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Reductions in suicidality after internet cognitive behaviour therapy for depression.

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Text 1226 words; abstract 116 words

Reductions in suicidality after internet cognitive behaviour therapy for depression.

Sarah Watts [1]

Jill M. Newby[1]

Louise Mewton[1,2]

Gavin Andrews [1]

1. Clinical Research Unit for Anxiety and Depression, School of Psychiatry, University of New South Wales at St Vincent's Hospital, Darlinghurst, NSW, Australia.
2. Corresponding author.

Competing interests

None declared

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

Patients who say they feel they would be 'better off dead' worry clinicians and, for that matter, research ethics committees approving depression trials, especially trials over the internet. As a consequence, patients reporting suicidal ideas are often arbitrarily excluded from internet treatment trials (1-3). Given that suicidal thoughts are an integral part of depression we sought data to provide a rational basis for inclusion/exclusion of people with suicidal ideas.

Rates of suicide can be reduced through treatment of depression or reduction in access to the means for suicide (4-6). The efficacy of cognitive behavioural therapy (CBT) in treating depression has been established. Suicidal ideas and attempts decrease, commensurate with reductions in depressive symptomatology (7-15). These studies have all been conducted within a clinical trial framework amongst depressed patients selected for their high suicide risk. To our knowledge, there is currently no evidence regarding the effectiveness of CBT or internet CBT (iCBT) in reducing suicidal ideation in the depressed patient seeking treatment in primary care, and no data to inform inclusion/exclusion criteria in clinical trials.

The aim of the current quality assurance study is to therefore examine reductions in both depressive symptomatology and suicidal ideation amongst a sample of patients who were prescribed an internet CBT course for depression by primary care clinicians.

Method

Sample: Primary care physicians prescribed the internet depression course for patients they deemed suitable (1). They were advised to exclude people who were 'actively suicidal'. As part of a routine quality assurance exercise we analysed the progress of the 299 primary care patients who completed the six lesson iCBT depression course between April 2009 and May 2011 (1). Data gathered was confined to measures used as a routine to inform practitioners about the progress of their patients. All patients agreed that their pooled data could be used for quality assurance purposes. This paper was written as part of the Quality Assurance activities of St Vincent's Hospital with whom the draft of the paper was lodged prior to submission.

Intervention: The iCBT depression course consists of six lessons covering psycho-education, behavioural activation, cognitive restructuring, problem solving, graded exposure and relapse prevention. Content is presented in the form of an illustrated story in which the character gains mastery over their depressive symptoms. At the end of each illustrated

lesson the patient downloads "homework," comprising a summary of the lesson content, and activities to be completed that translate the skills learnt in the lesson to their own lives. Automatic emails are also sent congratulating patients when they complete lessons. Clinicians are advised to contact patients at least twice during the course.

Outcome measures: The Patient Health Questionnaire (PHQ-9) is a brief 9-item measure of depression severity (16). The nine items assess DSM-IV Criterion A for major depressive disorder (MDD). Patients rate each item in terms of the frequency of symptoms over the past two weeks, on a 4-point scale (0= not at all, 1= several days, 2 = more than half of the days, 3= nearly every day). Scores can range from 0 to 27, with higher levels representing higher symptom severity. Cut points for MDD have been established as follows: 0-9 = well or sub-threshold, 10-14 = mild, 15-19 = moderate, and 20-27 = severe depression (17). Suicidal ideation was measured by question nine from the PHQ-9 which asks about the frequency of suicidal ideation ("thoughts that you would be better off dead, or of hurting yourself in some way") in the previous two weeks using the above 4 point scale.

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

Results

Baseline characteristics: The mean age of the 299 patients who completed the 6 lesson course was 43 years, 56% female. The mean baseline PHQ-9 score was 14.3 with 83 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 ($d = 0.98$). 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 ($Z = -7.9$, $p < 0.001$) 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.

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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 shown that 34% of people with ideas develop suicidal plans, and that these plans lead to suicide attempts in 72% of cases (15, 18). That is, 1 in 4 people who report suicidal ideation will transition to a suicide attempt, most within the first year of ideation onset (18). Suicide attempts are significant predictors of subsequent completed suicide. Suicidal ideas are distressing and dangerous, and therefore an important target for treatment.

