The Effectiveness of Telemental Health Applications: A Review

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Objective: To review the evidence of benefit from use of telemental health (TMH) in studies that reported clinical or administrative outcomes.

Method: Relevant publications were identified through computerized literature searches using several electronic databases. Included for review were scientifically valid articles that described controlled studies, comparing TMH with a non-TMH alternative, and uncontrolled studies that had no fewer than 20 participants. Quality of the evidence was assessed with an approach that considers both study performance and study design. Judgments were made on whether further data were needed to establish each TMH application as suitable for routine clinical use.

Results: Included in the review were 72 papers that described 65 clinical studies; 32 (49%) studies were of high or good quality. Quality of evidence was higher for Internet- and telephone-based interventions than for video conferencing approaches. There was evidence of success with TMH in the areas of child psychiatry, depression, dementia, schizophrenia, suicide prevention, posttraumatic stress, panic disorders, substance abuse, eating disorders, and smoking prevention. Evidence of success for general TMH programs and in the management of obsessive–compulsive disorder were less convincing. Further study was judged to be necessary or desirable in 53 (82%) of the studies.

Conclusion: Evidence of benefit from TMH applications is encouraging, though still limited. There is a need for more good-quality studies on the use of TMH in routine care. The emerging use of Internet-based applications is an important development that deserves further evaluation.

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Clinical Implications

- There is encouraging evidence of the successful use of TMH in several applications. However, further work to establish its suitability in routine practice is desirable.
- Internet-based approaches to TMH are likely to increase in importance.

Limitations

- The evidence base for TMH outcomes remains small.
- Assessment of quality is based in part on subjective judgments on study attributes.
- Findings on TMH success and need for further study are based on published material and do not necessarily reflect specific clinical experience.

Key Words: telemedicine, psychiatry, study quality, systematic review, outcome assessment

Telemedicine has been used in many countries for the delivery of mental health care, particularly psychiatric services, but there is still comparatively little information on the effectiveness of this approach to health services delivery. Several reviews have identified the benefits and potential of TMH, but have noted the need for additional good-quality studies.¹⁻⁴ There is continued interest in defining the status and potential of TMH as a guide to decision makers in health care.

As part of a collaborative project between the Institute of Health Economics, Edmonton, and the Finnish Office for Health Technology Assessment, Helsinki, we reviewed the current evidence available on the effectiveness of TMH services. Our study reviewed the evidence of benefit from TMH services, comparing results for different information technologies, and taking account of study quality.

For the purposes of our review, we took TMH to be defined as the use of electronic communications technology to eliminate or reduce geographic barriers to receiving psychiatric and other mental health services provided by many mental health providers.⁵ We considered the use of any form of communication technology and included services for management of alcohol and substance abuse, eating disorders, and smoking prevention.

Methods

In considering the evidence of effectiveness of TMH applications, we focused on studies that reported clinical or administrative outcomes. Administrative outcomes were those based on administrative data that were related to the performance of a health care organization or system. We did not consider publications that reported outcomes only in terms of satisfaction with TMH. Although obtaining indications of satisfaction is an important operational aspect for telemedicine programs, satisfaction is not regarded as a strong measure of outcome.⁶ Also, we did not include, for the purposes of this project, studies that reported outcomes only for caregivers and not for patients.

Searches were performed using MEDLINE, HealthSTAR, EMBASE, PsycINFO, and CINAHL databases to June 2006. Searches were also made using the ACP Journal Club, the Cochrane Database of Systematic Reviews, the Database of Abstracts of Reviews of Effects, and the Cochrane Controlled

Abbreviations used in this article					
CBT	cognitive-behavioural therapy				
RCT	randomized controlled trial				
ТМН	telemental health				

Clinical Trials Register. Search terms included mental health, mental health services, ehealth, teletherapy, telepsychiatry, telepsychology, teleconferencing, telemental health, video conferencing, remote consultation, satellite communication, and online health. Further details of the literature search strategy are available from the authors.

Screening of the identified articles using their abstracts was undertaken independently by all of the authors and the selection of relevant articles agreed upon in discussion. Full-text articles obtained for closer inspection were evaluated independently by the authors, who then reached a consensus on which articles should be included in the review. Inclusion criteria were articles that described, in a scientifically valid manner, studies reporting clinical or administrative outcomes of TMH applications; controlled studies in which TMH was compared with a non-TMH alternative; and noncontrolled studies in which there were no fewer than 20 subjects. We excluded articles that considered only technical issues, those in which the only outcome measures were related to satisfaction with TMH, studies that considered only outcomes of caregivers, those that duplicated other publications, reviews, general articles, and studies concerned with medical and continuing education.

The quality of the selected studies was assessed with an approach that considers both design and performance.⁴ For study design, large RCTs, defined as those with at least 50 subjects in each arm, were given a score of 5; small RCTs were given a score of 3, prospective nonrandomized studies 2, retrospective comparative studies 1, and noncontrolled series a value of 0. In assessing study performance, we considered the areas of patient selection, description of the interventions, specification and analysis of the study, patient disposal (noting length of follow-up, dropouts, and compliance failures), and outcomes reported. Each of these 5 areas were given a score of 0 (relevant information was missing or given in little detail), 1 (reasonable detail was provided but there were some important limitations), or 2 (information was satisfactory, no significant limitations). Each study therefore had a possible maximum score of 10 for performance and 5 for design. All authors independently assigned scores to each study. If there was disagreement on the study design classification or if individual scores for any performance item differed from each other by more than one, the discrepancies were resolved by consensus.

