METHODS

2.1 Design

A prospective randomised rater blinded intervention trial would be used in the study. Firstly, all patients presenting with self-harm to participating EDs would be approached by a staff member of the ED with written information about the study. Their written consent would be sought before they would be included in the study, if there are no other factors which preclude their participation. Participants would all be asked to nominate a reliable informant from whom collateral information regarding their further episodes of self-harm could be obtained which could be used to corroborate with ED attendance records. All consenting patients would be asked to undergo a baseline telephone assessment within 48 hours of admission to the ED, which would involve the completion of:

- A basic demographic form
- the Modified Scale for Suicide Ideation (MSSI) [34] which is a revised version of the Scale for Suicide Ideation (SSI) [36]. The MSSI is an 18 item scale that contains 13 items from the SSI and 5 additional items. The first 4 items have been designated as screening items to identify those individuals whose suicide ideation is severe enough to warrant the administration of the entire scale. Each item is rated on a 0-3 point scale and the ratings are summed to yield a total score ranging from 0 to 54. The MSSI takes approximately 10 minutes to administer.
- the Suicide Behaviors Questionnaire (SBQ) [37], which was designed for adults as a useful screening tool for suicide behaviours and unlike the MSSI, fails to provide detailed information although the scores generally correlate with scores on the later scale.
- the Positive and Negative Suicide Ideation Inventory (PANSI) [38] which is a 20-item self-report measure of positive and negative thoughts related to suicide attempts. Respondents rate each item during the past two weeks using a 5-point Likert scale, ranging from 1 ("none of the time") to 5 ("most of the time"). The inventory consists of two scales, Positive Ideation and Negative Ideation. The PANSI takes approximately 5 minutes to administer.
- the Beck Hopelessness Scale (BHS) [39] which was designed for adults age 17-80 and measures three major aspects of hopelessness: feelings about the future, loss of motivation, and expectations, and
- the Global Assessment of Function Scale (GAFS) [40] which is a numeric scale (0 through 100) used by mental health clinicians and physicians to rate subjectively the social, occupational, and psychological functioning of adults.

The permission of participants would be sought to review their case notes for the index presentation and to review the records of their future presentations to the ED.

The patients would be randomised by one of the researchers into one of two groups prior to their discharge or within 48 hours after discharge from the ED, namely; 'an intervention group and a 'non-intervention group'. The randomisation would be done using a computer programme to generate a series of random numbers. Participants would be assigned the next available number from the randomisation sequence and depending on whether the

number is even or odd, they would be placed in the intervention group or the non-intervention group respectively. The investigator randomising patients into groups would be the same investigator sending out the text messages and would not be involved in the follow-up assessments.

At 3 months, patients would be contacted by a blinded investigator who would assist them in completing a range of assessment tools which would help to quantify the primary and secondary outcome measures. To assess the success of the blinding, the investigator will be required to make a guess from the assessment as to which group each patient had been assigned. If the investigator is able to guess which group most of the participants are assigned to, then the blinding was not successful.

2.2 Setting

The research will be carried out in Beaumont Hospital, a large university-based teaching hospital in Dublin with a demographically diverse ED census of approximately 50,000 patient visits per year of which about 800 visit per year are for self-harm presentations. Patients will be recruited from those presenting to the ED with self-harm.

2.3 Ethics

The study will be conducted in accordance with the Declaration of Helsinki (Hon Kong Amendment) and Good Clinical Practice (European Guidelines). Written informed consent will be obtained from each subject. Approval of the protocol has been received from the Research Ethics Committee of Beaumont Hospital and the trial is registered with ClinicalTrials.gov (ClinicalTrials.gov Identifier: NCT01823120).

2.4 Inclusion and Exclusion Criteria

2.4.1 Inclusion criteria

1. All patients 18 years and over, presenting to the ED with self-harm.
2. All patients should have a mobile phone, be familiar with text messaging technology and be willing to take part in the study.

