



Reductions in suicidality after internet cognitive behaviour therapy for depression.

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4 **Reductions in suicidality after internet cognitive behaviour therapy for depression.**
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30 **Competing interests**
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39 or not-for-profit sectors
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Abstract

Objectives: To examine reductions in both depressive symptomatology and suicidal ideation amongst a sample of patients who were prescribed an internet CBT course for depression.

Design: Effectiveness study within a quality assurance framework. Setting: Primary care.

Participants: 299 patients who were prescribed an internet CBT course for depression by primary care clinicians. Intervention: 6 lesson, fully automated cognitive behaviour therapy course delivered over the internet. Primary outcome: suicidal ideation as measured by question 9 on the Patient Health Questionnaire (PHQ-9). Results: Suicidal ideation was common (54%) amongst primary care patients prescribed treatment for depression but dropped to 30% post treatment despite minimal clinician contact and the absence of an intervention focused on suicidal ideation. This reduction in suicidal ideation was evident regardless of sex and age. Conclusions: The findings do not support the exclusion of patients with significant suicidal ideation.

Article summary

Article focus

- The reduction of suicidal ideation amongst patients treated for depression using internet cognitive behaviour therapy in clinical practice

Key messages

- Suicidal ideation is common amongst primary care patients prescribed internet CBT for depression
- After treatment with internet CBT, suicidal ideation decreased significantly
- The continued exclusion of these patients from research studies and internet CBT is no longer justified.

Strengths and limitations

- Evidence is needed to see if the changes in suicidal ideation is sustained over time

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3 Patients who say they feel they would be 'better off dead' worry clinicians and, for that
4 matter, research ethics committees approving depression trials, especially trials over the
5 internet. As a consequence, patients reporting suicidal ideas are often arbitrarily excluded
6 from internet treatment trials (1-3). Given that suicidal thoughts are an integral part of
7 depression we sought data to provide a rational basis for inclusion/exclusion of people with
8 suicidal ideas.
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14 Rates of suicide can be reduced through treatment of depression or reduction in access to the
15 means for suicide (4-6). The efficacy of cognitive behavioural therapy (CBT) in treating
16 depression has been established. Suicidal ideas and attempts decrease, commensurate with
17 reductions in depressive symptomatology (7-15). These studies have all been conducted
18 within a clinical trial framework amongst depressed patients selected for their high suicide
19 risk. To our knowledge, there is currently no evidence regarding the effectiveness of CBT or
20 internet CBT (iCBT) in reducing suicidal ideation in the depressed patient seeking treatment
21 in primary care, and no data to inform inclusion/exclusion criteria in clinical trials.
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28 The aim of the current quality assurance study is to therefore examine reductions in both
29 depressive symptomatology and suicidal ideation amongst a sample of patients who were
30 prescribed an internet CBT course for depression by primary care clinicians.
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34 **Method**

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37 *Sample:* Primary care physicians prescribed the internet depression course for patients they
38 deemed suitable (1). They were advised to exclude people who were 'actively suicidal'. As
39 part of a routine quality assurance exercise we analysed the progress of the 299 primary care
40 patients who completed the six lesson iCBT depression course between April 2009 and May
41 2011 (1). Data gathered was confined to measures used as a routine to inform practitioners
42 about the progress of their patients. All patients agreed that their pooled data could be used
43 for quality assurance purposes. This paper was written as part of the Quality Assurance
44 activities of St Vincent's Hospital with whom the draft of the paper was lodged prior to
45 submission.
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53 *Intervention:* The iCBT depression course consists of six lessons covering psycho-education,
54 behavioural activation, cognitive restructuring, problem solving, graded exposure and
55 relapse prevention. Content is presented in the form of an illustrated story in which the
56 character gains mastery over their depressive symptoms. At the end of each illustrated
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3 lesson the patient downloads “homework,” comprising a summary of the lesson content, and
4 activities to be completed that translate the skills learnt in the lesson to their own lives.

5 Automatic emails are also sent congratulating patients when they complete lessons.

6
7 Clinicians are advised to contact patients at least twice during the course.

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9
10 *Outcome measures:* The Patient Health Questionnaire (PHQ-9) is a brief 9-item measure of
11 depression severity (16). The nine items assess DSM-IV Criterion A for major depressive
12 disorder (MDD). Patients rate each item in terms of the frequency of symptoms over the
13 past two weeks, on a 4-point scale (0= not at all, 1= several days, 2 = more than half of the
14 days, 3= nearly every day). Scores can range from 0 to 27, with higher levels representing
15 higher symptom severity. Cut points for MDD have been established as follows: 0-9 = well
16 or sub-threshold, 10-14 = mild, 15-19 = moderate, and 20-27 = severe depression (17):

17 Suicidal ideation was measured by question nine from the PHQ-9 which asks about the
18 frequency of suicidal ideation (“thoughts that you would be better off dead, or of hurting
19 yourself in some way”) in the previous two weeks using the above 4 point scale.

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22 *Statistical Analysis:* Changes in participants’ PHQ-9 scores from pre- to post-treatment were
23 analysed using a paired samples t-test. Multivariate linear regression controlling for baseline
24 PHQ-9 scores was used to investigate the effect of sex and age on post-treatment PHQ-9
25 scores. A Wilcoxon signed-rank test was used to analyse differences in suicidal ideation in
26 response to treatment. Multinomial logistic regression controlling for baseline suicidality
27 investigated the effect of sex and age on post-treatment suicidal ideation. An alpha of .05
28 was used to test statistical significance.

29 30 31 32 33 34 35 36 37 38 39 40 41 **Results**

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43 *Baseline characteristics:* The mean age of the 299 patients who completed the 6 lesson
44 course was 43 years, 56% female. The mean baseline PHQ-9 score was 14.3 with 83
45 patients scoring 0-9 (well or subthreshold MDD), and 216 scoring 10-27 and likely to meet
46 criteria for MDD ($n= 72$ mild, $n= 70$ moderate, and $n= 74$ severe MDD). Prior to
47 commencing lesson 1, 54% of the patients (162/299) reported some level of suicidal ideation
48 on question 9 of the PHQ-9: 30% (91/299) had thought about it for several days in the past
49 two weeks, 15% (45/299) thought about it more than half the days and 9% (26/299)
50 indicated that they thought about suicide nearly every day.

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3 *Post-treatment outcomes:* From pre- to post-treatment there was a significant reduction in
4 PHQ-9 scores [$t(298) = 18.1, p < .001$], with PHQ-9 scores reducing by 6.2 points on
5 average ($d = 0.98$). A multivariate linear regression controlling for baseline PHQ-9 scores
6 indicated that age and gender were not statistically significant predictors of post-treatment
7 PHQ-9 scores. The reduction in suicidal ideation was considerable and evident at all
8 frequencies, with only 30% (90/299) reporting suicidal ideation at lesson 6 (see Figure). A
9 Wilcoxin signed-rank test showed a statistically significant change in suicidal ideation ($Z = -$
10 7.9, $p < 0.001$) as measured by question 9 on the PHQ-9, with median scores of 1 (“several
11 days”) pre-intervention and 0 (“not at all”) post-intervention. A multinomial logistic
12 regression controlling for baseline suicidal ideation scores indicated that age and gender
13 were not statistically significant predictors of post-intervention suicidal ideation scores.
14 Patient reported a median of 1 (range 0-2) clinician contacts during the course.
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<Insert Figure here>

28 Discussion

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30 Suicidal ideation was common (54%) amongst primary care patients prescribed treatment for
31 depression but dropped to 30% post treatment despite minimal clinician contact and the
32 absence of an intervention focused on suicidal ideation. This reduction in suicidal ideation
33 was evident regardless of sex and age. To our knowledge, this is the first study to show that
34 an internet CBT course for depression reduces suicidal ideation.
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39 The benefits in reducing suicidal ideas are clear. Suicidal behaviour lies on a continuum
40 from thoughts, through intent and planning, to attempt. In the general population it has been
41 shown that 34% of people with ideas develop suicidal plans, and that these plans lead to
42 suicide attempts in 72% of cases (15, 18). That is, 1 in 4 people who report suicidal ideation
43 will transition to a suicide attempt, most within the first year of ideation onset (18). Suicide
44 attempts are significant predictors of subsequent completed suicide. Suicidal ideas are
45 distressing and dangerous, and therefore an important target for treatment.
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52 We have conducted two randomised controlled trials of our iCBT program for depression (1,
53 2). In the first trial, 33% of applicants were excluded due to suicidal ideation. In the second,
54 23% were excluded due to suicidal ideation. Based on the current results it is now difficult to
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3 justify excluding patients from clinical trials on the basis of their high suicidal ideation
4 scores when internet CBT can reduce them quickly and effectively.
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7 *Limitations:* Whilst the item from the PHQ-9 assessed the presence and frequency of suicidal
8 ideation, it did not assess the intensity of the ideation, controllability, intention to act on
9 thoughts, nor suicide plans or means. Evidence is also needed to understand whether the
10 changes in suicidal ideation observed in this study are sustained over time.
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14 *Conclusion:* Both suicidal ideation and depressive symptomatology were reduced
15 considerably following completion of a six lesson iCBT course for depression. This is the
16 first study to demonstrate these benefits in primary care. At present, it is routine to exclude
17 patients with frequent suicidal ideation from participating in iCBT. This study provides
18 evidence for change.
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24 **Contributors**

