Implementing and up-scaling evidence-based eMental health in Europe: The study protocol for the MasterMind project

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ABSTRACT

Background: Depressive disorder is a major societal challenge. Despite the availability of clinically and cost-effective treatments including Internet interventions, the number of patients receiving treatment is limited. Evidence-based Internet interventions promise wide availability and high efficiency of treatments. However, these interventions often do not enter routine mental healthcare delivery at a large scale. The MasterMind project aims to provide insight into the factors that promote or hinder the uptake and implementation of evidence-based Internet interventions by mental healthcare practice. Internet-based Cognitive Behaviour Therapy (iCBT) and videoconferencing facilitating collaborative care (ccVC) will be implemented in routine mental healthcare. The services will be offered to 5230 depressed adults in 15 European regions. The current paper describes the evaluation protocol for this large-scale implementation project.

Design: Current summative evaluation study follows a naturalistic one-group pretest–posttest design and assesses three distinct stakeholders: patients, mental healthcare professionals, and mental healthcare organisations. The Model for Assessment of Telemedicine applications (MAST) will be employed to structure the implementation and evaluation study. The primary focal points of interest are reach, clinical effect, acceptability,

appropriateness, implementation costs, and sustainability of the interventions in practice. Mixed-methods are used to provide an understanding of what (quantitative) the implementation projects have achieved and their meaning to various stakeholders (qualitative).

Discussion: The use of Internet interventions in routine practice is limited. MasterMind attempts to bridge the gap between routine practice and effectiveness research by evaluating the implementation of evidence-based Internet interventions for depressive disorders in routine mental healthcare settings in Europe.

1. Introduction

Unipolar depressive disorder is currently one of the most prevalent mental disorders worldwide and is predicted to be the number one overall cause of disability by 2030 for citizens of higher income countries (World Health Organization, 2008; Mathers and Loncar, 2006). Depressive disorders can lead to reduced quality of life, impaired social and personal relationships and disturbed professional life. They are often accompanied by other psychiatric disorders (e.g. anxiety disorders, substance abuse) and a variety of physical health problems. A depressive disorder may start early in life and the course is often recurrent. (Bijl and Ravelli, 2000; Barney et al., 2006; Titov, 2011). Therefore, depressive disorders are associated with substantial economic and societal costs, such as cost of treatment, loss of work productivity, absenteeism, early retirement, and premature death (Ferrari et al., 2013; Wittchen et al., 2011; Gustavsson et al., 2011).

1.1. Background and rationales

Despite the availability of effective treatments, the number of people that actually receive treatment for depressive disorders is not optimal. Care utilization rates for adults with depression range from 35% to 45% in higher income countries (Andrews et al., 2001; Spijker et al., 2001). Suggested barriers that contribute to these low rates include, fear of or perceived stigmatisation (Hengartner et al., 2012; Van Voorhees et al., 2012), lack of adequately trained therapists, and the costs associated with healthcare delivery (Kazdin and Blase, 2011; Wittchen et al., 2011).

eMental health is often regarded as a promising approach in lowering the burden of depressive disorders and entails the use of digital technologies and new media for the delivery of effective and efficient mental healthcare. eMental health may contribute to lowering access barriers to mental healthcare and enable for more efficient use of healthcare resources through smart Information and Communication Technology (ICT) solutions (Riper et al., 2010). For example, a large number of randomized controlled trials and meta-analyses have demonstrated that Internet-based Cognitive Behavioural Therapy (iCBT) in comparison with waitlist-control, can be effective in treating depression. Clinical outcomes are also found to be comparable with face-to-face interventions when delivered with professional guidance (Cuijpers et al., 2014, 2008a,b; Cuijpers, 2009; Andrews et al., 2010; Spek et al., 2007; Ebert et al., 2015b). Additionally, a number of studies evaluating cost-effectiveness indicate that iCBT might be financially viable for optimising mental healthcare for patients with a depressive disorder (Warmerdam et al., 2010; Gerhards et al., 2010; Hollinghurst et al., 2010; Lokkerbol et al., 2014). Despite the evidence showing clinical effectiveness, limited attention has been paid to potential negative effects of Internet treatment, such as low self-esteem, therapist dependency and stigmatisation which desires more research (Rozental et al., 2014).