We have conducted two randomised controlled trials of our iCBT program for depression (1, 2). In the first trial, 33% of applicants were excluded due to suicidal ideation. In the second, 23% were excluded due to suicidal ideation. Based on the current results it is now difficult to

justify excluding patients from clinical trials on the basis of their high suicidal ideation scores when internet CBT can reduce them quickly and effectively.

Limitations: Whilst the item from the PHQ-9 assessed the presence and frequency of suicidal ideation, it did not assess the intensity of the ideation, controllability, intention to act on thoughts, nor suicide plans or means. Evidence is also needed to understand whether the changes in suicidal ideation observed in this study are sustained over time.

Conclusion: Both suicidal ideation and depressive symptomatology were reduced considerably following completion of a six lesson iCBT course for depression. This is the first study to demonstrate these benefits in primary care. At present, it is routine to exclude patients with frequent suicidal ideation from participating in iCBT. This study provides evidence for change.

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 the trial. All four authors contributed to revised paper drafts.

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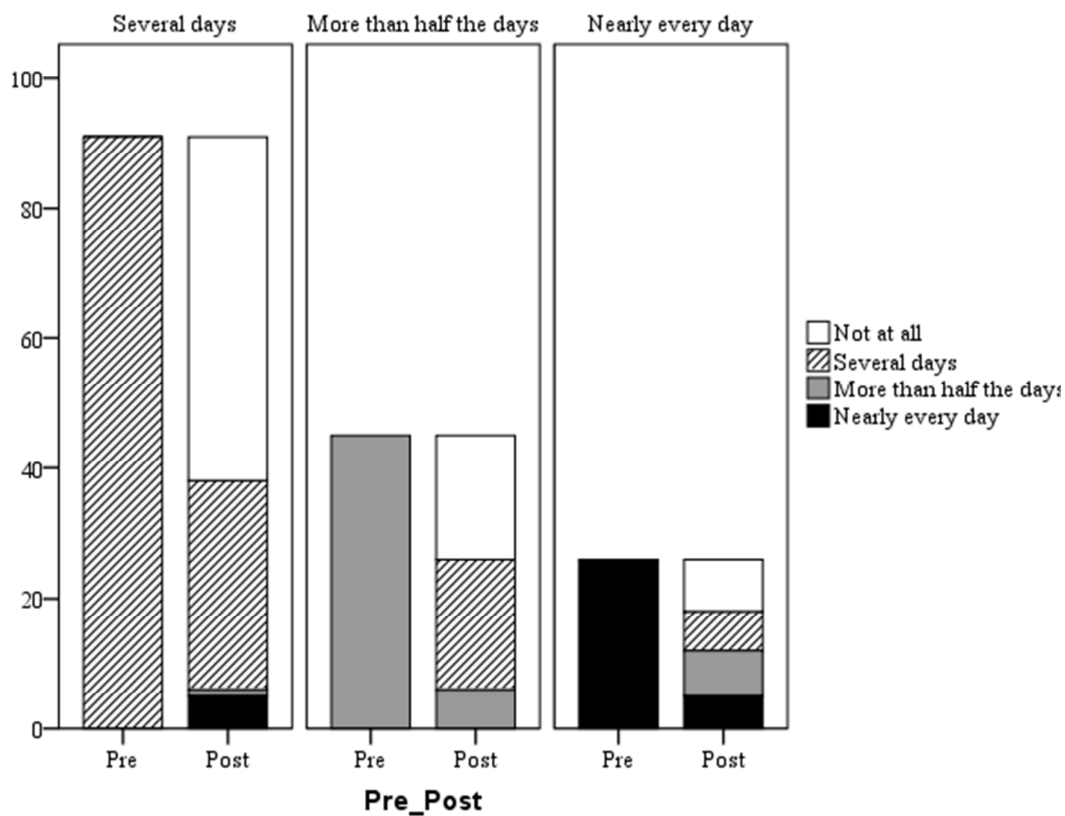
Figure. Frequency of suicidal thoughts (number of patients) before and after treatment for depression.

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SQUIRE Guidelines
(**S**tandards for **QU**ality **I**mprovement **R**eporting **E**xcellence)
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).