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26 SW drafted the initial manuscript, prepared and cleaned the data, and conducted initial data
27 analysis. LM and JN conducted further statistical analysis. GA supervised the trial. All four
28 authors contributed to revised paper drafts.
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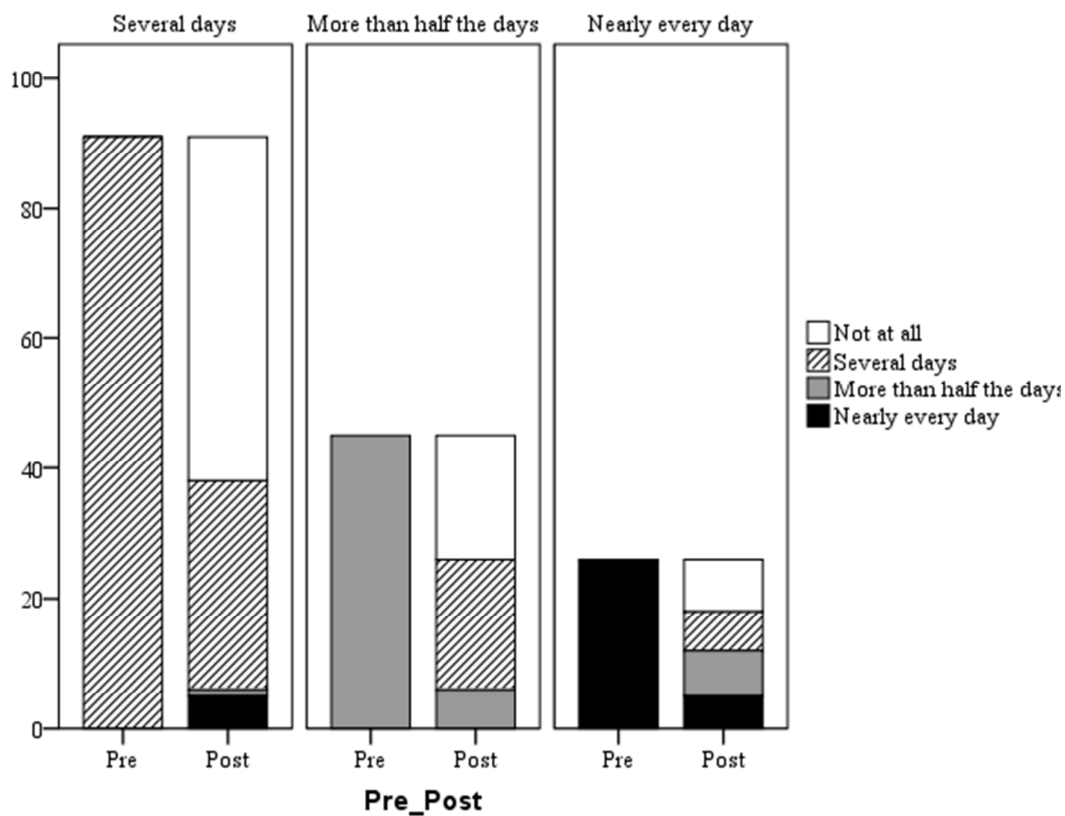


Figure. Frequency of suicidal thoughts (number of patients) before and after treatment for depression.

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SQUIRE Guidelines
(Standards for Quality Improvement Reporting Excellence)
Final revision – 4-29-08

- These guidelines provide a framework for reporting formal, planned studies designed to assess the nature and effectiveness of interventions to improve the quality and safety of care.
- It may not be possible to include information about every numbered guideline item in reports of original formal studies, but authors should at least consider every item in writing their reports.
- Although each major section (i.e., Introduction, Methods, Results, and Discussion) of a published original study generally contains some information about the numbered items within that section, information about items from one section (for example, the Introduction) is often also needed in other sections (for example, the Discussion).

<i>Text section; Item number and name</i>	<i>Section or Item description</i>
<u>Title and abstract</u>	<i>Did you provide clear and accurate information for finding, indexing, and scanning your paper?</i>
1. Title	<ul style="list-style-type: none"> a. Indicates the article concerns the improvement of quality (broadly defined to include the safety, effectiveness, patient-centeredness, timeliness, efficiency, and equity of care) b. States the specific aim of the intervention c. Specifies the study method used (for example, “A qualitative study,” or “A randomized cluster trial”)
2. Abstract	Summarizes precisely all key information from various sections of the text using the abstract format of the intended publication
<u>Introduction</u>	<i>Why did you start?</i>
3. Background Knowledge	Provides a brief, non-selective summary of current knowledge of the care problem being addressed, and characteristics of organizations in which it occurs
4. Local problem	Describes the nature and severity of the specific local problem or system dysfunction that was addressed
5. Intended improvement	<ul style="list-style-type: none"> a. Describes the specific aim (changes/improvements in care processes and patient outcomes) of the proposed intervention b. Specifies who (champions, supporters) and what (events, observations) triggered the decision to make changes, and why now (timing)
6. Study question	States precisely the primary improvement-related question and any secondary questions that the study of the intervention was designed to answer
<u>Methods</u>	<i>What did you do?</i>
7. Ethical issues	Describes ethical aspects of implementing and studying the improvement, such as privacy concerns, protection of participants’ physical well-being, and potential author conflicts of interest, and how ethical concerns were addressed
8. Setting	Specifies how elements of the local care environment considered most likely to influence change/improvement in the involved site or sites were identified and characterized
9. Planning the intervention	<ul style="list-style-type: none"> a. Describes the intervention and its component parts in sufficient detail that others could reproduce it b. Indicates main factors that contributed to choice of the specific intervention (for example, analysis of causes of dysfunction; matching relevant improvement experience of others with the local situation)

<i>Text section; Item number and name</i>	<i>Section or Item description</i>
Planning the intervention (continued)	c. Outlines initial plans for how the intervention was to be implemented: e.g., <i>what</i> was to be done (initial steps; functions to be accomplished by those steps; how tests of change would be used to modify intervention), and <i>by whom</i> (intended roles, qualifications, and training of staff)
10. Planning the study of the intervention	a. Outlines plans for assessing how well the intervention was implemented (dose or intensity of exposure) b. Describes mechanisms by which intervention components were expected to cause changes, and plans for testing whether those mechanisms were effective c. Identifies the study design (for example, observational, quasi-experimental, experimental) chosen for measuring impact of the intervention on primary and secondary outcomes, if applicable d. Explains plans for implementing essential aspects of the chosen study design, as described in publication guidelines for specific designs, if applicable (see, for example, www.equator-network.org) e. Describes aspects of the study design that specifically concerned internal validity (integrity of the data) and external validity (generalizability)
11. Methods of evaluation	a. Describes instruments and procedures (qualitative, quantitative, or mixed) used to assess a) the effectiveness of implementation, b) the contributions of intervention components and context factors to effectiveness of the intervention, and c) primary and secondary outcomes b. Reports efforts to validate and test reliability of assessment instruments c. Explains methods used to assure data quality and adequacy (for example, blinding; repeating measurements and data extraction; training in data collection; collection of sufficient baseline measurements)
12. Analysis	a. Provides details of qualitative and quantitative (statistical) methods used to draw inferences from the data b. Aligns unit of analysis with level at which the intervention was implemented, if applicable c. Specifies degree of variability expected in implementation, change expected in primary outcome (effect size), and ability of study design (including size) to detect such effects d. Describes analytic methods used to demonstrate effects of time as a variable (for example, statistical process control)
Results	<i>What did you find?</i>
13. Outcomes	a) Nature of setting and improvement intervention i. Characterizes relevant elements of setting or settings (for example, geography, physical resources, organizational culture, history of change efforts), and structures and patterns of care (for example, staffing, leadership) that provided context for the intervention ii. Explains the actual course of the intervention (for example, sequence of steps, events or phases; type and number of participants at key points), preferably using a time-line diagram or flow chart iii. Documents degree of success in implementing intervention components iv. Describes how and why the initial plan evolved, and the most important lessons learned from that evolution, particularly the effects of internal feedback from tests of change (reflexiveness) b) Changes in processes of care and patient outcomes associated with the intervention i. Presents data on changes observed in the care delivery process ii. Presents data on changes observed in measures of patient outcome (for example, morbidity, mortality, function, patient/staff satisfaction, service utilization, cost, care disparities)