The performance and design scores were then combined to give an overall score for each publication to give an indication of the confidence that decision makers should place in the findings that were reported. The maximum value was 15 (corresponding to a large RCT with no significant limitations). On the basis of the combined scores, we assigned each study to one of 5 categories to give an indication of the





reliability of the findings that the study reported (Table 1). When there was more than one publication relating to the same study, the papers were considered together and a judgment made on the overall quality and reliability of the evidence applicable to the TMH application.

In addition to the appraisal of quality, judgments were made on whether each study, or group of related studies, had indicated that the TMH application could be considered suitable for clinical use. The status of each TMH application was rated as:

- successful (TMH suitable for clinical use, possibly with further study of its outcomes);
- potentially successful (TMH shows promise for clinical use but further information required before routine use is implemented);
- unsuccessful (TMH did not offer comparative benefit or had disadvantages and should not be used); or
- unclear (The study results did not show whether or not TMH had sufficient benefit to justify clinical use).

Judgments were also made as to whether additional data were needed to establish the TMH method as suitable for routine use (ratings: yes, desirable, or no).

Results

Selected Publications

From 1028 publications identified in the literature search, 132 were retrieved for closer inspection. Eleven other publications were identified through references from a separate project and from one of the retrieved papers for a total of 143 papers for consideration. Seventy-two papers describing 65 unique studies met the selection criteria and were included in the review. Identification and selection of the studies are summarized in Figure 1.

Reasons for exclusion of the other retrieved papers included feasibility or accuracy study (19 papers), narrative review (16 papers), only satisfaction findings for outcomes (13 papers), study considered caregivers but not patients (7 papers), only cost details for outcomes (5 papers), study was not about mental health (5 papers), participant numbers were too small (4 papers), and study was not considered scientifically credible (2 papers).

Study Classification

Table 2 shows the number of studies by mental health condition or type of service, and by the type of communication technology used. Studies on the use of video conferencing in TMH were the most common and were mainly on general psychiatry and child psychiatry programs that dealt with various types of mental health conditions.

Study Quality

Seventeen of the selected papers described large RCTs, 25 small RCTs, 8 prospective comparative studies, 9 retrospective comparative studies, and 13 noncomparative series. Thirty-six of the papers (50%), all describing RCTs, were judged to be of high or good quality and a further 13 (18%) were of fair to good quality (5 small RCTs, 4 prospective

Table 1 Study quality scores and implications for decision making					
Overall quality score ^a	Implications for decision making				
11.1 to 15.0	High quality; high degree of confidence in study findings				
9.1 to 11.0	Good quality; some uncertainty regarding the study findings				
7.1 to 9.0	Fair-to-good quality; some limitations that should be considered in any implementation of study findings				
5.1 to 7.0	Poor-to-fair quality; substantial limitations in the study, findings should be used cautiously				
≤5.0	Poor quality; unacceptable uncertainty for study findings				

^aTotal of scores for study design and study performance

Table 2 Classification of TMH studies								
		Communication method						
Condition and (or) area	Studies and (or) programs	Telephone	Video conferencing	Internet Virtual reali				
General psychiatry and (or) mental health	15	2	13	0	0			
Depression	12	8	1	3	0			
Panic disorder and (or) phobias	9	3 1		5	0			
Smoking	6	6	0	0	0			
Dementia and (or) cognitive disability	4	1	3	0	0			
Child psychiatry	4	4 2 2		0	0			
Obsessive– compulsive disorder	3	3	0	0	0			
Schizophrenia	3	2	0	1	0			
Alcohol and (or) substance abuse	3	2	2 0		0			
Eating disorders	3	2	0	0	1			
Suicide prevention	2	2	0	0	0			
Posttraumatic stress	1	0	0	1	0			
Total	65	33	20	11	1			

studies, and 4 retrospective studies). Table 3 shows the distribution of quality scores by the type of communication method used in the studies. Quality of evidence was higher for the Internet and telephone-based interventions, than for video conferencing approaches.

Evidence for TMH Benefits by Type of Condition or Application

The following summaries provide an overview of findings from the review. Further details of the studies considered are available in an appendix that is available from the authors.

General Psychiatric and Mental Health Services. The largest group of studies covered the use of TMH in programs that

provided services to clients with a range of mental health conditions.^{7–24} Most used video conferencing as the communication technology. Quality ratings were fair-to-good for 3 studies, poor-to-fair for 6, and poor for 7. Three of the studies provided evidence that TMH was successful; findings from 8 others suggested that TMH was potentially successful; and the status of TMH was unclear from the other 5. Further work as follow-up to the investigations was judged to be necessary for 14 studies and desirable for another 2.