Text section; Item number and name	Section or Item description
Title and abstract	*Did you provide clear and accurate information for finding, indexing, and scanning your paper?*
1. Title	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
Introduction	*Why did you start?*
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	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
Methods	*What did you do?*
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	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)

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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., *what* was to be done (initial steps; functions to be accomplished by those steps; how tests of change would be used to modify intervention), and *by whom* (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	*What did you find?*

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)

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Text section; Item number and name	Section or Item description
Outcomes (continued)	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
Discussion	*What do the findings mean?*
14. Summary	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	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	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	a. Considers overall practical usefulness of the intervention b. Suggests implications of this report for further studies of improvement interventions
Other information	*Were other factors relevant to conduct and interpretation of the study?*
19. Funding	Describes funding sources, if any, and role of funding organization in design, implementation, interpretation, and publication of study

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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
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Strengths and limitations

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

Patients who say they feel they would be 'better off dead' worry clinicians and, for that matter, research ethics committees approving depression trials, especially trials over the internet. As a consequence, patients reporting suicidal ideas are often excluded from internet treatment trials (1-3). Given that suicidal thoughts are an integral part of depression we sought data to provide a rational basis for inclusion/exclusion of people with suicidal ideas.

Rates of suicide can be reduced through treatment of depression or reduction in access to the means for suicide (4-6). The efficacy of cognitive behavioural therapy (CBT) in treating depression has been established. Suicidal ideas and attempts decrease, commensurate with reductions in depressive symptomatology (7-15). These studies have all been conducted within a clinical trial framework amongst depressed patients selected for their high suicide risk. To our knowledge, there is currently no evidence regarding the effectiveness of CBT or internet CBT (iCBT) in reducing suicidal ideation in the depressed patient seeking treatment in primary care, and no data to inform inclusion/exclusion criteria in clinical trials.

We have previously reported from two randomized controlled trials that the progress of patients receiving the internet CBT course used in this study was significantly better than the progress of a waitlist control group (1, 2). We have also reported from quality assurance studies that when these courses were used routinely by primary care clinicians that effectiveness was comparable to the efficacy and that adherence rates of 60% could be achieved (16, 17). The aim of the current quality assurance study is to examine reductions in suicidal ideation amongst a sample of patients who were prescribed an internet CBT course for depression by primary care clinicians.

Method

Sample: Primary care physicians prescribed the internet depression course for patients they deemed suitable (1). They were advised to exclude people who were 'actively suicidal'. As part of a routine quality assurance exercise we analysed the progress of the 299 primary care patients who completed the six lesson iCBT depression course between April 2009 and May 2011 (1). Data gathered was confined to measures used as a routine to inform practitioners about the progress of their patients. All patients agreed that their pooled data could be used for quality assurance purposes. This paper was written as part of the Quality Assurance activities of St Vincent's Hospital with whom the draft of the paper was lodged prior to submission.

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

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Baseline characteristics: The mean age of the 299 patients who completed the 6 lesson course was 43 years, 56% female. The mean baseline PHQ-9 score was 14.3 with 83

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.

<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 shown that 34% of people with ideas develop suicidal plans, and that these plans lead to suicide attempts in 72% of cases (15, 21). That is, 1 in 4 people who report suicidal ideation

will transition to a suicide attempt, most within the first year of ideation onset (21). Suicide attempts are significant predictors of subsequent completed suicide. Suicidal ideas are distressing and dangerous, and therefore an important target for treatment.

We have conducted two randomised controlled trials of our iCBT program for depression (1, 2). In the first trial, 33% of applicants were excluded due to suicidal ideation. In the second, 23% were excluded due to suicidal ideation. Based on the current results it is now difficult to justify excluding patients from clinical trials on the basis of their high suicidal ideation scores when internet CBT can reduce them quickly and effectively.