<i>Text section; Item number and name</i>	<i>Section or Item description</i>
Outcomes (continued)	<ul style="list-style-type: none"> iii. Considers benefits, harms, unexpected results, problems, failures iv. Presents evidence regarding the strength of association between observed changes/improvements and intervention components/context factors v. Includes summary of missing data for intervention and outcomes
<u>Discussion</u>	<i>What do the findings mean?</i>
14. Summary	<ul style="list-style-type: none"> a. Summarizes the most important successes and difficulties in implementing intervention components, and main changes observed in care delivery and clinical outcomes b. Highlights the study's particular strengths
15. Relation to other evidence	Compares and contrasts study results with relevant findings of others, drawing on broad review of the literature; use of a summary table may be helpful in building on existing evidence
16. Limitations	<ul style="list-style-type: none"> a. Considers possible sources of confounding, bias, or imprecision in design, measurement, and analysis that might have affected study outcomes (internal validity) b. Explores factors that could affect generalizability (external validity), for example: representativeness of participants; effectiveness of implementation; dose-response effects; features of local care setting c. Addresses likelihood that observed gains may weaken over time, and describes plans, if any, for monitoring and maintaining improvement; explicitly states if such planning was not done d. Reviews efforts made to minimize and adjust for study limitations e. Assesses the effect of study limitations on interpretation and application of results
17. Interpretation	<ul style="list-style-type: none"> a. Explores possible reasons for differences between observed and expected outcomes b. Draws inferences consistent with the strength of the data about causal mechanisms and size of observed changes, paying particular attention to components of the intervention and context factors that helped determine the intervention's effectiveness (or lack thereof), and types of settings in which this intervention is most likely to be effective c. Suggests steps that might be modified to improve future performance d. Reviews issues of opportunity cost and actual financial cost of the intervention
18. Conclusions	<ul style="list-style-type: none"> a. Considers overall practical usefulness of the intervention b. Suggests implications of this report for further studies of improvement interventions
<u>Other information</u>	<i>Were other factors relevant to conduct and interpretation of the study?</i>
19. Funding	Describes funding sources, if any, and role of funding organization in design, implementation, interpretation, and publication of study



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Manuscripts

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Competing interests

None declared

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Abstract

Objectives: To examine reductions in suicidal ideation amongst a sample of patients who were prescribed an internet CBT course for depression. Design: Effectiveness study within a quality assurance framework. Setting: Primary care. Participants: 299 patients who were prescribed an internet CBT (iCBT) course for depression by primary care clinicians.

Intervention: 6 lesson, fully automated cognitive behaviour therapy course delivered over the internet. Primary outcome: suicidal ideation as measured by question 9 on the Patient Health Questionnaire (PHQ-9). Results: Suicidal ideation was common (54%) amongst primary care patients prescribed iCBT treatment for depression but dropped to 30% post treatment despite minimal clinician contact and the absence of an intervention focused on suicidal ideation.

This reduction in suicidal ideation was evident regardless of sex and age. Conclusions: The findings do not support the exclusion of patients with significant suicidal ideation.

Article summary

Article focus

- The reduction of suicidal ideation amongst patients treated for depression using internet cognitive behaviour therapy in clinical practice

Key messages

- Suicidal ideation is common amongst primary care patients prescribed internet CBT for depression
- After treatment with internet CBT, suicidal ideation decreased significantly
- The continued exclusion of these patients from research studies and internet CBT is no longer justified.

Strengths and limitations

- Evidence is needed to see if the changes in suicidal ideation is sustained over time

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13 means for suicide (4-6). The efficacy of cognitive behavioural therapy (CBT) in treating
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17 risk. To our knowledge, there is currently no evidence regarding the effectiveness of CBT or
18 internet CBT (iCBT) in reducing suicidal ideation in the depressed patient seeking treatment
19 in primary care, and no data to inform inclusion/exclusion criteria in clinical trials.
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24 We have previously reported from two randomized controlled trials that the progress of
25 patients receiving the internet CBT course used in this study was significantly better than the
26 progress of a waitlist control group (1, 2). We have also reported from quality assurance
27 studies that when these courses were used routinely by primary care clinicians that
28 effectiveness was comparable to the efficacy and that adherence rates of 60% could be
29 achieved (16, 17). The aim of the current quality assurance study is to examine reductions in
30 suicidal ideation amongst a sample of patients who were prescribed an internet CBT course
31 for depression by primary care clinicians.
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40 **Method**

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6 character gains mastery over their depressive symptoms. At the end of each illustrated
7 lesson the patient downloads “homework,” comprising a summary of the lesson content, and
8 activities to be completed that translate the skills learnt in the lesson to their own lives.
9 Automatic emails are also sent congratulating patients when they complete lessons.
10 Clinicians are advised to contact patients at least twice during the course.
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17 *Outcome measures:* The Patient Health Questionnaire (PHQ-9) is a brief 9-item measure of
18 depression severity (18). The nine items assess DSM-IV Criterion A for major depressive
19 disorder (MDD). Patients rate each item in terms of the frequency of symptoms over the
20 past two weeks, on a 4-point scale (0= not at all, 1= several days, 2 = more than half of the
21 days, 3= nearly every day). Scores can range from 0 to 27, with higher levels representing
22 higher symptom severity. Cut points for MDD have been established as follows: 0-9 = well
23 or sub-threshold, 10-14 = mild, 15-19 = moderate, and 20-27 = severe depression (19).
24 Suicidal ideation was measured by question nine from the PHQ-9 which asks about the
25 frequency of suicidal ideation (“thoughts that you would be better off dead, or of hurting
26 yourself in some way”) in the previous two weeks using the above 4 point scale. The PHQ-9
27 has been shown to demonstrate adequate reliability, convergent/discriminant validity, and
28 responsiveness to change in previous studies of iCBT (20), with a Cronbach’s alpha of 0.89
29 in the current sample.
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40 *Statistical Analysis:* Changes in participants’ PHQ-9 scores from pre- to post-treatment were
41 analysed using a paired samples t-test. Multivariate linear regression controlling for baseline
42 PHQ-9 scores was used to investigate the effect of sex and age on post-treatment PHQ-9
43 scores. A Wilcoxon signed-rank test was used to analyse differences in suicidal ideation in
44 response to treatment. Multinomial logistic regression controlling for baseline suicidality
45 investigated the effect of sex and age on post-treatment suicidal ideation. An alpha of .05
46 was used to test statistical significance.
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52 **Results**

53 *Baseline characteristics:* The mean age of the 299 patients who completed the 6 lesson
54 course was 43 years, 56% female. The mean baseline PHQ-9 score was 14.3 with 83
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3 patients scoring 0-9 (well or subthreshold MDD), and 216 scoring 10-27 and likely to meet
4 criteria for MDD ($n= 72$ mild, $n= 70$ moderate, and $n= 74$ severe MDD). Prior to
5 commencing lesson 1, 54% of the patients (162/299) reported some level of suicidal ideation
6 on question 9 of the PHQ-9: 30% (91/299) had thought about it for several days in the past
7 two weeks, 15% (45/299) thought about it more than half the days and 9% (26/299)
8 indicated that they thought about suicide nearly every day.
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14 *Post-treatment outcomes:* From pre- to post-treatment there was a significant reduction in
15 PHQ-9 scores [$t(298) = 18.1, p < .001$], with PHQ-9 scores reducing by 6.2 points on
16 average [S.D. = 5.9; $d = 0.98$ (95% CI:)]. A multivariate linear regression controlling for
17 baseline PHQ-9 scores indicated that age and gender were not statistically significant
18 predictors of post-treatment PHQ-9 scores. The reduction in suicidal ideation was
19 considerable and evident at all frequencies, with only 30% (90/299) reporting suicidal
20 ideation at lesson 6 (see Figure). A Wilcoxin signed-rank test showed a statistically
21 significant change in suicidal ideation ($Z= -7.9, p < 0.001, r = 0.5$) as measured by question 9
22 on the PHQ-9, with median scores of 1 (“several days”) pre-intervention and 0 (“not at all”)
23 post-intervention. A multinomial logistic regression controlling for baseline suicidal ideation
24 scores indicated that age and gender were not statistically significant predictors of post-
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40 Discussion