Child Psychiatry. Two studies on telephone-based interventions, one of fair-to-good quality and the other poor quality,

Table 3 Communication method and quality of clinical studies								
	Study quality, score (%)							
Communication	High	Good	Fair-to-good	Poor-to-fair	Poor			
Internet	3 (27)	6 (55)	1 (9)	1 (9)	0 (0)			
Telephone	13 (41)	7 (22)	5 (16)	3 (9)	4 (12)			
Video conference	1 (5)	2 (10)	6 (28)	6 (28)	6 (28)			
Virtual reality	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)			
Total	17 (26)	15 (23)	12 (18)	11 (17)	10 (15)			

both showed that TMH was successful, with follow-up study desirable.^{25,26}

A good-quality evaluation of cognitive-behavioural therapy for children with depression found that treatment was effective in both telemedicine and face-to-face groups, with a faster decline in the Children's Depression Inventory score for the telemedicine group.²⁷ A study comparing video conferencing, telephone, and face-to-face counselling for rural teenagers with epilepsy who had psychosocial difficulties did not find evidence that the mode of counselling influenced outcomes.²⁸

Depression. Three high- or good-quality Internet studies showed TMH to be successful, with follow-up work needed for one, and desirable for another.^{29–31} Six of 8 studies that used telephone-based approaches showed TMH to be successful, but with a need for follow-up study.^{32–38} One study indicated TMH was unsuccessful,³⁹ and results from another were unclear.⁴⁰ A high-quality RCT found that treatment of depression by telepsychiatry and face-to-face intervention had comparable outcomes.⁴¹

Dementia and Cognitive Disability. A study of a brief telephone-based screen for cognitive disability indicated that it was as good as standard tests and also faster and easier to administer.42 A small study indicated the potential for telemedicine to provide improved diagnostic services for people in remote areas suspected of having dementia, though there were limitations on which people could participate in video conferencing sessions.⁴³ A video conferencing intervention for people with mild dementia provided similar outcomes to face-to-face intervention, though spatial construction ability training often requires physical guidance, which cannot be effectively delivered through video conferencing.⁴⁴ A study on use of telemedicine for clients at a rural hospital found that telemedicine was cheaper than face-to-face options and received similar ratings from clients, though there were lower ratings for video conferencing from psychologists.45

Obsessive–Compulsive Disorder. The studies in this group^{46–48} made use of the computer-aided system BT STEPS, which has an interactive voice response approach. Two studies had acceptable quality—one found that a scheduled TMH approach with the system gave better results than use of a requested helpline⁴⁶ and the other found that face-to-face treatment was more effective than TMH.⁴⁷

Panic Disorder and Phobias. Two studies found preliminary indications of benefit from Internet-based approaches to treatment of panic disorder and social phobia.^{49,50} A high-quality study confirmed benefit from Internet-based CBT for panic disorder and also indicated that the addition of stress management does not confer additional benefit.⁵¹ Another Internet study obtained indications of benefit from CBT in treatment of phobias, but further work is needed to clarify the performance of specific approaches.⁵² Potential benefits from a CBT approach for people at risk of developing anxiety disorders were not confirmed in a good-quality study.⁵³

A high-quality study found that telephone-based collaborative care for panic disorder and generalized anxiety disorder is more effective than usual care at improving anxiety symptoms, health-related quality of life, and work-related outcomes.⁵⁴ A good-quality study found that a telephone-based behaviour therapy program was an effective treatment for people with panic disorder and agoraphobia.⁵⁵

A small study gave a preliminary indication that video conferencing is an acceptable method of delivery for CBT for people who have panic disorder with agoraphobia.⁵⁶

Schizophrenia. An RCT of an Internet-based approach found that the intervention group reported lower perceived stress than the usual care group.⁵⁷ One telephone-based intervention was associated with lower readmission rates and an increase in community survival, compared with control subjects, but the differences in this small study were not statistically significant.⁵⁸ In the other telephone study,

Table 4 Evidence and outcomes for TMH studies or programs										
	Study quality			Whether TMH successful				Whether further study needed		
Condition and (or) area	High or good	Fair to good	Poor to fair or poor	Yes	Potentially	Unclear	No	Yes	Desirable	No
General TMH	0	4	12	3	8	5	0	14	2	0
Child psychiatry	2	1	1	3	1	0	0	1	2	1
Dementia	0	3	1	2	2	0	0	2	1	1
Depression	8	2	2	10	0	1	1	6	4	2
Obsessive-compulsive disorder	2	0	1	0	3	0	0	3	0	0
Panic and (or) phobias	6	1	1	6	1	0	1	5	2	1
Schizophrenia	2	1	0	1	2	0	0	3	0	0
Suicide prevention	1	1	0	1	0	1	0	1	0	1
Posttraumatic stress	1	0	0	1	0	0	0	0	0	1
Alcohol and substance abuse	3	0	0	2	0	1	0	2	1	0
Eating disorders	1	0	2	2	1	0	0	2	1	0
Smoking	6	0	0	5	0	0	1	1	0	5
Total	32	13	20	36	18	8	3	40	13	12

telemonitoring was associated with an improved rate of adherence to medication and a reduction in emergency visits and medical appointments.⁵⁹

Suicide Prevention. The 2 telephone-based studies for suicide prevention gave differing indications of success. A high-quality RCT found there was no significant difference in the number of repeat suicide attempts or in treatment attendance among people who had already attempted suicide.⁶⁰ A longitudinal study of the effects of a telephone hotline and emergency service over a 10-year period found there were statistically significantly fewer suicides among service users than expected despite an assumed overpresentation of people at increased risk. The service performed well for elderly females but not males. The results suggested that the service was effective and supported its continuation.⁶¹

Posttraumatic Stress Disorder. The use of an Internet approach to treatment of posttraumatic stress was evaluated in 3 linked studies, with a preliminary case series being followed up by 2 small RCTs.^{62–64} Participants who received the intervention had a statistically significant improvement, compared with the control subjects, on trauma-related symptoms and general psychopathology, with large effect sizes.