Similar to the evidence-base for iCBT, research has also shown that live videoconferencing technologies can be used to deliver treatments to patients who are otherwise difficult to reach, and for facilitating collaboration among healthcare professionals (Shore, 2013; Chung-Do et al., 2012; Rowe et al., 2008). Although evidence supporting the effectiveness of videoconferencing in mental healthcare is less rigorous

(García-Lizana and Muñoz-Mayorga, 2010), research has shown that they can be a viable option for delivering mental healthcare to patients with mental health problems in both in- and outpatient care settings (Shore, 2013; Valdagno et al., 2014; Moreno et al., 2012; Chong and Moreno, 2012; Fortney et al., 2011). Videoconferencing technology integrated in a collaborative settings, such as offering multidisciplinary care to patients through a video-based collaboration of different healthcare professionals, collaborative care facilitated by videoconferencing (ccVC) has been shown to be equally effective as or more effective than practice-based collaborative care for depressed patients (Fortney et al., 2007).

Examples of successful iCBT and ccVC implementation trajectories do exist (De Weger et al., 2013; Coulthard et al., 2013). However, large-scale uptake of eMental health by routine practice is limited (Brownson et al., 2012; Greenhalgh et al., 2005; Kazdin and Blase, 2011). Suggested factors that might hinder the use of Internet interventions include acceptance of iCBT and ccVC in the target population and of healthcare professionals (Ebert et al., 2015a; Baumeister et al., 2014), the financial reimbursement systems and the availability of adequately trained professionals (Kazdin and Blase, 2011; Emmelkamp et al., 2013; McHugh and Barlow, 2012).

To strengthen the current knowledge base, our study aims to evaluate the large-scale implementation of evidence-based eMental healthcare services for depressive disorders in routine mental healthcare in Europe with the following two main aims:

1. To investigate the factors that promote or hinder the implementation of internet-based Cognitive Behaviour Therapy (iCBT) and mental and collaborative care facilitated by videoconferencing (ccVC) for treating depressive disorders in routine mental healthcare practice.
2. To investigate the transferability of the identified factors to different mental healthcare contexts.

iCBT and ccVC services will be implemented in routine mental healthcare and offered to at least 5230 depressed adults in 15 European regions. The results will be used to develop guidelines and recommendations for promoting and facilitating the broader implementation and up scaling of the evidence-based eMental health services across Europe.

1.2. Theoretical underpinning

Translating scientific knowledge into practice is not a new problem, and is not limited to mental healthcare alone (Rogers, 2003; Brownson et al., 2012; Greenhalgh et al., 2005). The emerging field of Implementation Science might provide guidance in innovating the mental healthcare practice. Theories such as the Normalization Process Theory (NPT) developed by May and Finch (May and Finch, 2009), can help to understand *why* innovations become routine by explaining the processes, factors, and work that hinder and facilitate the implementation of innovations in routine healthcare. For concrete implementation activities and the evaluation of *what* they achieved, more pragmatic frameworks can be used such as the Consolidated Framework for Implementation Research (CFIR) by Damschroder et al. (2009), Glasgow et al.'s RE-AIM (Glasgow et al., 1999) and the Model for Assessment of Telemedicine applications (MAST) developed by Kidholm et al. (2012). These frameworks tend to structure the factors and concepts

that are relevant for the outcomes of concrete implementation programmes. Examples of such concepts are the availability of resources, organisational readiness, the (perceived) usefulness of the innovation.