Limitations: Whilst the item from the PHQ-9 assessed the presence and frequency of suicidal ideation, it did not assess the intensity of the ideation, controllability, intention to act on thoughts, nor suicide plans or means. Evidence is also needed to understand whether the changes in suicidal ideation observed in this study are sustained over time. In addition, there was no control sample, meaning that treatment effects could be attributable to regression to the mean, spontaneous remission or placebo effects, rather than the intervention *per se*. The fact that benefits were observed amongst patients at different levels of baseline risk indicates that regression to the mean may not underlie treatment effects. However, it is not possible to fully examine the influence of these alternative factors on the outcomes of interest. It was also not possible to establish whether treatment effects were sustained over time due to the lack of follow up data. Finally, the lack of formal exclusion criteria means that patients may have been using adjunctive treatments which contributed to the magnitude of treatment effects. Whilst the limitations outlined above may be critical within the context of an efficacy trial, they are endemic to effectiveness research.

Conclusion: Both suicidal ideation and depressive symptomatology were reduced considerably following completion of a six lesson iCBT course for depression. This is the first study to demonstrate these benefits in primary care. At present, it is routine to exclude patients with frequent suicidal ideation from participating in iCBT. This study provides evidence for change.

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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Text 1226 words; abstract 116 words

Reductions in suicidality after internet cognitive behaviour therapy for depression.

Sarah Watts [1]

Jill M. Newby[1]

Louise Mewton[1,2]

Gavin Andrews [1]

1. Clinical Research Unit for Anxiety and Depression, School of Psychiatry, University of New South Wales at St Vincent's Hospital, Darlinghurst, NSW, Australia.

2. Corresponding author.

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

Patients who say they feel they would be 'better off dead' worry clinicians and, for that matter, research ethics committees approving depression trials, especially trials over the internet. As a consequence, patients reporting suicidal ideas are often ~~arbitrarily~~ excluded from internet treatment trials (1-3). Given that suicidal thoughts are an integral part of depression we sought data to provide a rational basis for inclusion/exclusion of people with suicidal ideas.

Rates of suicide can be reduced through treatment of depression or reduction in access to the means for suicide (4-6). The efficacy of cognitive behavioural therapy (CBT) in treating depression has been established. Suicidal ideas and attempts decrease, commensurate with reductions in depressive symptomatology (7-15). These studies have all been conducted within a clinical trial framework amongst depressed patients selected for their high suicide risk. To our knowledge, there is currently no evidence regarding the effectiveness of CBT or internet CBT (iCBT) in reducing suicidal ideation in the depressed patient seeking treatment in primary care, and no data to inform inclusion/exclusion criteria in clinical trials.

We have previously reported from two randomized controlled trials that the progress of patients receiving the internet CBT course used in this study was significantly better than the progress of a waitlist control group (1, 2). We have also reported from quality assurance studies that when these courses were used routinely by primary care clinicians that effectiveness was comparable to the efficacy and that adherence rates of 60% could be achieved (16, 17). The aim of the current quality assurance study is to ~~therefore~~ examine reductions in suicidal ideation amongst a sample of patients who were prescribed an internet CBT course for depression by primary care clinicians.

Method

Sample: Primary care physicians prescribed the internet depression course for patients they deemed suitable (1). They were advised to exclude people who were 'actively suicidal'. As part of a routine quality assurance exercise we analysed the progress of the 299 primary care patients who completed the six lesson iCBT depression course between April 2009 and May 2011 (1). Data gathered was confined to measures used as a routine to inform practitioners about the progress of their patients. All patients agreed that their pooled data could be used for quality assurance purposes. This paper was written as part of the Quality Assurance

activities of St Vincent's Hospital with whom the draft of the paper was lodged prior to submission.

Intervention: The iCBT depression course consists of six lessons covering psycho-education, behavioural activation, cognitive restructuring, problem solving, graded exposure and relapse prevention (1, 2). Content is presented in the form of an illustrated story in which the character gains mastery over their depressive symptoms. At the end of each illustrated lesson the patient downloads "homework," comprising a summary of the lesson content, and activities to be completed that translate the skills learnt in the lesson to their own lives. Automatic emails are also sent congratulating patients when they complete lessons. Clinicians are advised to contact patients at least twice during the course.