Alcohol and Substance Abuse. A study on the use of a binge drinking prevention intervention delivered through the Internet found there was no significant difference in outcomes, in comparison with a print-based intervention delivered through postal mail.⁶⁵ Two related papers found that telephone-based continuing care is effective step-down treatment for most patients with alcohol and cocaine dependence who complete initial stabilization treatment. However, patients with current dependence on both alcohol and cocaine who make little progress toward achieving the goals of intensive outpatient programs may have a better outcome if they receive twice-weekly group counselling following these programs.^{66,67} The efficacy of an interactive voice response intervention to reduce relapse by substance abusers following discharge from residential treatment was not established.68

Eating Disorders. A high-quality study on self-help treatments for bulimia found that face-to-face intervention gave better results than a telephone-administered intervention.⁶⁹ It was suggested that telephone intervention might be useful if face-to-face contact is difficult to arrange. In a case series with follow-up to 10 months, there was a decrease in bulimic episodes and improvements in psychological test scores.⁷⁰ A study on a virtual reality technology gave a preliminary indication of benefits from the approach. Further work is needed to clarify comparative benefit over other approaches.⁷¹

Smoking. All the studies on TMH in smoking cessation used telephone-based technology and were of high or good quality with large numbers of participants. Five studies found that the TMH interventions used were successful, with use of telemedicine providing better outcomes than alternative approaches.^{72–76} In the remaining study, the telemedicine intervention was unsuccessful, possibly associated with the approach taken to counselling.⁷⁷

Overview of Outcomes

An overview of outcomes for the 65 studies is shown in Table 4. In just under one-half of the studies, the quality was high or good, and a further 20% were of fair-to-good quality. The remaining 31% were of poorer quality.

TMH was judged to have been successful in clinical use in 55% of the studies and it was potentially successful, with follow-up experience required, in a further 28%. In 12% of the studies, it was unclear from the study findings whether TMH was successful or not. In the remaining 5% of studies, TMH was judged to have been unsuccessful.

In only 18% of the studies that were reviewed was there sufficient information available to confirm the status of TMH in a particular application, with further evaluation unnecessary. In 62% of the studies, further work was needed to provide reliable evidence of benefit. Further follow-up work seemed desirable for the remaining 20% of studies.

Discussion

We conducted a systematic review on the evidence of benefit from a range of TMH services, comparing results for different information technologies and critically examining study quality and need for further evaluation in different applications. Our findings provide a further guide to decision makers on the status and potential of TMH. Some of the literature published since the cut-off date for our review provides further guidance.

The use of video conferencing in TMH is widespread, but the quality of video conferencing-based studies covered in our review was relatively limited. Several of the reviewed papers were preliminary accounts of experience with TMH applications, and more substantial reports on efficacy and effectiveness of longer-term use of TMH were lacking. A recent paper by O'Reilly et al⁷⁸ described a study in Ontario that provided good evidence of benefit from use of telepsychiatry. In this high-quality RCT, clinical outcomes using telepsychiatry with short-term follow-up were equivalent to those when patients were seen face-to-face. A further small RCT found no

difference in short-term clinical outcomes between video conferencing and same-room use of CBT for treatment of combat-related posttraumatic stress disorder.⁷⁹ A small nonrandomized comparative study indicated improved 1-month mental health outcomes for telepsychiatry clients, compared with those undergoing face-to-face consultations, using the Short Form-12 health survey.⁸⁰

Study quality was good for many of the telephone-based TMH studies, with evidence of benefit for several applications. The telephone remains an effective means of health service delivery. Our findings are consistent with those of Leach and Christensen³ who excluded telephone-accessed computer systems and uncontrolled studies from their review. A recent good-quality study on a telephone care management program for outpatients starting antidepressant treatment provided some qualification, finding that the program did not significantly improve clinical outcomes, compared with those from usual care.⁸¹

We identified numerous Internet-based studies, several of good quality, which indicated the emerging use of this technology in mental health care. Our findings on studies of Internet applications were consistent with points made in recent reviews. Griffith et al⁸² conclude there is evidence that Internet-based programs can improve a range of mental health conditions. However, there are issues to be decided including the merits of the Internet alone, compared with being used as an adjunct to face-to-face therapy, and how Internet interventions are best delivered to clients. They also note that attrition rates can be high for web-based interventions. Cuijpers and Schuurmans⁸³ point to the rapidly growing research area of Internet-based self-help interventions and discuss advantages and dangers of self-help treatments. A metaanalysis on Internet-based CBT for symptoms of depression and anxiety found that quality of the included studies was reasonable to good.⁸⁴ There was a moderate overall mean effect size, with significant heterogeneity. Subgroup analysis of treatment studies showed a large mean effect size for treatment of anxiety and a small effect size for treatment of depression. It was also found that mean effect size was large for studies that included support in the interventions and small in those without support.⁸⁴

The non-Internet studies in our review, apart from 3 on computer-aided interventions,^{40,46,71} used TMH in association with established groups of health care professionals or researchers providing treatment or support. TMH was effectively being used as a means to extend the delivery of established health services. Most of these studies concluded that TMH had the potential to be an alternative to face-to-face services. However, as many of the studies were preliminary, the extent of TMH use in different applications was not addressed.