2.4.2 Exclusion criteria

1. Patients who do not consent to take part in the study.
2. Patients who do not have a mobile phone or are unable to use the mobile text message technology.
3. Patients who are admitted as a psychiatric inpatient following the assessment in the ED or those who require admission to a medical ward for longer than 48 hours.
4. Patients who would be unavailable for follow-up during the study period.

2.5 Interventions

We will deliver daily supportive and informative text messages for one month followed by one supportive and informative text message every other day the second month and then one weekly text message the third month to patients in the intervention group after they have been discharged from the ED following an episode of self-harm. Supportive text messages

will mainly target relieving the patients of mood symptoms and providing them with strategies for dealing with suicidal thoughts while the informative ones will provide patients with a dedicated mobile phone number through which they can receive interactive support from the Samaritans. The text messages will encourage participants to text the Samaritans in times of crisis. Please see appendix I for examples of the relevant text messages.

Patients in the non-intervention group will not receive any text messages. Both groups of patients will receive the routine outpatient follow-up arrangements associated with attendance at an ED with self-harm including the provision of a contact phone number for the Samaritans.

2.6 Outcome Measures

2.6.1 The primary outcome measures will include

- Proportion of patients repeating self-harms at one, three and six months
- Number of repeat episodes of self-harm per person at one, three and six months
- The one, three and six months change scores on the MSSI from baseline. The change score for the MSSI was chosen as one of the primary outcome measures because it has been shown to have higher discrimination between groups of suicide ideators and attempters than other scales for assessing suicidal ideation including the SBQ, PANASI and BHS [35].

2.6.2 Secondary outcome measures will include

- The self-reported range and frequency of utilisation of services offered by the Samaritans.
- The one, three and six months change scores on the SBQ from baseline.
- The one, three and six months change scores on the PANASI from baseline.
- The one, three and six months change scores on the BHS from baseline.
- The one, three and six months change scores on the GAFS from baseline.
- The range and frequency of utilisation of the services provided by the Samaritans at one, three and six months.
- Patient satisfaction (for both groups) with their overall follow-up treatment at three months following discharge from the ED would be measured using a self-designed likert scale.
- Feedback about patients' experiences, expectations and satisfaction with the communication system and its perceived impact on their mood, suicidal thoughts and potential to repeat self-harm. These aspects would be measured using semi-structured questionnaires which include likert scales at 3 months.

2.7 Sample Size

As data regarding the results of text messaging interventions in patients presenting to an ED with self-harm were not found in the available literature, a proper calculation of the sample size based on text message interventions to obtain the generally accepted statistical power of 0.8 could not be achieved a priori. Consistent with the idea that this is an exploratory study, the research will use the data elicited from the participants that can be enrolled within the existing time frame and budget, a principle described by Haynes et al. as using "the patients I can get" [41]. The study will therefore be limited to a sample size of 100

participants, with 50 participants recruited into each of the two arms to explore the feasibility of using supportive text message intervention in this population and also provide an estimate of an effect size for the text message intervention.

2.8 Statistical Methods

Data will be analysed on an intention-to-treat basis using SPSS version 19 for Windows (SPSS Inc. Chicago, IL). Data will be presented as means (standard deviation) and tests would be two-sided, with p values of less than 0.05 judged as significant. Effect sizes (Cohen's d) would be calculated between-groups based on the pooled standard deviation (Cohen's $d = M_1 - M_2 / \sigma_{\text{pooled}}$) where M_1 is the change on outcome measures from baseline to post treatment for the text message group; M_2 is the change in outcome measures from baseline to post treatment for the control group and $\sigma_{\text{pooled}} = \sqrt{[(N_1 - 1)\sigma_1^2 + (N_2 - 1)\sigma_2^2] / (N_1 + N_2 - 2)}$. Small effect sizes would be defined as Cohen's $d \geq 0.20$ but < 0.5 , medium effect sizes would be defined as Cohen's $d \geq 0.5$ but < 0.8 and large effect sizes would be defined as Cohen's $d \geq 0.80$ [42].