Outcome measures: The Patient Health Questionnaire (PHQ-9) is a brief 9-item measure of depression severity (18). The nine items assess DSM-IV Criterion A for major depressive disorder (MDD). Patients rate each item in terms of the frequency of symptoms over the past two weeks, on a 4-point scale (0= not at all, 1= several days, 2 = more than half of the days, 3= nearly every day). Scores can range from 0 to 27, with higher levels representing higher symptom severity. Cut points for MDD have been established as follows: 0-9 = well or sub-threshold, 10-14 = mild, 15-19 = moderate, and 20-27 = severe depression (19). Suicidal ideation was measured by question nine from the PHQ-9 which asks about the frequency of suicidal ideation ("thoughts that you would be better off dead, or of hurting yourself in some way") in the previous two weeks using the above 4 point scale. The PHQ-9 has been shown to demonstrate adequate reliability, convergent/discriminant validity, and responsiveness to change in previous studies of iCBT (20), with a Cronbach's alpha of 0.89 in the current sample.

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

Results

Baseline characteristics: The mean age of the 299 patients who completed the 6 lesson course was 43 years, 56% female. The mean baseline PHQ-9 score was 14.3 with 83 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.

<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

shown that 34% of people with ideas develop suicidal plans, and that these plans lead to suicide attempts in 72% of cases (15, 21). That is, 1 in 4 people who report suicidal ideation will transition to a suicide attempt, most within the first year of ideation onset (21). Suicide attempts are significant predictors of subsequent completed suicide. Suicidal ideas are distressing and dangerous, and therefore an important target for treatment.

We have conducted two randomised controlled trials of our iCBT program for depression (1, 2). In the first trial, 33% of applicants were excluded due to suicidal ideation. In the second, 23% were excluded due to suicidal ideation. Based on the current results it is now difficult to justify excluding patients from clinical trials on the basis of their high suicidal ideation scores when internet CBT can reduce them quickly and effectively.

Limitations: Whilst the item from the PHQ-9 assessed the presence and frequency of suicidal ideation, it did not assess the intensity of the ideation, controllability, intention to act on thoughts, nor suicide plans or means. Evidence is also needed to understand whether the changes in suicidal ideation observed in this study are sustained over time. In addition, there was no control sample, meaning that treatment effects could be attributable to regression to the mean, spontaneous remission or placebo effects, rather than the intervention *per se*. The fact that benefits were observed amongst patients at different levels of baseline risk indicates that regression to the mean may not underlie treatment effects. However, it is not possible to fully examine the influence of these alternative factors on the outcomes of interest. It was also not possible to establish whether treatment effects were sustained over time due to the lack of follow up data. Finally, the lack of formal exclusion criteria means that patients may have been using adjunctive treatments which contributed to the magnitude of treatment effects. Whilst the limitations outlined above may be critical within the context of an efficacy trial, they are endemic to effectiveness research.

Conclusion: Both suicidal ideation and depressive symptomatology were reduced considerably following completion of a six lesson iCBT course for depression. This is the first study to demonstrate these benefits in primary care. At present, it is routine to exclude patients with frequent suicidal ideation from participating in iCBT. This study provides evidence for change.

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 datathe trial. All four authors contributed to revised paper drafts.