In the MasterMind project, the MAST framework is used to both guide the implementation process as well as to structure the evaluation. The MAST framework is based on a broad view and analysis of the factors and areas to consider and account for when introducing and implementing telemedicine in an existing healthcare setting. The MAST assessment tool is a result from the MethoTelemed Study (Kidholm et al., 2010) and uses the EUnetHTA Core Health Technology Assessment Model (EUnetHTA, n.d.) as a starting point. The principal elements of MAST consist of three steps. In the first step, a number of preceding considerations are made regarding legislation, reimbursement and maturity of the application. This step enables explicit decision-making regarding the implementation of the targeted innovation. The second step concerns a multidisciplinary assessment of outcomes across seven domains, namely: 1. health problem and characteristics of the intervention, 2. safety, 3. clinical effectiveness, 4. patient and healthcare professional perspectives, 5. economic, 6. organisational, and 7. socio, ethical, and legal aspects. This step is designed to take into account those factors that are found to be relevant when implementing complex interventions in healthcare settings and, as such, sensitizes the further design of the present evaluation study. The third and final step addresses the transferability and scalability of the implemented services to other healthcare contexts. In this step, relevant contextual information of the outcomes of the multidisciplinary assessment (step 2) will be provided in order to enable others to determine the applicability of the findings to their contexts. Examples are the implementation costs related to cost-variation per patient, restraints in legislations, reimbursement systems, et cetera. The current article and subsequent sections provide a detailed account for executing steps two and three of the MAST framework in the context of the MasterMind project.

1.3. Objectives

To investigate the factors promoting or hindering implementation of eMental health in routine care and their transferability to other mental healthcare contexts, the MAST framework and the seven assessment domains are translated into six interrelated research questions:

1. To what extent do patients' depressive symptoms improve when treated with iCBT and ccVC in routine practice? This question relates to domain 3. Clinical effectiveness of the MAST framework and aims to provide information on the clinical effects that treatment might have on patients in real-life routine practice.

2. What costs are associated with the implementation and up-scaling of iCBT and ccVC for treating depression in routine practice? This question relates to domain 5. Economic aspects, 6. organisational aspects, and 7. socio, ethical, and legal aspects, of the MAST framework and focuses on real-world investments needed to implement iCBT and ccVC in routine practice.

3. How is a patient's safety ascertained in terms of their mental health when provided with iCBT and ccVC operationalized in routine practice? Information about how the safety of patients is assessed and managed in practice will inform the implementation and up-scaling of iCBT and ccVC. This question is related to domain 2. safety of the MAST framework.

4. To what extent are patients satisfied with the iCBT treatment and ccVC services and the use of technologies for optimising their mental health? This research question is related to domain 4. patient and healthcare professional perspectives and will provide knowledge on how patients in routine care perceive and value the use of technological innovations for their treatment.

5. To what extent are healthcare professionals satisfied with the iCBT treatment and ccVC services in terms of their professional needs in

treating patients? Similar to question four, this question will investigate satisfaction and usability of professionals with novel technologies in providing treatment to their patients. This question will provide input in domain 4. patient and healthcare professional perspectives and 6. organisational aspects.

6. How many and what type of patients are reached by the iCBT treatment and ccVC services in routine practice? Finally, knowing what patients are actually treated with iCBT and ccVC in routine practice will provide valuable information on the extent to which the interventions are offered to people with depression who would normally have no or limited access to treatment. This question is related to domain 1. health problem and characteristics of the intervention and domain 7. socio, ethical and legal aspects of the MAST framework.

In terms of outcomes, the primary outcome measure in this study is implementation effectiveness. Implementation success is defined as a combination of clinical effectiveness, acceptability and appropriateness, sustainability, and reach of the interventions implemented in real life routine practice. The study design, outcomes, measures and instruments are detailed in the following section.

2. Methods and design

2.1. Study design

This study follows a naturalistic summative evaluation of the implementation of iCBT and ccVC in routine practice. This means that the primary focus is on the outcomes rather than the process of implementation. For the current study, the MAST framework is adapted to cater for items that are specific for the mental healthcare practice. Examples of issues that needed to be addressed are the variety of instruments used in practice for estimating symptom severity, referral modalities, perspectives of healthcare professionals, and the various interventions applied in MasterMind.

The MasterMind evaluation assesses multiple levels of stakeholders: a) patients, b) mental healthcare professionals, and c) mental healthcare organisations. Mixed-methods are used to provide an understanding of what (quantitative) the implementation projects have achieved and the reasons for success or failure (qualitative) (Gaglio and Glasgow, 2012). The qualitative study is designed to understand the meaning of the services and implementation efforts to stakeholders working with the interventions.