There appear to be some general criteria that define the circumstances under which a mental health intervention is appropriately administered by video conferencing or telephone instead of face-to-face. For TMH to be effective, it must be technically reliable and robust, well accepted by both clients and health care professionals, and able to produce equivalent quality services to face-to-face consultations without undue disruption to practice patterns.

In addition, appropriate use of video conferencing and telephone relative to face-to-face consultations will be influenced by local conditions, and judgments by those who operate these services. For example, in a study of telepsychiatry for victims of domestic violence, precautions were taken in operation of the program because of the high prevalence of suicidal ideation among victims of domestic violence (presence of the counsellor and psychiatric nurse practitioner during teleconference evaluation and follow-up appointments, residential supervision of the violence shelter).¹⁶ In an assessment of a Canadian routine telepsychiatry service, several psychiatrists considered follow-up to video conferencing consultation to be more appropriately performed as face-to-face sessions.²⁰

Support provided by health professionals in the Internet studies included in our review varied. Approaches included therapist feedback but no face-to-face contact,^{51,57,62} minimal therapist interaction by email,^{29,50} and no therapist interaction,^{53,65} though with provision of reminders,³¹ or instruction on use of websites.³⁰ The Internet gives the opportunity to provide interventions for some conditions with little or no support, though the appropriate level of therapist interaction for particular applications requires further study.⁸⁴ Some of the approaches and applications covered are in the early stages of development and there is a need for further work to establish the place of the Internet in provision of routine mental health services. Internet-based self-help programs may be of importance in the future should difficulties develop in recruiting enough skilled personnel to health care.

One-half of the studies we reviewed were of high or good quality and a further 20% were of fair-to-good quality. However, even the better quality studies did not always establish whether TMH applications could be considered suitable for clinical use. TMH was judged to have been successful in just over one-half of the studies considered and as potentially successful in a further 28%. In 62% of the reviewed studies, further work was needed to provide reliable evidence of benefit, and further follow-up work seemed desirable for another 20%. Follow-up studies to provide such additional information have seldom been reported in the telemedicine literature.

In conclusion, our review found that evidence of benefit from TMH applications is still limited. Although numerous good-quality studies on evaluation of TMH have been published, the evidence base for this area of telemedicine remains small, considering the many mental health subspecialties and the diversity of telemedicine technologies. There remains a need for more good-quality studies on the use of TMH in routine care. The emerging use of Internet-based applications is an important development that deserves further study and review.

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References

- Roine R, Ohinmaa A, Hailey D. Assessing telemedicine: a systematic review of the literature. CMAJ. 2001;165:765–774.
- Hilty DM, Marks SL, Urness D, et al. Clinical and educational telepsychiatry applications: a review. Can J Psychiatry. 2004;49:12–23.
- Leach LS, Christensen H. A systematic review of telephone-based interventions for mental disorders. J Telemed Telecare. 2006;12:122–194.
- Hailey D, Ohinmaa A, Roine R. Study quality and evidence of benefit in recent assessments of telemedicine. J Telemed Telecare. 2004;10:318–324.
- Alberta Netcare. Telemental health initiatives for children and youth. Status report and recommendations for future activities [Internet]. Edmonton (AB): Alberta Mental Health Board [cited 2002 Jun 28]. Available from: http://www.albertawellnet.org/telehealth/presentations/ RecommendationsJune2002.doc.
- Mair F, Whitten P. Systematic review of studies of patient satisfaction with telemedicine. BMJ. 2000;320:1517–1520.
- Kennedy C, Yellowlees P. The effectiveness of telepsychiatry measured using the Health of the Nation Outcome Scale and the Mental Health Inventory. J Telemed Telecare. 2003;9:12–16.
- D'Souza R. Telemedicine for intensive support of psychiatric inpatients admitted to local hospitals. J Telemed Telecare. 2000;6(Suppl 1):S26–S28.
- D'Souza R. Improving treatment adherence and longitudinal outcomes in patients with a serious mental illness by using telemedicine. J Telemed Telecare. 2002;8(Suppl 2):113–115.
- Lexcen FJ, Hawk GL, Herrick S, et al. Use of video conferencing for psychiatric and forensic evaluations. Psychiatr Serv. 2006;57:713–715.
- Marcin JP, Nesbitt TS, Cole SL, et al. Changes in diagnosis, treatment, and clinical improvement among patients receiving telemedicine consultations. Telemed J E Health. 2005;11:36–43.
- Rohland BM. Telepsychiatry in the heartland: if we build it, will they come? Community Ment Health J. 2001;37:449–459.
- Roques C, Hovanec L. Tele-medicine and the reduction of psychiatric admissions for dementia patients—social work as the core discipline. J Soc Work Long-Term Care. 2002;1:35–41.
- Zaylor C. Clinical outcomes in telepsychiatry. J Telemed Telecare. 1999;5(Suppl 1):S59–S60.
- Zaylor C, Nelson EL, Cook DJ. Clinical outcomes in a prison telepsychiatry clinic. J Telemed Telecare. 2001;7(Suppl 1):S47–S49.
- Thomas CR, Miller G, Hartshorn JC, et al. Telepsychiatry program for rural victims of domestic violence. Telemed J E Health. 2005;11:567–573.
- Grady BJ, Melcer T. A retrospective evaluation of TeleMental Healthcare services for remote military populations. Telemed J E Health. 2005;11:551–558.
- Doze S, Simpson J, Hailey D, et al. Evaluation of a telepsychiatry pilot project. J Telemed Telecare. 1999;5:38–46.
- Simpson J, Doze S, Urness D, et al. Telepsychiatry as a routine service-the perspective of the patient. J Telemed Telecare. 2001;7:155–160.
- Simpson J, Doze S, Urness D, et al. Evaluation of a routine telepsychiatry service. J Telemed Telecare. 2001;7:90–98.
- Mielonen ML, Ohinmaa A, Moring J, et al. Psychiatric inpatient care planning via telemedicine. J Telemed Telecare. 2000;6:152–157.