Baseline demographic and clinical characteristics of the two groups would be analysed using Student's t-test and an ANOVA analysis. Categorical baseline variables would be compared with chi-square tests. The proportions of patients repeating self-harm would be compared between the two groups using the chi-square test. Three months MSSI and the SBQ scores would be compared between the intervention and control groups using an analysis of covariance (ANCOVA), with the treatment condition (supportive and informative text messages v. no supportive and informative text messages) as the independent variable, baseline MSSI or SBQ as the covariate and MSSI or SBQ at three months respectively as the dependent variable. Student's t-test and ANCOVA analysis would also be used to explore statistical differences in the secondary outcome measures in the two groups, with adjustments made for some baseline scores. For participants with missing data, we would use the last observation carried forward (baseline measures) to impute missing data thus attempting to correct for any potential bias caused by missing data [43]. We would perform sensitivity analyses to explore the impact of imputation of data loss on primary outcome analysis.

3. RESULTS AND DISCUSSION

We hypothesize that supportive, informative and interactive text messages delivered to patients discharged from an ED after an episode of self-harm will significantly reduce the frequency and intensity of thoughts of self-harm and self-harming behaviour in patients compared with those receiving only follow-up treatment as usual. A secondary hypothesis is that patients receiving the text messages will report a favourable experience and an overall satisfaction with the system. How the actual results of the study fare will differ from the expected will be known after the study has been successfully concluded.

Previous studies of interventions to reduce the repetition of self-harm in a general population of patients presenting with self-harm have been unsuccessful in reducing the proportion of repeaters [7]. These interventions have included the use of antidepressants, problem solving, intensive care with outreach, an emergency card, psychosocial crisis intervention, and guaranteed inpatient shelter in cases of emergency [7, 44, 45]. In a study involving the use of low cost postcards after an episode of self-poisoning, although no significant difference in the proportion of individual patients who repeated self-harm were detected,

there was a clinically and statistically significant reduction in the number of events per individual by about 50% [7].

If our study on the use of supportive and interactive text messages as an intervention in an unselected group of self-harmers presenting to the ED is successful in reducing the proportion of repeaters, it will have significant implications for the care of this group of patients given that mobile text messages are cheap, widely available and have the advantage of being location independent so that healthcare is not confined to fixed locations such as surgeries or hospitals [46]. This flexibility improves the ability of both patients and clinicians to access information, with consequent advantages for continuous monitoring of patients' conditions, interactive consultancy, remote/rural care and fast emergency responses [46, 47].

4. CONCLUSION

If the text message intervention is successful in reducing the proportion of repeat self-harmers presenting to the ED, it will significantly reduce congestion in the ED so that health care resources in the ED could be concentrated on patients with other acute presentations.

CONSENT

All authors declare that written informed consent will be obtained from each patient recruited into this study.

ETHICAL APPROVAL

All authors hereby declare that all intended experiments have been examined and approved by the Beaumont Hospital Dublin ethics committee and will therefore be performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX

Sample Text Messages

- *Remember the Samaritans are always there to talk to you in times of crisis. If you get the urge to self-harm, call the Samaritans on 1850 60 90 90*
- *Remember the Samaritans have an interactive text message support service that you can access in times of crisis. When you get the urge to self-harm, contact the Samaritans by text on 0872609090*
- *If you keep on going, maintaining your hope and belief that something good will happen, it generally does. One day at a time.*
- *Ask for help. You have lent a hand to others in need in the past. There is probably someone in your life that would be genuinely honoured to help you now.*
- *Anger can be empowering when it's properly channelled, use it as an ally in your recovery. It can give you the energy and motivation to get moving physically, mentally and emotionally.*
- *Think of your recovery as an opportunity to find new solutions in your life. Remember that the past is gone and what you do next is what really matters.*
- *There are two days in the week we should not worry about, yesterday and tomorrow. That leaves today, live for today.*
- *Do not throw away recovery because of one bad day, tomorrow may be different and better.*
- *Today, I will focus on what I have instead of what I haven't.*
- *Make a list of five people you can talk to if you get thoughts of wanting to harm yourself.*

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