The evaluation follows a one-group pretest-posttest design because iCBT and ccVC are implemented in routine practice with routine care patients (Campbell and Stanley, 1963). The study connects to routinely gathered data on, for example, treatment effect where possible. For example, the Routine Outcome Measurements (ROM) is used which refers to a standardised set of instruments used in routine care with the aim to systematically and periodically measure the effect of and satisfaction with the treatment received. By using this existing data source, only a limited number of questions that require a minimal time investment from the participants need to be issued. To enable for early learning effects between the study sites within MasterMind, the implementation projects are grouped in two separate implementation waves. Wave one regions are more experienced in providing iCBT to patients and in using videoconferencing techniques in care settings through e.g. (research) controlled environments or small-scale pilot projects in routine care. Wave two regions have less experience with iCBT or ccVC and benefit from sharing knowledge and lessons learned available in the project. Wave-one regions include Syddanmark (Denmark), Hessen (Germany), Amsterdam area (The Netherlands), Northern Norway (Norway) and Scotland (United Kingdom). Wave-two regions include Veneto and Piemonte (Italy), Tallin area (Estonia), Aragon, Basque Country, Badalona and Galicia (Spain), Nuuk (Greenland), Ankara (Turkey) and Wales (United Kingdom).

2.2. Interventions

2.2.1. Internet-based Cognitive Behavioural Therapy

Within MasterMind, the participating healthcare organisations will implement evidence-based iCBT interventions in routine mental healthcare practice. The iCBT interventions are evidence-based in that there is clinical evidence from randomized controlled trials demonstrating that the underlying therapeutic principles contribute to improvement of depressive symptoms and health related client outcomes. Most of the included interventions and underlying technical platforms have been available on the market for some years. They include interventions with minimal support (e.g. MoodGym (Christensen et al., 2002) and Beating the Blues (Proudfoot et al., 2004)), and more recent developments combining face-to-face with online treatment (Blended treatment, (Kooistra et al., 2014)) and integrating full video and audio support (iKAT-D (Hedman et al., 2014) and Get.On Mood Enhancer (Ebert et al., 2014)). The exact treatment and service modalities depend on the type and structure of the technical iCBT platform, the individual needs of patients, and the actual care setting. For all implementation sites, the treatment protocols and technological solutions adhere to the multidisciplinary NICE clinical guidelines for depression developed by the National Institute for Care and Excellence in the UK (NICE, 2009). The core components of all iCBT treatments are: (1) psycho-education, (2) cognitive restructuring, (3) behavioural activation, and (4) relapse prevention. These components are delivered over a number of sessions either online (with minimal guidance) or via a combination of face-to-face sessions with a mental healthcare professional, in alternation with online sessions in which the CBT components are described and practised. Patients for whom CBT treatment is indicated and who, for example, have difficulty visiting the clinic, will be offered a video supported iCBT treatment. The online sessions will be delivered through a secure web-based online treatment platform. The platforms are either owned by a commercial party that licences the implementation sites to use the service platform or developed by the site themselves. The Internet platforms include a web-based interface providing patients with access to iCBT therapy modules, a digital workbook, and a secure communication channel for both the therapists and the patients. Additional file 1 provides an overview of the included iCBT interventions. Staff will be trained in working with the treatment platform while taking into account their role in treatment delivery (e.g. GP, referrer, specialist, etc) and can be of a technological nature, therapeutic nature or both. Training courses are delivered either as part of the medical training, special training course on cCBT, workshops regarding written contact, including role-play, presentations, and e-learning modules to test the skills. On-going support (maintenance) measures are available and include supervision and intervision, protocols, manuals and elaborate information packs.

2.2.2. Videoconferencing facilitating mental healthcare and collaborative care

With mental healthcare and collaborative care facilitated by video-conferencing (ccVC) we refer to the technical infrastructure, security measures and the procedures, guidelines, and competences needed to operate and utilise the videoconferencing technology to the benefit of treating depressive disorders. Based on the Cochrane definition of collaborative care (Gunn et al., 2006), the videoconferencing services in the present project are utilised in five different ways: (a) collaborative care between specialist and general practitioner (GP), (b) collaborative care between specialist and GP with patient, (c) video diagnosis during inclusion to iCBT, (d) follow-up or outpatient care of the patient at home, and (e) acute care. Videoconferencing will be used with either standard computer-based (mobile or desktop) videoconferencing devices, or dedicated and furnished video-conferencing units including a speaking room with specific video, audio and connectivity devices. The services adhere to state of the art communication and security standards for voice over TCP/IP (Transmission Control Protocol/Internet Protocol).