- Tang WK, Chiu H, Woo J, et al. Telepsychiatry in psychogeriatric service: a pilot study. Int J Geriatr Psychiatry. 2001;16:88–93.
- Taylor CE, LoPiccolo CJ, Eisdorfer C, et al. Reducing rehospitalization with telephonic targeted care management in a managed health care plan. Psychiatr Serv. 2005;56:652–654.
- Kates N, Crustolo AM, Nikolaou L, et al. Providing psychiatric backup to family physicians by telephone. Can J Psychiatry. 1997;42(9):955–959.
- Herreros O, Sánchez F, Herrera I, et al. [Telemedicine: telephonic interventions in child psychiatry]. Revista de Psiquiatria Infanto-Juvenil. 2002;19:11–13. Spanish.
- McKay MM, Stoewe J, McCadam K, et al. Increasing access to child mental health services for urban children and their caregivers. Health Soc Work. 1998;23:9–15.
- Nelson EL, Barnard M, Cain S. Treating childhood depression over videoconferencing. Telemed J E Health. 2003;9:49–55.
- Glueckauf RL, Fritz SP, Ecklund-Johnson EP, et al. Videoconferencing-based family counseling for rural teenagers with epilepsy: phase 1 findings. Rehabil Psychol. 2002;47:49–72.
- Andersson G, Bergstrom J, Hollandare F, et al. Internet-based self-help for depression: randomised controlled trial. Br J Psychiatry. 2005;187:456–461.
- Christensen H, Griffiths KM, Jorm AF. Delivering interventions for depression by using the internet: randomised controlled trial. BMJ. 2004;328(7434):265–269.
- 31. Clarke G, Eubanks D, Reid E, et al. Overcoming depression on the Internet (ODIN) (2): a randomized trial of a self-help depression skills program with reminders. J Med Internet Res. 2005;7:e16.
- Datto CJ, Thompson R, Horowitz D, et al. The pilot study of a telephone disease management program for depression. Gen Hosp Psychiatry. 2003;25:169–177.
- 33. Hunkeler EM, Meresman JF, Hargreaves WA, et al. Efficacy of nurse telehealth care and peer support in augmenting treatment of depression in primary care. Arch Fam Med. 2000;9:700–708.
- 34. Pearson B, Katz SE, Soucie V, et al. Evidence-based care for depression in Maine: dissemination of the Kaiser Permanente Nurse Telecare Program. Psychiatr Q. 2003;74:91–102.
- Miller L, Weissman M. Interpersonal psychotherapy delivered over the telephone to recurrent depressives: a pilot study. Depress Anxiety. 2002;16:114–117.
- Mohr DC, Hart SL, Julian L, et al. Telephone-administered psychotherapy for depression. Arch Gen Psychiatry. 2005;62:1007–1014.
- Mohr DC, Likosky W, Bertagnolli A, et al. Telephone-administered cognitive-behavioral therapy for the treatment of depressive symptoms in multiple sclerosis. J Consult Clin Psychol. 2000;68:356–361.
- Simon GE, Ludman EJ, Tutty S, et al. Telephone psychotherapy and telephone care management for primary care patients starting antidepressant treatment: a randomized controlled trial. JAMA. 2004;292:935–942.
- Lynch D, Tamburrino M, Nagel R, et al. Telephone-based treatment for family practice patients with mild depression. Psychol Rep. 2004;94:785–792.
- Osgood-Hynes DJ, Greist JH, Marks IM, et al. Self-administered psychotherapy for depression using a telephone-accessed computer system plus booklets: an open US-UK study. J Clin Psychiatry. 1998;59:358–365.
- Ruskin PE, Silver-Aylaian M, Kling MA, et al. Treatment outcomes in depression: comparison of remote treatment through telepsychiatry to in-person treatment. Am J Psychiatry. 2004;161:1471–1476.
- Hill J, McVay JM, Walter-Ginzburg A, et al. Validation of a brief screen for cognitive impairment (BSCI) administered by telephone for use in the Medicare population. Dis Manag. 2005;8:223–234.
- Loh PK, Maher S, Goldswain P, et al. Diagnostic accuracy of telehealth community dementia assessments. J Am Geriatr Soc. 2005;53:2043–2044.
- 44. Poon P, Hui E, Dai D, et al. Cognitive intervention for community-dwelling older persons with memory problems: telemedicine versus face-to-face treatment. Int J Geriatr Psychiatry. 2005;20:285–286.
- Schopp L, Johnstone B, Merrell D. Telehealth and neuropsychological assessment: new opportunities for psychologists. Prof Psychol Res Pr. 2000;31:179–183.
- Greist JH, Marks IM, Baer L, et al. Behavior therapy for obsessive-compulsive disorder guided by a computer or by a clinician compared with relaxation as a control. J Clin Psychiatr. 2002;63:138–145.
- Kenwright M, Marks I, Graham C, et al. Brief scheduled phone support from a clinician to enhance computer-aided self-help for obsessive-compulsive disorder: randomized controlled trial. J Clin Psychol. 2005;61:1499–1508.
- Bachofen M, Nakagawa A, Marks IM, et al. Home self-assessment and self-treatment of obsessive-compulsive disorder using a manual and a computer-conducted telephone interview: replication of a UK-US study. J Clin Psychiatr. 1999;60:545–549.
- Carlbring P, Ekselius L, Andersson G. Treatment of panic disorder via the Internet: a randomized trial of CBT vs applied relaxation. J Behav Ther Exp Psychiatry. 2003;34:129–140.
- Carlbring P, Furnark T, Steczko J, et al. An open study of internet-based bibliotherapy with minimal therapist contact via email for social phobia. Clin Psychol. 2006;10:30–38.