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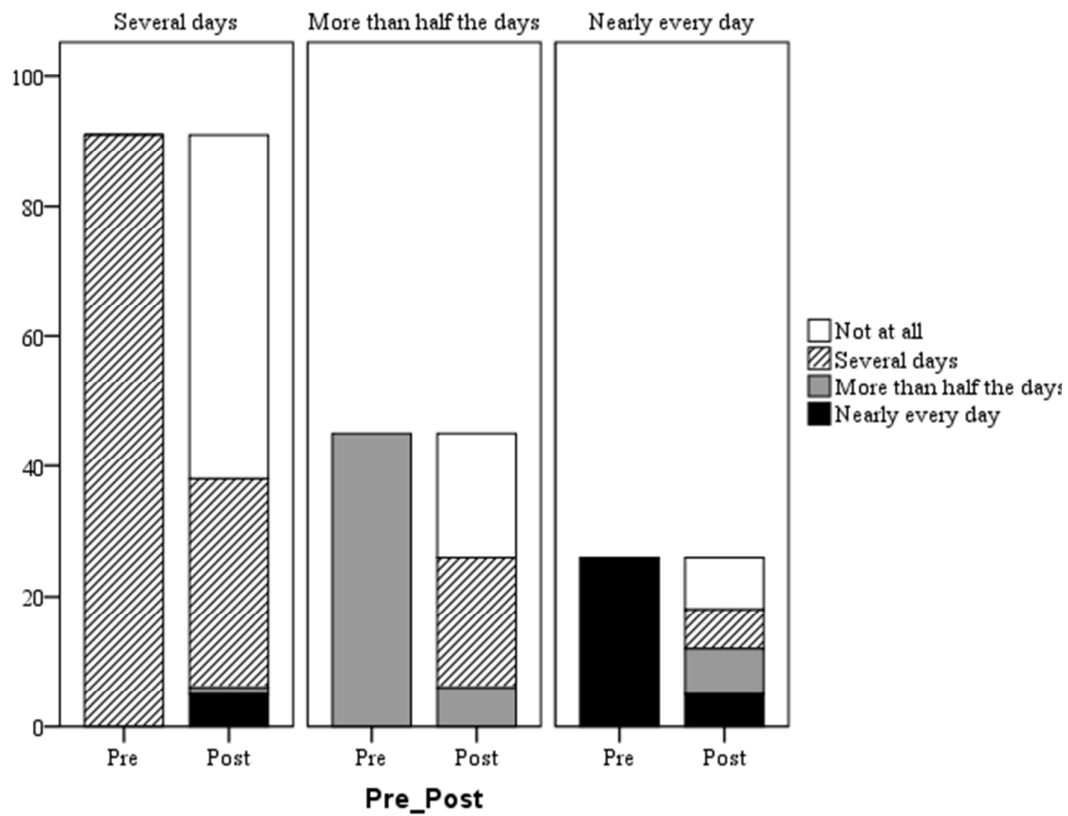|	Not at all	Several days	More than half the days	Nearly every day
Pre-intervention PHQ-9 score	137 (45.8%)	91 (30.4%)	45 (15.15%)	26 (8.7%)
Post-intervention PHQ-9 score	209 (69.9%)	66 (22.1%)	14 (4.7%)	10 (3.3%)

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).

Text section; Item number and name	Section or Item description
Title and abstract	*Did you provide clear and accurate information for finding, indexing, and scanning your paper?*
1. Title	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
Introduction	*Why did you start?*
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	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
Methods	*What did you do?*
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	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., *what* was to be done (initial steps; functions to be accomplished by those steps; how tests of change would be used to modify intervention), and *by whom* (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	*What did you find?*

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)

SQUIRE Publication Guidelines – Final revision – 4-29-08
Page 3

Text section; Item number and name	Section or Item description
Outcomes (continued)	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
Discussion	*What do the findings mean?*
14. Summary	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	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	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	a. Considers overall practical usefulness of the intervention b. Suggests implications of this report for further studies of improvement interventions
Other information	*Were other factors relevant to conduct and interpretation of the study?*
19. Funding	Describes funding sources, if any, and role of funding organization in design, implementation, interpretation, and publication of study

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

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Manuscripts

Text 1541 words; abstract 138 words

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

Sarah Watts [1]

Jill M. Newby[1]

Louise Mewton[1,2]

Gavin Andrews [1]

1. Clinical Research Unit for Anxiety and Depression, School of Psychiatry, University of New South Wales at St Vincent's Hospital, Darlinghurst, NSW, Australia.
2. Corresponding author.

Competing interests

None declared

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Rates of suicide can be reduced through treatment of depression or reduction in access to the means for suicide (4-6). The efficacy of cognitive behavioural therapy (CBT) in treating depression has been established. Suicidal ideas and attempts decrease, commensurate with reductions in depressive symptomatology (7-15). These studies have all been conducted within a clinical trial framework amongst depressed patients selected for their high suicide risk. To our knowledge, there is currently no evidence regarding the effectiveness of CBT or internet CBT (iCBT) in reducing suicidal ideation in the depressed patient seeking treatment in primary care, and no data to inform inclusion/exclusion criteria in clinical trials.

We have previously reported from two randomized controlled trials that the progress of patients receiving the internet CBT course used in this study was significantly better than the progress of a waitlist control group (1, 2). We have also reported from quality assurance studies that when these courses were used routinely by primary care clinicians that effectiveness was comparable to the efficacy and that adherence rates of 60% could be achieved (16, 17). The aim of the current quality assurance study is to examine reductions in suicidal ideation amongst a sample of patients who were prescribed an internet CBT course for depression by primary care clinicians.