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42 Suicidal ideation was common (54%) amongst primary care patients prescribed treatment for
43 depression but dropped to 30% post treatment despite minimal clinician contact and the
44 absence of an intervention focused on suicidal ideation. This reduction in suicidal ideation
45 was evident regardless of sex and age. To our knowledge, this is the first study to show that
46 an internet CBT course for depression reduces suicidal ideation.
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52 The benefits in reducing suicidal ideas are clear. Suicidal behaviour lies on a continuum
53 from thoughts, through intent and planning, to attempt. In the general population it has been
54 shown that 34% of people with ideas develop suicidal plans, and that these plans lead to
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10 We have conducted two randomised controlled trials of our iCBT program for depression (1,
11 2). In the first trial, 33% of applicants were excluded due to suicidal ideation. In the second,
12 23% were excluded due to suicidal ideation. Based on the current results it is now difficult to
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19 *Limitations:* Whilst the item from the PHQ-9 assessed the presence and frequency of suicidal
20 ideation, it did not assess the intensity of the ideation, controllability, intention to act on
21 thoughts, nor suicide plans or means. Evidence is also needed to understand whether the
22 changes in suicidal ideation observed in this study are sustained over time. In addition, there
23 was no control sample, meaning that treatment effects could be attributable to regression to
24 the mean, spontaneous remission or placebo effects, rather than the intervention *per se*. The
25 fact that benefits were observed amongst patients at different levels of baseline risk indicates
26 that regression to the mean may not underlie treatment effects. However, it is not possible to
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28 also not possible to establish whether treatment effects were sustained over time due to the
29 lack of follow up data. Finally, the lack of formal exclusion criteria means that patients may
30 have been using adjunctive treatments which contributed to the magnitude of treatment
31 effects. Whilst the limitations outlined above may be critical within the context of an
32 efficacy trial, they are endemic to effectiveness research.
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44 *Conclusion:* Both suicidal ideation and depressive symptomatology were reduced
45 considerably following completion of a six lesson iCBT course for depression. This is the
46 first study to demonstrate these benefits in primary care. At present, it is routine to exclude
47 patients with frequent suicidal ideation from participating in iCBT. This study provides
48 evidence for change.
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Contributors

SW drafted the initial manuscript, prepared and cleaned the data, and conducted initial data analysis. LM and JN conducted further statistical analysis. GA supervised and took responsibility for the data. All four authors contributed to revised drafts.

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Reductions in suicidality after internet cognitive behaviour therapy for depression.Sarah Watts¹Jill M. Newby¹Louise Mewton^{1,2}Gavin Andrews¹

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Competing interests

None declared

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Abstract

Objectives: To examine reductions in suicidal ideation amongst a sample of patients who were prescribed an internet CBT course for depression. Design: Effectiveness study within a quality assurance framework. Setting: Primary care. Participants: 299 patients who were prescribed an internet CBT (iCBT) course for depression by primary care clinicians.

Intervention: 6 lesson, fully automated cognitive behaviour therapy course delivered over the internet. Primary outcome: suicidal ideation as measured by question 9 on the Patient Health Questionnaire (PHQ-9). Results: Suicidal ideation was common (54%) amongst primary care patients prescribed iCBT treatment for depression but dropped to 30% post treatment despite minimal clinician contact and the absence of an intervention focused on suicidal ideation.

This reduction in suicidal ideation was evident regardless of sex and age. Conclusions: The findings do not support the exclusion of patients with significant suicidal ideation.

Article summary

Article focus

- The reduction of suicidal ideation amongst patients treated for depression using internet cognitive behaviour therapy in clinical practice

Key messages

- Suicidal ideation is common amongst primary care patients prescribed internet CBT for depression
- After treatment with internet CBT, suicidal ideation decreased significantly
- The continued exclusion of these patients from research studies and internet CBT is no longer justified.

Strengths and limitations

- Evidence is needed to see if the changes in suicidal ideation is sustained over time

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3 Patients who say they feel they would be 'better off dead' worry clinicians and, for that
4 matter, research ethics committees approving depression trials, especially trials over the
5 internet. As a consequence, patients reporting suicidal ideas are often ~~arbitrarily~~-excluded
6 from internet treatment trials (1-3). Given that suicidal thoughts are an integral part of
7 depression we sought data to provide a rational basis for inclusion/exclusion of people with
8 suicidal ideas.
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14 Rates of suicide can be reduced through treatment of depression or reduction in access to the
15 means for suicide (4-6). The efficacy of cognitive behavioural therapy (CBT) in treating
16 depression has been established. Suicidal ideas and attempts decrease, commensurate with
17 reductions in depressive symptomatology (7-15). These studies have all been conducted
18 within a clinical trial framework amongst depressed patients selected for their high suicide
19 risk. To our knowledge, there is currently no evidence regarding the effectiveness of CBT or
20 internet CBT (iCBT) in reducing suicidal ideation in the depressed patient seeking treatment
21 in primary care, and no data to inform inclusion/exclusion criteria in clinical trials.
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28 We have previously reported from two randomized controlled trials that the progress of
29 patients receiving the internet CBT course used in this study was significantly better than the
30 progress of a waitlist control group (1, 2). We have also reported from quality assurance
31 studies that when these courses were used routinely by primary care clinicians that
32 effectiveness was comparable to the efficacy and that adherence rates of 60% could be
33 achieved (16, 17). The aim of the current quality assurance study is to ~~therefore~~ examine
34 reductions in suicidal ideation amongst a sample of patients who were prescribed an internet
35 CBT course for depression by primary care clinicians.
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42 **Method**

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45 *Sample:* Primary care physicians prescribed the internet depression course for patients they
46 deemed suitable (1). They were advised to exclude people who were 'actively suicidal'. As
47 part of a routine quality assurance exercise we analysed the progress of the 299 primary care
48 patients who completed the six lesson iCBT depression course between April 2009 and May
49 2011 (1). Data gathered was confined to measures used as a routine to inform practitioners
50 about the progress of their patients. All patients agreed that their pooled data could be used
51 for quality assurance purposes. This paper was written as part of the Quality Assurance
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3 activities of St Vincent's Hospital with whom the draft of the paper was lodged prior to
4 submission.
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7 *Intervention:* The iCBT depression course consists of six lessons covering psycho-education,
8 behavioural activation, cognitive restructuring, problem solving, graded exposure and
9 relapse prevention (1, 2). Content is presented in the form of an illustrated story in which the
10 character gains mastery over their depressive symptoms. At the end of each illustrated
11 lesson the patient downloads "homework," comprising a summary of the lesson content, and
12 activities to be completed that translate the skills learnt in the lesson to their own lives.
13 Automatic emails are also sent congratulating patients when they complete lessons.
14 Clinicians are advised to contact patients at least twice during the course.
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21 *Outcome measures:* The Patient Health Questionnaire (PHQ-9) is a brief 9-item measure of
22 depression severity (18). The nine items assess DSM-IV Criterion A for major depressive
23 disorder (MDD). Patients rate each item in terms of the frequency of symptoms over the
24 past two weeks, on a 4-point scale (0= not at all, 1= several days, 2 = more than half of the
25 days, 3= nearly every day). Scores can range from 0 to 27, with higher levels representing
26 higher symptom severity. Cut points for MDD have been established as follows: 0-9 = well
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30 yourself in some way") in the previous two weeks using the above 4 point scale. The PHQ-9
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32 responsiveness to change in previous studies of iCBT (20), with a Cronbach's alpha of 0.89
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44 *Statistical Analysis:* Changes in participants' PHQ-9 scores from pre- to post-treatment were
45 analysed using a paired samples t-test. Multivariate linear regression controlling for baseline
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56 57 **Results** 58 59 60

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3 *Baseline characteristics:* The mean age of the 299 patients who completed the 6 lesson
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5 patients scoring 0-9 (well or subthreshold MDD), and 216 scoring 10-27 and likely to meet
6 criteria for MDD ($n=72$ mild, $n=70$ moderate, and $n=74$ severe MDD). Prior to
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<Insert Table and Figure here>

Discussion

Suicidal ideation was common (54%) amongst primary care patients prescribed treatment for depression but dropped to 30% post treatment despite minimal clinician contact and the absence of an intervention focused on suicidal ideation. This reduction in suicidal ideation was evident regardless of sex and age. To our knowledge, this is the first study to show that an internet CBT course for depression reduces suicidal ideation.

The benefits in reducing suicidal ideas are clear. Suicidal behaviour lies on a continuum from thoughts, through intent and planning, to attempt. In the general population it has been

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Contributors

SW drafted the initial manuscript, prepared and cleaned the data, and conducted initial data analysis. LM and JN conducted further statistical analysis. GA supervised [and took responsibility for the data](#)~~the trial~~. All four authors contributed to revised ~~paper~~ drafts.