- Richards JC, Klein B, Austin DW. Internet cognitive behavioural therapy for panic disorder: does the inclusion of stress management information improve end-state functioning? Clin Psychol. 2006;10:2–15.
- Schneider AJ, Mataix-Cols D, Marks IM, et al. Internet-guided self-help with or without exposure therapy for phobic and panic disorders. Psychother Psychosom. 2005;74:154–164.
- Kenardy J, McCafferty K, Rosa V. Internet-delivered indicated prevention for anxiety disorders: a randomized controlled trial. Behav Cogn Psychother. 2003;31:279–289.
- 54. Rollman BL, Belnap BH, Mazumdar S, et al. A randomized trial to improve the quality of treatment for panic and generalized anxiety disorders in primary care. Arch Gen Psychiatry. 2005;62:1332–1341.
- Swinson RP, Fergus KD, Cox BJ, et al. Efficacy of telephone-administered behavioral therapy for panic disorder with agoraphobia. Behav Res Ther. 1995;33:465–469.
- Bouchard S, Paquin B, Payeur R, et al. Delivering cognitive-behavior therapy for panic disorder with agoraphobia in videoconference. Telemed J E Health. 2004;10:13–25.
- Rotondi AJ, Haas GL, Anderson CM, et al. A clinical trial to test the feasibility of a telehealth psychoeducational intervention for persons with schizophrenia and their families: intervention and 3-month findings. Rehabil Psychol. 2005;50:325–336.
- Beebe LH. Community nursing support for clients with schizophrenia. Arch Psychiatr Nurs. 2001;15:214–222.
- Frangou S, Sachpazidis I, Stassinakis A, et al. Telemonitoring of medication adherence in patients with schizophrenia. Telemed J E Health. 2005;11:675–683.
- 60. Cedereke M, Monti K, Ojehagen A. Telephone contact with patients in the year after a suicide attempt: does it affect treatment attendance and outcome? A randomised controlled study. Eur Psychiatry. 2002;17:82–91.
- 61. De Leo D, Buono MD, Dwyer J. Suicide among the elderly: the long-term impact of a telephone support and assessment intervention in northern Italy. Br J Psychiatry. 2002;181:226–229.
- 62. Lange A, Rietdijk D, Hudcovicova M, et al. Interapy: a controlled randomized trial of the standardized treatment of posttraumatic stress through the internet. J Consult Clin Psychol. 2003;71:901–909.
- 63. Lange A, van de Ven JP, Schrieken B, et al. Interapy, treatment of posttraumatic stress through the Internet: a controlled trial. J Behav Ther Exp Psychiatry. 2001;32:73–90.
- Lange A, van de Ven JP, Schrieken BA, et al. Internet-mediated, protocol-driven treatment of psychological dysfunction. J Telemed Telecare. 2000;6:15–21.
- 65. Moore MJ, Soderquist J, Werch C. Feasibility and efficacy of a binge drinking prevention intervention for college students delivered via the Internet versus postal mail. J Am Coll Health. 2005;54:38–44.
- 66. McKay JR, Lynch KG, Shepard DS, et al. The effectiveness of telephone-based continuing care for alcohol and cocaine dependence: 24-month outcomes. Arch Gen Psychiatry. 2005;62:199–207.
- 67. McKay JR, Lynch KG, Shepard DS, et al. Do patient characteristics and initial progress in treatment moderate the effectiveness of telephone-based continuing care for substance use disorders? Addiction. 2005;100:216–226.
- Simpson TL, Kivlahan DR, Bush KR, et al. Telephone self-monitoring among alcohol use disorder patients in early recovery: a randomized study of feasibility and measurement reactivity. Drug Alcohol Depend. 2005;79:241–250.
- 69. Palmer RL, Birchall H, McGrain L, et al. Self-help for bulimic disorders: a randomised controlled trial comparing minimal guidance with face-to-face or telephone guidance. Br J Psychiatry. 2002;181:230–235.
- Paul T, Weitemeyer E, Pudel V. [Telephone consultations in bulimia nervosa]. Z Klin Psychol Psychiatr Psychother. 1986;34:315–324. German.
- Riva G, Bacchetta M, Cesa G, et al. The use of VR in the treatment of eating disorders. Stud Health Technol Inform. 2004;99:121–163.
- An LC, Zhu S-H, Nelson DB, et al. Benefits of telephone care over primary care for smoking cessation: a randomized trial. Arch Intern Med. 2006;166:536–542.
- Orleans CT, Schoenbach VJ, Wagner EH, et al. Self-help quit smoking interventions: effects of self-help materials, social support instructions, and telephone counseling. J Consult Clin Psychol. 1991;59:439–448.
- Rabius V, McAlister AL, Geiger A, et al. Telephone counseling increases cessation rates among young adult smokers. Health Psychol. 2004;23:539–541.
- Wadland WC, Soffelmayr B, Ives K. Enhancing smoking cessation of low-income smokers in managed care. J Fam Prac. 2001;50:138–144.
- Zhu SH, Stretch V, Balabanis M, et al. Telephone counseling for smoking cessation: effects of single-session and multiple-session interventions. J Consult Clin Psychol. 1996;64:202–211.
- Gilbert H, Sutton S. Evaluating the effectiveness of proactive telephone counselling for smoking cessation in a randomized controlled trial. Addiction. 2006;10:590–598.
- O'Reilly R, Bishop J, Maddox K, et al. Is telepsychiatry equivalent to face-to-face psychiatry? Results from a randomized controlled equivalence trial. Psychiatr Serv. 2007;58(6):836–843.
- Freuh CB, Monnier J, Yim E et al. A randomized trial of telepsychiatry for post-traumatic stress disorder. J Telemed Telecare. 2007;13(3):142–147.