Method

Sample: Primary care physicians prescribed the internet depression course for patients they deemed suitable (1). They were advised to exclude people who were 'actively suicidal'. As part of a routine quality assurance exercise we analysed the progress of the 299 primary care patients who completed the six lesson iCBT depression course between April 2009 and May 2011 (1). Data gathered was confined to measures used as a routine to inform practitioners about the progress of their patients. All patients agreed that their pooled data could be used for quality assurance purposes. This paper was written as part of the Quality Assurance activities of St Vincent's Hospital with whom the draft of the paper was lodged prior to submission.

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Intervention: The iCBT depression course consists of six lessons covering psycho-education, behavioural activation, cognitive restructuring, problem solving, graded exposure and relapse prevention (1, 2). Content is presented in the form of an illustrated story in which the character gains mastery over their depressive symptoms. At the end of each illustrated lesson the patient downloads "homework," comprising a summary of the lesson content, and activities to be completed that translate the skills learnt in the lesson to their own lives. Automatic emails are also sent congratulating patients when they complete lessons. Clinicians are advised to contact patients at least twice during the course.

Outcome measures: The Patient Health Questionnaire (PHQ-9) is a brief 9-item measure of depression severity (18). The nine items assess DSM-IV Criterion A for major depressive disorder (MDD). Patients rate each item in terms of the frequency of symptoms over the past two weeks, on a 4-point scale (0= not at all, 1= several days, 2 = more than half of the days, 3= nearly every day). Scores can range from 0 to 27, with higher levels representing higher symptom severity. Cut points for MDD have been established as follows: 0-9 = well or sub-threshold, 10-14 = mild, 15-19 = moderate, and 20-27 = severe depression (19). Suicidal ideation was measured by question nine from the PHQ-9 which asks about the frequency of suicidal ideation ("thoughts that you would be better off dead, or of hurting yourself in some way") in the previous two weeks using the above 4 point scale. The PHQ-9 has been shown to demonstrate adequate reliability, convergent/discriminant validity, and responsiveness to change in previous studies of iCBT (20), with a Cronbach's alpha of 0.89 in the current sample.

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

Results

Baseline characteristics: The mean age of the 299 patients who completed the 6 lesson course was 43 years, 56% female. The mean baseline PHQ-9 score was 14.3 with 83

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

was evident regardless of sex and age. To our knowledge, this is the first study to document an association between iCBT for depression and reductions in 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 shown that 34% of people with ideas develop suicidal plans, and that these plans lead to suicide attempts in 72% of cases (15, 21). That is, 1 in 4 people who report suicidal ideation will transition to a suicide attempt, most within the first year of ideation onset (21). Suicide attempts are significant predictors of subsequent completed suicide. Suicidal ideas are distressing and dangerous, and therefore an important target for treatment.

We have conducted two randomised controlled trials of our iCBT program for depression (1, 2). In the first trial, 33% of applicants were excluded due to suicidal ideation. In the second, 23% were excluded due to suicidal ideation. Based on the current results it is now difficult to justify excluding patients from clinical trials on the basis of their high suicidal ideation scores when internet CBT can reduce them quickly and effectively.

Limitations: Whilst the item from the PHQ-9 assessed the presence and frequency of suicidal ideation, it did not assess the intensity of the ideation, controllability, intention to act on thoughts, nor suicide plans or means. Evidence is also needed to understand whether the changes in suicidal ideation observed in this study are sustained over time. In addition, there was no control sample, meaning that treatment effects could be attributable to regression to the mean, spontaneous remission or placebo effects, rather than the intervention *per se*. The fact that benefits were observed amongst patients at different levels of baseline risk indicates that regression to the mean may not underlie treatment effects. However, it is not possible to fully examine the influence of these alternative factors on the outcomes of interest. It was also not possible to establish whether treatment effects were sustained over time due to the lack of follow up data. Finally, the lack of formal exclusion criteria means that patients may have been using adjunctive treatments which contributed to the magnitude of treatment effects. Whilst the limitations outlined above may be critical within the context of an efficacy trial, they are endemic to effectiveness research.