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	Not at all	Several days	More than half the days	Nearly every day
Pre-intervention PHQ-9 score	137 (45.8%)	91 (30.4%)	45 (15.15%)	26 (8.7%)
Post-intervention PHQ-9 score	209 (69.9%)	66 (22.1%)	14 (4.7%)	10 (3.3%)

For peer review only

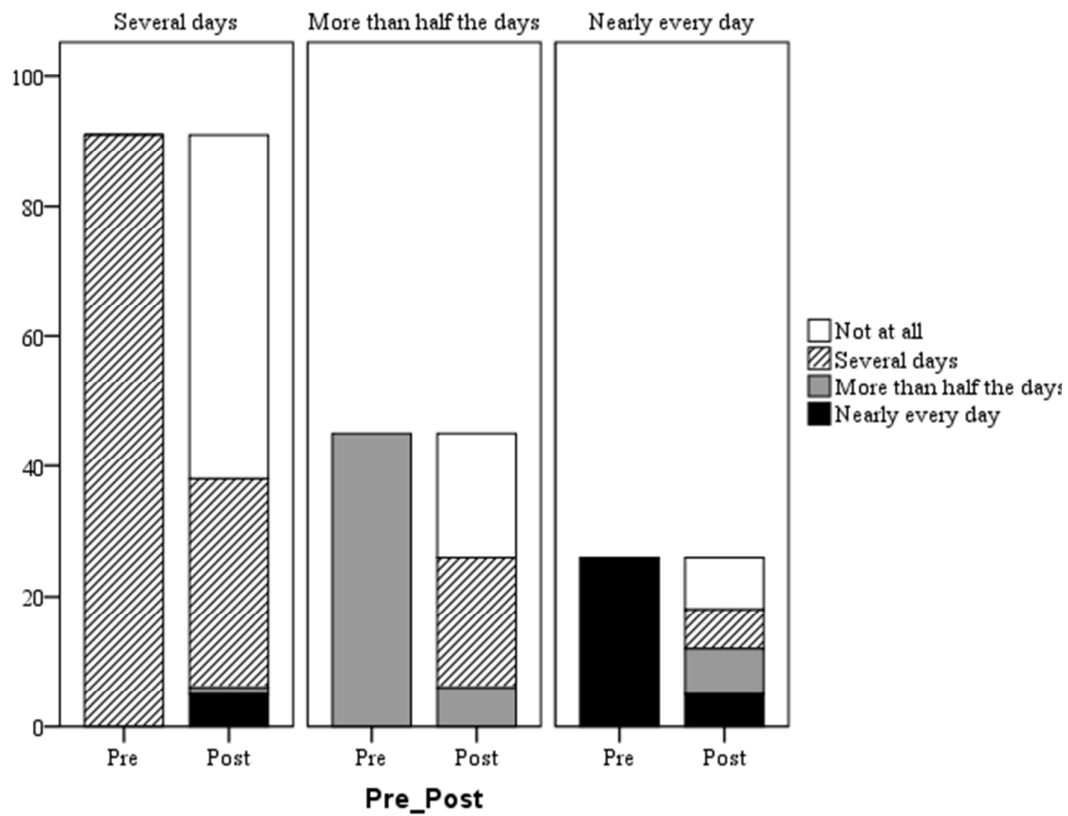


Figure. Frequency of suicidal thoughts (number of patients) before and after treatment for depression.

Review only

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SQUIRE Guidelines
(Standards for Quality Improvement Reporting Excellence)
Final revision – 4-29-08

- These guidelines provide a framework for reporting formal, planned studies designed to assess the nature and effectiveness of interventions to improve the quality and safety of care.
- It may not be possible to include information about every numbered guideline item in reports of original formal studies, but authors should at least consider every item in writing their reports.
- Although each major section (i.e., Introduction, Methods, Results, and Discussion) of a published original study generally contains some information about the numbered items within that section, information about items from one section (for example, the Introduction) is often also needed in other sections (for example, the Discussion).

<i>Text section; Item number and name</i>	<i>Section or Item description</i>
<u>Title and abstract</u>	<i>Did you provide clear and accurate information for finding, indexing, and scanning your paper?</i>
1. Title	<ul style="list-style-type: none"> a. Indicates the article concerns the improvement of quality (broadly defined to include the safety, effectiveness, patient-centeredness, timeliness, efficiency, and equity of care) b. States the specific aim of the intervention c. Specifies the study method used (for example, “A qualitative study,” or “A randomized cluster trial”)
2. Abstract	Summarizes precisely all key information from various sections of the text using the abstract format of the intended publication
<u>Introduction</u>	<i>Why did you start?</i>
3. Background Knowledge	Provides a brief, non-selective summary of current knowledge of the care problem being addressed, and characteristics of organizations in which it occurs
4. Local problem	Describes the nature and severity of the specific local problem or system dysfunction that was addressed
5. Intended improvement	<ul style="list-style-type: none"> a. Describes the specific aim (changes/improvements in care processes and patient outcomes) of the proposed intervention b. Specifies who (champions, supporters) and what (events, observations) triggered the decision to make changes, and why now (timing)
6. Study question	States precisely the primary improvement-related question and any secondary questions that the study of the intervention was designed to answer
<u>Methods</u>	<i>What did you do?</i>
7. Ethical issues	Describes ethical aspects of implementing and studying the improvement, such as privacy concerns, protection of participants’ physical well-being, and potential author conflicts of interest, and how ethical concerns were addressed
8. Setting	Specifies how elements of the local care environment considered most likely to influence change/improvement in the involved site or sites were identified and characterized
9. Planning the intervention	<ul style="list-style-type: none"> a. Describes the intervention and its component parts in sufficient detail that others could reproduce it b. Indicates main factors that contributed to choice of the specific intervention (for example, analysis of causes of dysfunction; matching relevant improvement experience of others with the local situation)

Text section; Item number and name	Section or Item description
Planning the intervention (continued)	c. Outlines initial plans for how the intervention was to be implemented: e.g., <i>what</i> was to be done (initial steps; functions to be accomplished by those steps; how tests of change would be used to modify intervention), and <i>by whom</i> (intended roles, qualifications, and training of staff)
10. Planning the study of the intervention	a. Outlines plans for assessing how well the intervention was implemented (dose or intensity of exposure) b. Describes mechanisms by which intervention components were expected to cause changes, and plans for testing whether those mechanisms were effective c. Identifies the study design (for example, observational, quasi-experimental, experimental) chosen for measuring impact of the intervention on primary and secondary outcomes, if applicable d. Explains plans for implementing essential aspects of the chosen study design, as described in publication guidelines for specific designs, if applicable (see, for example, www.equator-network.org) e. Describes aspects of the study design that specifically concerned internal validity (integrity of the data) and external validity (generalizability)
11. Methods of evaluation	a. Describes instruments and procedures (qualitative, quantitative, or mixed) used to assess a) the effectiveness of implementation, b) the contributions of intervention components and context factors to effectiveness of the intervention, and c) primary and secondary outcomes b. Reports efforts to validate and test reliability of assessment instruments c. Explains methods used to assure data quality and adequacy (for example, blinding; repeating measurements and data extraction; training in data collection; collection of sufficient baseline measurements)
12. Analysis	a. Provides details of qualitative and quantitative (statistical) methods used to draw inferences from the data b. Aligns unit of analysis with level at which the intervention was implemented, if applicable c. Specifies degree of variability expected in implementation, change expected in primary outcome (effect size), and ability of study design (including size) to detect such effects d. Describes analytic methods used to demonstrate effects of time as a variable (for example, statistical process control)
Results	<i>What did you find?</i>
13. Outcomes	a) Nature of setting and improvement intervention i. Characterizes relevant elements of setting or settings (for example, geography, physical resources, organizational culture, history of change efforts), and structures and patterns of care (for example, staffing, leadership) that provided context for the intervention ii. Explains the actual course of the intervention (for example, sequence of steps, events or phases; type and number of participants at key points), preferably using a time-line diagram or flow chart iii. Documents degree of success in implementing intervention components iv. Describes how and why the initial plan evolved, and the most important lessons learned from that evolution, particularly the effects of internal feedback from tests of change (reflexiveness) b) Changes in processes of care and patient outcomes associated with the intervention i. Presents data on changes observed in the care delivery process ii. Presents data on changes observed in measures of patient outcome (for example, morbidity, mortality, function, patient/staff satisfaction, service utilization, cost, care disparities)

<i>Text section; Item number and name</i>	<i>Section or Item description</i>
Outcomes (continued)	<ul style="list-style-type: none"> iii. Considers benefits, harms, unexpected results, problems, failures iv. Presents evidence regarding the strength of association between observed changes/improvements and intervention components/context factors v. Includes summary of missing data for intervention and outcomes
<u>Discussion</u>	<i>What do the findings mean?</i>
14. Summary	<ul style="list-style-type: none"> a. Summarizes the most important successes and difficulties in implementing intervention components, and main changes observed in care delivery and clinical outcomes b. Highlights the study's particular strengths
15. Relation to other evidence	Compares and contrasts study results with relevant findings of others, drawing on broad review of the literature; use of a summary table may be helpful in building on existing evidence
16. Limitations	<ul style="list-style-type: none"> a. Considers possible sources of confounding, bias, or imprecision in design, measurement, and analysis that might have affected study outcomes (internal validity) b. Explores factors that could affect generalizability (external validity), for example: representativeness of participants; effectiveness of implementation; dose-response effects; features of local care setting c. Addresses likelihood that observed gains may weaken over time, and describes plans, if any, for monitoring and maintaining improvement; explicitly states if such planning was not done d. Reviews efforts made to minimize and adjust for study limitations e. Assesses the effect of study limitations on interpretation and application of results
17. Interpretation	<ul style="list-style-type: none"> a. Explores possible reasons for differences between observed and expected outcomes b. Draws inferences consistent with the strength of the data about causal mechanisms and size of observed changes, paying particular attention to components of the intervention and context factors that helped determine the intervention's effectiveness (or lack thereof), and types of settings in which this intervention is most likely to be effective c. Suggests steps that might be modified to improve future performance d. Reviews issues of opportunity cost and actual financial cost of the intervention
18. Conclusions	<ul style="list-style-type: none"> a. Considers overall practical usefulness of the intervention b. Suggests implications of this report for further studies of improvement interventions
<u>Other information</u>	<i>Were other factors relevant to conduct and interpretation of the study?</i>
19. Funding	Describes funding sources, if any, and role of funding organization in design, implementation, interpretation, and publication of study



A clinical audit of changes in suicide ideas with internet treatment for depression.