- Urness D, Wass M, Gordon A, et al. Client acceptability and quality of life-telepsychiatry compared to in-person consultation. J Telemed Telecare. 2006;12(5):251–254.
- Simon GE, Ludman EJ, Operskalski BH. Randomized trial of a telephone care management program for outpatients starting antidepressant treatment. Psychiatr Serv. 2006;57(10):1441–1445.
- Griffiths K, Farrer L, Christensen H. Clickety-click: e-mental health train on track. Australas Psychiatry. 2007;15(2):100–108.
- Cuijpers P, Schuurmans J. Self-help interventions for anxiety disorders: an overview. Curr Psychiatry Rep. 2007;9(4):284–290.
- Spek V, Cuijpers P, Nyklicek I, et al. Internet-based cognitive behaviour therapy for symptoms of depression and anxiety: a meta-analysis. Psychol Med. 2007;37(3):319–328.
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Résumé : L'efficacité des applications de la santé télémentale : une revue

Objectif : Examiner les données probantes sur les avantages de l'utilisation de la santé télémentale (STM) dans les études qui ont déclaré des résultats cliniques ou administratifs.

Méthode : Les publications pertinentes ont été identifiées lors de recherches de la documentation par ordinateur, à l'aide de plusieurs bases de données électroniques. Étaient inclus dans la revue des articles scientifiquement valides qui décrivaient des études contrôlées comparant la STM avec une variante non STM, et des études non contrôlées comportant au moins 20 sujets. La qualité des données probantes était évaluée par une approche qui tenait compte du rendement et de la méthode de l'étude. Les jugements se basaient sur la question de savoir s'il fallait ou non d'autres données pour estimer que chaque application de la STM convenait à une utilisation clinique systématique.

Résultats : Étaient inclus dans la revue 72 articles qui décrivaient 65 études cliniques; 32 études (49 %) étaient de qualité bonne ou supérieure. La qualité des données probantes était plus élevée pour les interventions par Internet ou par téléphone que pour les approches par vidéoconférence. Il y avait des données probantes de la réussite de la STM dans les domaines de la pédopsychiatrie, de la dépression, de la démence, de la schizophrénie, de la prévention du suicide, du stress post-traumatique, des troubles paniques, de l'abus de substances, des troubles alimentaires, et de la prévention du tabagisme. Les données probantes de la réussite des programmes généraux de STM et de la prise en charge du trouble obsessionnel-compulsif étaient moins convaincantes. D'autres études ont été jugées nécessaires ou souhaitables dans 53 (82 %) des études.

Conclusion : Les données probantes sur les avantages des applications de la STM sont encourageantes, quoiqu'encore limitées. Il faut un plus grand nombre d'études de bonne qualité sur l'utilisation de la STM dans les soins réguliers. L'utilisation croissante des applications par Internet est un développement important qui mérite plus d'évaluation.