Conclusion: Both suicidal ideation and depressive symptomatology were reduced considerably following completion of a six lesson iCBT course for depression. This is the

first study to demonstrate this association in primary care. At present, it is routine to exclude patients with frequent suicidal ideation from participating in iCBT. This study provides evidence for change.

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.

Data Sharing Statement

No additional data available

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Text 1541 words; abstract 138 words

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

~~Reductions in suicidality after internet cognitive behaviour therapy for depression.~~

Sarah Watts [1]

Jill M. Newby[1]

Louise Mewton[1,2]

Gavin Andrews [1]

1. Clinical Research Unit for Anxiety and Depression, School of Psychiatry, University of New South Wales at St Vincent's Hospital, Darlinghurst, NSW, Australia.
2. Corresponding author.

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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<Insert Table and Figure here>

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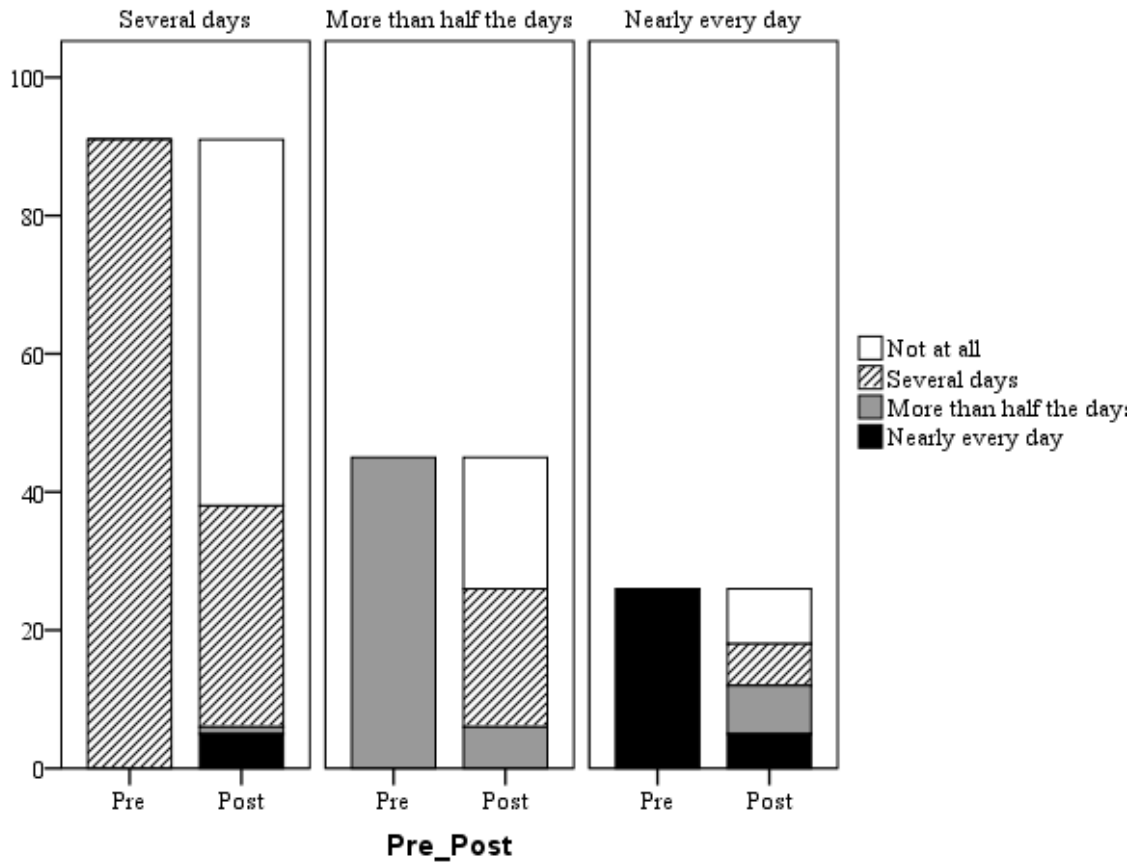
Figure. Frequency of suicidal thoughts (number of patients) before and after treatment for depression.