Journal:	<i>BMJ Open</i>
Manuscript ID:	bmjopen-2012-001558.R2
Article Type:	Research
Date Submitted by the Author:	07-Aug-2012
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Primary Subject Heading:	Evidence based practice
Secondary Subject Heading:	Mental health, Health services research
Keywords:	MENTAL HEALTH, PRIMARY CARE, PSYCHIATRY, Depression & mood disorders < PSYCHIATRY

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Manuscripts

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4 **A clinical audit of changes in suicide ideas with internet treatment for depression.**
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8 Sarah Watts¹
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10 Jill M. Newby¹
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30 **Competing interests**
31

32 None declared
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40 Medical Research Council Capacity Building Grant.
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Abstract

Objectives: To examine reductions in suicidal ideation amongst a sample of patients who were prescribed an internet CBT course for depression. **Design:** Effectiveness study within a quality assurance framework. **Setting:** Primary care. **Participants:** 299 patients who were prescribed an internet CBT (iCBT) course for depression by primary care clinicians.

Intervention: 6 lesson, fully automated cognitive behaviour therapy course delivered over the internet. Primary outcome: suicidal ideation as measured by question 9 on the Patient Health Questionnaire (PHQ-9). **Results:** Suicidal ideation was common (54%) amongst primary care patients prescribed iCBT treatment for depression but dropped to 30% post treatment despite minimal clinician contact and the absence of an intervention focused on suicidal ideation. This reduction in suicidal ideation was evident regardless of sex and age.

Conclusions: The findings do not support the exclusion of patients with significant suicidal ideation.

Article summary

Article focus

- The reduction of suicidal ideation amongst patients treated for depression using internet cognitive behaviour therapy in clinical practice

Key messages

- Suicidal ideation is common amongst primary care patients prescribed internet CBT for depression
- After treatment with internet CBT, suicidal ideation decreased significantly
- The continued exclusion of these patients from research studies and internet CBT is no longer justified.

Strengths and limitations

- Evidence is needed to see if the changes in suicidal ideation is sustained over time

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3 Patients who say they feel they would be 'better off dead' worry clinicians and, for that
4 matter, research ethics committees approving depression trials, especially trials over the
5 internet. As a consequence, patients reporting suicidal ideas are often excluded from internet
6 treatment trials (1-3). Given that suicidal thoughts are an integral part of depression we
7 sought data to provide a rational basis for inclusion/exclusion of people with suicidal ideas.
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12 Rates of suicide can be reduced through treatment of depression or reduction in access to the
13 means for suicide (4-6). The efficacy of cognitive behavioural therapy (CBT) in treating
14 depression has been established. Suicidal ideas and attempts decrease, commensurate with
15 reductions in depressive symptomatology (7-15). These studies have all been conducted
16 within a clinical trial framework amongst depressed patients selected for their high suicide
17 risk. To our knowledge, there is currently no evidence regarding the effectiveness of CBT or
18 internet CBT (iCBT) in reducing suicidal ideation in the depressed patient seeking treatment
19 in primary care, and no data to inform inclusion/exclusion criteria in clinical trials.
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27 We have previously reported from two randomized controlled trials that the progress of
28 patients receiving the internet CBT course used in this study was significantly better than the
29 progress of a waitlist control group (1, 2). We have also reported from quality assurance
30 studies that when these courses were used routinely by primary care clinicians that
31 effectiveness was comparable to the efficacy and that adherence rates of 60% could be
32 achieved (16, 17). The aim of the current quality assurance study is to examine reductions in
33 suicidal ideation amongst a sample of patients who were prescribed an internet CBT course
34 for depression by primary care clinicians.
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41 **Method**

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43 *Sample:* Primary care physicians prescribed the internet depression course for patients they
44 deemed suitable (1). They were advised to exclude people who were 'actively suicidal'. As
45 part of a routine quality assurance exercise we analysed the progress of the 299 primary care
46 patients who completed the six lesson iCBT depression course between April 2009 and May
47 2011 (1). Data gathered was confined to measures used as a routine to inform practitioners
48 about the progress of their patients. All patients agreed that their pooled data could be used
49 for quality assurance purposes. This paper was written as part of the Quality Assurance
50 activities of St Vincent's Hospital with whom the draft of the paper was lodged prior to
51 submission.
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3 *Intervention:* The iCBT depression course consists of six lessons covering psycho-education,
4 behavioural activation, cognitive restructuring, problem solving, graded exposure and
5 relapse prevention (1, 2). Content is presented in the form of an illustrated story in which the
6 character gains mastery over their depressive symptoms. At the end of each illustrated
7 lesson the patient downloads “homework,” comprising a summary of the lesson content, and
8 activities to be completed that translate the skills learnt in the lesson to their own lives.
9 Automatic emails are also sent congratulating patients when they complete lessons.
10 Clinicians are advised to contact patients at least twice during the course.
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17 *Outcome measures:* The Patient Health Questionnaire (PHQ-9) is a brief 9-item measure of
18 depression severity (18). The nine items assess DSM-IV Criterion A for major depressive
19 disorder (MDD). Patients rate each item in terms of the frequency of symptoms over the
20 past two weeks, on a 4-point scale (0= not at all, 1= several days, 2 = more than half of the
21 days, 3= nearly every day). Scores can range from 0 to 27, with higher levels representing
22 higher symptom severity. Cut points for MDD have been established as follows: 0-9 = well
23 or sub-threshold, 10-14 = mild, 15-19 = moderate, and 20-27 = severe depression (19).
24 Suicidal ideation was measured by question nine from the PHQ-9 which asks about the
25 frequency of suicidal ideation (“thoughts that you would be better off dead, or of hurting
26 yourself in some way”) in the previous two weeks using the above 4 point scale. The PHQ-9
27 has been shown to demonstrate adequate reliability, convergent/discriminant validity, and
28 responsiveness to change in previous studies of iCBT (20), with a Cronbach’s alpha of 0.89
29 in the current sample.
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40 *Statistical Analysis:* Changes in participants’ PHQ-9 scores from pre- to post-treatment were
41 analysed using a paired samples t-test. Multivariate linear regression controlling for baseline
42 PHQ-9 scores was used to investigate the effect of sex and age on post-treatment PHQ-9
43 scores. A Wilcoxon signed-rank test was used to analyse differences in suicidal ideation in
44 response to treatment. Multinomial logistic regression controlling for baseline suicidality
45 investigated the effect of sex and age on post-treatment suicidal ideation. An alpha of .05
46 was used to test statistical significance.
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52 **Results**

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55 *Baseline characteristics:* The mean age of the 299 patients who completed the 6 lesson
56 course was 43 years, 56% female. The mean baseline PHQ-9 score was 14.3 with 83
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patients scoring 0-9 (well or subthreshold MDD), and 216 scoring 10-27 and likely to meet criteria for MDD ($n=72$ mild, $n=70$ moderate, and $n=74$ severe MDD). Prior to commencing lesson 1, 54% of the patients (162/299) reported some level of suicidal ideation on question 9 of the PHQ-9: 30% (91/299) had thought about it for several days in the past two weeks, 15% (45/299) thought about it more than half the days and 9% (26/299) indicated that they thought about suicide nearly every day.

Post-treatment outcomes: From pre- to post-treatment there was a significant reduction in PHQ-9 scores [$t(298) = 18.1, p < .001$], with PHQ-9 scores reducing by 6.2 points on average [S.D. = 5.9; $d = 0.98$ (95% CI:)]. A multivariate linear regression controlling for baseline PHQ-9 scores indicated that age and gender were not statistically significant predictors of post-treatment PHQ-9 scores. The reduction in suicidal ideation was considerable and evident at all frequencies, with only 30% (90/299) reporting suicidal ideation at lesson 6 (see Figure). A Wilcoxin signed-rank test showed a statistically significant change in suicidal ideation ($Z = -7.9, p < 0.001, r = 0.5$) as measured by question 9 on the PHQ-9, with median scores of 1 (“several days”) pre-intervention and 0 (“not at all”) post-intervention. A multinomial logistic regression controlling for baseline suicidal ideation scores indicated that age and gender were not statistically significant predictors of post-intervention suicidal ideation scores. Patient reported a median of 1 (range 0-2) clinician contacts during the course.

Table 1

	Not at all	Several days	More than half the days	Nearly every day
Pre-intervention PHQ-9 score	137 (45.8%)	91 (30.4%)	45 (15.15%)	26 (8.7%)
Post-intervention PHQ-9 score	209 (69.9%)	66 (22.1%)	14 (4.7%)	10 (3.3%)

Discussion

Suicidal ideation was common (54%) amongst primary care patients prescribed treatment for depression but dropped to 30% post treatment despite minimal clinician contact and the absence of an intervention focused on suicidal ideation. This reduction in suicidal ideation

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3 was evident regardless of sex and age. To our knowledge, this is the first study to document
4 an association between iCBT for depression and reductions in suicidal ideation.
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8 The benefits in reducing suicidal ideas are clear. Suicidal behaviour lies on a continuum
9 from thoughts, through intent and planning, to attempt. In the general population it has been
10 shown that 34% of people with ideas develop suicidal plans, and that these plans lead to
11 suicide attempts in 72% of cases (15, 21). That is, 1 in 4 people who report suicidal ideation
12 will transition to a suicide attempt, most within the first year of ideation onset (21). Suicide
13 attempts are significant predictors of subsequent completed suicide. Suicidal ideas are
14 distressing and dangerous, and therefore an important target for treatment.
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21 We have conducted two randomised controlled trials of our iCBT program for depression (1,
22 2). In the first trial, 33% of applicants were excluded due to suicidal ideation. In the second,
23 23% were excluded due to suicidal ideation. Based on the current results it is now difficult to
24 justify excluding patients from clinical trials on the basis of their high suicidal ideation
25 scores when internet CBT can reduce them quickly and effectively.
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31 *Limitations:* Whilst the item from the PHQ-9 assessed the presence and frequency of suicidal
32 ideation, it did not assess the intensity of the ideation, controllability, intention to act on
33 thoughts, nor suicide plans or means. Evidence is also needed to understand whether the
34 changes in suicidal ideation observed in this study are sustained over time. In addition, there
35 was no control sample, meaning that treatment effects could be attributable to regression to
36 the mean, spontaneous remission or placebo effects, rather than the intervention *per se*. The
37 fact that benefits were observed amongst patients at different levels of baseline risk indicates
38 that regression to the mean may not underlie treatment effects. However, it is not possible to
39 fully examine the influence of these alternative factors on the outcomes of interest. It was
40 also not possible to establish whether treatment effects were sustained over time due to the
41 lack of follow up data. Finally, the lack of formal exclusion criteria means that patients may
42 have been using adjunctive treatments which contributed to the magnitude of treatment
43 effects. Whilst the limitations outlined above may be critical within the context of an
44 efficacy trial, they are endemic to effectiveness research.
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55 *Conclusion:* Both suicidal ideation and depressive symptomatology were reduced
56 considerably following completion of a six lesson iCBT course for depression. This is the
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3 first study to demonstrate this association in primary care. At present, it is routine to exclude
4 patients with frequent suicidal ideation from participating in iCBT. This study provides
5 evidence for change.
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11 12 13 14 **Contributors**

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17 SW drafted the initial manuscript, prepared and cleaned the data, and conducted initial data
18 analysis. LM and JN conducted further statistical analysis. GA supervised and took
19 responsibility for the data. All four authors contributed to revised drafts.
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23 **Data Sharing Statement**

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25 No additional data available
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A clinical audit of changes in suicide ideas with internet treatment for depression.
Reductions in suicidality after internet cognitive behaviour therapy for depression.

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Competing interests

None declared

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Abstract

Objectives: To examine reductions in suicidal ideation amongst a sample of patients who were prescribed an internet CBT course for depression. Design: Effectiveness study within a quality assurance framework. Setting: Primary care. Participants: 299 patients who were prescribed an internet CBT (iCBT) course for depression by primary care clinicians.

Intervention: 6 lesson, fully automated cognitive behaviour therapy course delivered over the internet. Primary outcome: suicidal ideation as measured by question 9 on the Patient Health Questionnaire (PHQ-9). Results: Suicidal ideation was common (54%) amongst primary care patients prescribed iCBT treatment for depression but dropped to 30% post treatment despite minimal clinician contact and the absence of an intervention focused on suicidal ideation.

This reduction in suicidal ideation was evident regardless of sex and age. Conclusions: The findings do not support the exclusion of patients with significant suicidal ideation.

Article summary

Article focus

- The reduction of suicidal ideation amongst patients treated for depression using internet cognitive behaviour therapy in clinical practice

Key messages

- Suicidal ideation is common amongst primary care patients prescribed internet CBT for depression
- After treatment with internet CBT, suicidal ideation decreased significantly
- The continued exclusion of these patients from research studies and internet CBT is no longer justified.

Strengths and limitations

- Evidence is needed to see if the changes in suicidal ideation is sustained over time

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3 Patients who say they feel they would be 'better off dead' worry clinicians and, for that
4 matter, research ethics committees approving depression trials, especially trials over the
5 internet. As a consequence, patients reporting suicidal ideas are often excluded from internet
6 treatment trials (1-3). Given that suicidal thoughts are an integral part of depression we
7 sought data to provide a rational basis for inclusion/exclusion of people with suicidal ideas.
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12 Rates of suicide can be reduced through treatment of depression or reduction in access to the
13 means for suicide (4-6). The efficacy of cognitive behavioural therapy (CBT) in treating
14 depression has been established. Suicidal ideas and attempts decrease, commensurate with
15 reductions in depressive symptomatology (7-15). These studies have all been conducted
16 within a clinical trial framework amongst depressed patients selected for their high suicide
17 risk. To our knowledge, there is currently no evidence regarding the effectiveness of CBT or
18 internet CBT (iCBT) in reducing suicidal ideation in the depressed patient seeking treatment
19 in primary care, and no data to inform inclusion/exclusion criteria in clinical trials.
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24 We have previously reported from two randomized controlled trials that the progress of
25 patients receiving the internet CBT course used in this study was significantly better than the
26 progress of a waitlist control group (1, 2). We have also reported from quality assurance
27 studies that when these courses were used routinely by primary care clinicians that
28 effectiveness was comparable to the efficacy and that adherence rates of 60% could be
29 achieved (16, 17). The aim of the current quality assurance study is to examine reductions in
30 suicidal ideation amongst a sample of patients who were prescribed an internet CBT course
31 for depression by primary care clinicians.
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34 35 36 37 38 39 40 41 **Method**

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44 *Sample:* Primary care physicians prescribed the internet depression course for patients they
45 deemed suitable (1). They were advised to exclude people who were 'actively suicidal'. As
46 part of a routine quality assurance exercise we analysed the progress of the 299 primary care
47 patients who completed the six lesson iCBT depression course between April 2009 and May
48 2011 (1). Data gathered was confined to measures used as a routine to inform practitioners
49 about the progress of their patients. All patients agreed that their pooled data could be used
50 for quality assurance purposes. This paper was written as part of the Quality Assurance
51 activities of St Vincent's Hospital with whom the draft of the paper was lodged prior to
52 submission.
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3 *Intervention:* The iCBT depression course consists of six lessons covering psycho-education,
4 behavioural activation, cognitive restructuring, problem solving, graded exposure and
5 relapse prevention (1, 2). Content is presented in the form of an illustrated story in which the
6 character gains mastery over their depressive symptoms. At the end of each illustrated
7 lesson the patient downloads “homework,” comprising a summary of the lesson content, and
8 activities to be completed that translate the skills learnt in the lesson to their own lives.
9 Automatic emails are also sent congratulating patients when they complete lessons.
10 Clinicians are advised to contact patients at least twice during the course.
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17 *Outcome measures:* The Patient Health Questionnaire (PHQ-9) is a brief 9-item measure of
18 depression severity (18). The nine items assess DSM-IV Criterion A for major depressive
19 disorder (MDD). Patients rate each item in terms of the frequency of symptoms over the
20 past two weeks, on a 4-point scale (0= not at all, 1= several days, 2 = more than half of the
21 days, 3= nearly every day). Scores can range from 0 to 27, with higher levels representing
22 higher symptom severity. Cut points for MDD have been established as follows: 0-9 = well
23 or sub-threshold, 10-14 = mild, 15-19 = moderate, and 20-27 = severe depression (19).
24 Suicidal ideation was measured by question nine from the PHQ-9 which asks about the
25 frequency of suicidal ideation (“thoughts that you would be better off dead, or of hurting
26 yourself in some way”) in the previous two weeks using the above 4 point scale. The PHQ-9
27 has been shown to demonstrate adequate reliability, convergent/discriminant validity, and
28 responsiveness to change in previous studies of iCBT (20), with a Cronbach’s alpha of 0.89
29 in the current sample.
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40 *Statistical Analysis:* Changes in participants’ PHQ-9 scores from pre- to post-treatment were
41 analysed using a paired samples t-test. Multivariate linear regression controlling for baseline
42 PHQ-9 scores was used to investigate the effect of sex and age on post-treatment PHQ-9
43 scores. A Wilcoxon signed-rank test was used to analyse differences in suicidal ideation in
44 response to treatment. Multinomial logistic regression controlling for baseline suicidality
45 investigated the effect of sex and age on post-treatment suicidal ideation. An alpha of .05
46 was used to test statistical significance.
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52 **Results**

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55 *Baseline characteristics:* The mean age of the 299 patients who completed the 6 lesson
56 course was 43 years, 56% female. The mean baseline PHQ-9 score was 14.3 with 83
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3 patients scoring 0-9 (well or subthreshold MDD), and 216 scoring 10-27 and likely to meet
4 criteria for MDD ($n=72$ mild, $n=70$ moderate, and $n=74$ severe MDD). Prior to
5 commencing lesson 1, 54% of the patients (162/299) reported some level of suicidal ideation
6 on question 9 of the PHQ-9: 30% (91/299) had thought about it for several days in the past
7 two weeks, 15% (45/299) thought about it more than half the days and 9% (26/299)
8 indicated that they thought about suicide nearly every day.
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14 *Post-treatment outcomes:* From pre- to post-treatment there was a significant reduction in
15 PHQ-9 scores [$t(298) = 18.1, p < .001$], with PHQ-9 scores reducing by 6.2 points on
16 average [S.D. = 5.9; $d = 0.98$ (95% CI:)]. A multivariate linear regression controlling for
17 baseline PHQ-9 scores indicated that age and gender were not statistically significant
18 predictors of post-treatment PHQ-9 scores. The reduction in suicidal ideation was
19 considerable and evident at all frequencies, with only 30% (90/299) reporting suicidal
20 ideation at lesson 6 (see Figure). A Wilcoxin signed-rank test showed a statistically
21 significant change in suicidal ideation ($Z = -7.9, p < 0.001, r = 0.5$) as measured by question 9
22 on the PHQ-9, with median scores of 1 (“several days”) pre-intervention and 0 (“not at all”)
23 post-intervention. A multinomial logistic regression controlling for baseline suicidal ideation
24 scores indicated that age and gender were not statistically significant predictors of post-
25 intervention suicidal ideation scores. Patient reported a median of 1 (range 0-2) clinician
26 contacts during the course.
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37 <Insert Table and Figure here>
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40 Discussion

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42 Suicidal ideation was common (54%) amongst primary care patients prescribed treatment for
43 depression but dropped to 30% post treatment despite minimal clinician contact and the
44 absence of an intervention focused on suicidal ideation. This reduction in suicidal ideation
45 was evident regardless of sex and age. To our knowledge, this is the first study to ~~show that~~
46 an internet CBT course for depression reduces suicidal ideation document an association
47 between iCBT for depression and reductions in suicidal ideation.
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54 The benefits in reducing suicidal ideas are clear. Suicidal behaviour lies on a continuum
55 from thoughts, through intent and planning, to attempt. In the general population it has been
56 shown that 34% of people with ideas develop suicidal plans, and that these plans lead to
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3 suicide attempts in 72% of cases (15, 21). That is, 1 in 4 people who report suicidal ideation
4 will transition to a suicide attempt, most within the first year of ideation onset (21). Suicide
5 attempts are significant predictors of subsequent completed suicide. Suicidal ideas are
6 distressing and dangerous, and therefore an important target for treatment.
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11 We have conducted two randomised controlled trials of our iCBT program for depression (1,
12 2). In the first trial, 33% of applicants were excluded due to suicidal ideation. In the second,
13 23% were excluded due to suicidal ideation. Based on the current results it is now difficult to
14 justify excluding patients from clinical trials on the basis of their high suicidal ideation
15 scores when internet CBT can reduce them quickly and effectively.
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21 *Limitations:* Whilst the item from the PHQ-9 assessed the presence and frequency of suicidal
22 ideation, it did not assess the intensity of the ideation, controllability, intention to act on
23 thoughts, nor suicide plans or means. Evidence is also needed to understand whether the
24 changes in suicidal ideation observed in this study are sustained over time. In addition, there
25 was no control sample, meaning that treatment effects could be attributable to regression to
26 the mean, spontaneous remission or placebo effects, rather than the intervention *per se*. The
27 fact that benefits were observed amongst patients at different levels of baseline risk indicates
28 that regression to the mean may not underlie treatment effects. However, it is not possible to
29 fully examine the influence of these alternative factors on the outcomes of interest. It was
30 also not possible to establish whether treatment effects were sustained over time due to the
31 lack of follow up data. Finally, the lack of formal exclusion criteria means that patients may
32 have been using adjunctive treatments which contributed to the magnitude of treatment
33 effects. Whilst the limitations outlined above may be critical within the context of an
34 efficacy trial, they are endemic to effectiveness research.
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45 *Conclusion:* Both suicidal ideation and depressive symptomatology were reduced
46 considerably following completion of a six lesson iCBT course for depression. This is the
47 first study to demonstrate ~~these benefits~~this association in primary care. At present, it is
48 routine to exclude patients with frequent suicidal ideation from participating in iCBT. This
49 study provides evidence for change.
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Contributors

SW drafted the initial manuscript, prepared and cleaned the data, and conducted initial data analysis. LM and JN conducted further statistical analysis. GA supervised and took responsibility for the data. All four authors contributed to revised drafts.

For peer review only

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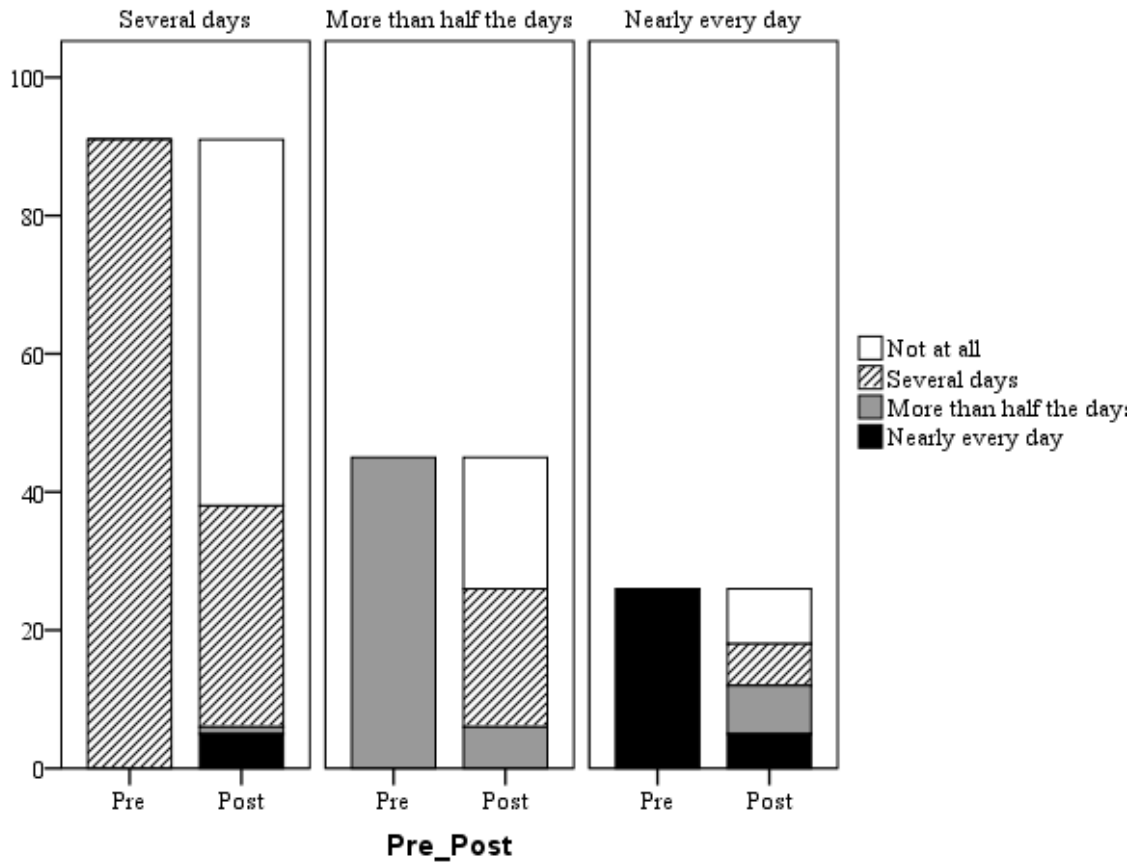


Figure. Frequency of suicidal thoughts (number of patients) before and after treatment for depression.

Review only