Scotland, Estonia and Turkey will not deploy ccVC, whereas Greenland will realize a collaborative care model based exclusively on the use of videoconferencing. Additional file 1 provides an overview of the included ccVC services. Depending on their role in providing the services, staff will be trained in the technical aspects as well as in usability issues and videoconferencing techniques.

2.3. Population and enrolment

The project will take place in primary care (Italy, The Netherlands, Norway, Scotland, Wales) and in specialised care (Denmark, Estonia, Germany, Greenland, Italy, The Netherlands, Spain, Turkey). In each setting participants at the level of the (1) patient, (2) healthcare professional, and (3) mental healthcare organisation will be recruited. Table 1 provides the target number of participants for each of the participating implementation sites. The target numbers are based on purposive quota sampling meaning the number of participants needed to be enrolled to be able to regard the interventions as being implemented in routine practice when the study is finished. With estimating the sample sizes, feasibility and regional service delivery characteristics are taken into account.

2.3.1. Patients' enrolment

Consecutive adult patients (N = 5230) from routine mental healthcare practice will be offered iCBT or ccVC or both, and will be invited to participate in the study when they have symptoms of mild, moderate or severe depression. The symptoms will be established in accordance with routine working procedures at the participating implementation sites.

At the time of enrolment, patients will be classified in three categories: (1) patients who want to receive iCBT, (2) those that want to receive iCBT, and perform Routine Outcome Measurements (ROM) or similar, and (3) those that want to receive iCBT, perform ROM and agree to fill out additional questionnaires. These three categories are reflected in the flow diagram presented in Fig. 1. The additional questionnaires aim to capture patient's perspectives regarding satisfaction with and usability of the intervention.

2.3.2. Enrolment of healthcare professionals

Healthcare professionals (N = 141) are included in the study if they provide patients with iCBT treatment, refer patients to the iCBT service included in study, or are clinically involved in treating depressed patients by making use of the ccVC service. As such, healthcare

Table 1
Overview of the number of patients, healthcare professionals and organisations to be included.

	Patients	Healthcare professionals	Organisations
Syddanmark (DK)	800	16	23
Scotland (UK)	800	16	1
Wales (UK)	500	10	9
GGZ InGeest Amsterdam Area (NL)	300	6	4
Aragon (ES)	100	2	1
Basque Country (ES)	300	6	3
Badalona Serv. Assist. (ES)	200	4	1
Galicia (ES)	200	4	1
Veneto (IT)	200	20	1
Piemonte (IT)	300	6	1
Turkey (TR)	200	3	1
Hessen (DE)	500	10	1
North. Norway (NO)	500	30	16
Estonia (EE)	300	6	1
Greenland (GL)	30	2	1
Total	5230	141	65

The number of patients to be included is based on quota sampling. The number of healthcare professionals and mental healthcare organisations follows from the number of patients that can be treated in routine care.

professionals in the study can be therapists, team leaders and referrers, and vary from General Practitioners to psychiatrists and psychologists. This broad definition allows for assessing the transferability of the findings in different healthcare settings. The recruited healthcare professionals have received clinical iCBT and ccVC training.

2.3.3. Enrolment of mental healthcare organisations

Mental healthcare organisations (N = 65) are defined as the service providers that implement the iCBT interventions and/or ccVC services in their routine practice. The organisations involved vary from GP practices to large specialised care centres. For each involved healthcare provider, a representative will be invited to take part in the study. To be included in the study, the representative should have substantive decision-making power related to the management of their organisation's mental healthcare practice.

2.4. Outcomes and measurements

Implementation outcomes are defined as the effects of deliberate and purposive actions to implement new treatments, practices, and services (Proctor et al., 2011). The primary outcome measure in this study is implementation success. Following the research questions, implementation success is defined as a combination of reach, clinical effectiveness, acceptability and appropriateness, implementation costs, and sustainability (Proctor et al., 2011). Following the RE-AIM framework (Glasgow, 2007), reach is defined as the participation rate and representativeness of patients at an individual level and provides valuable insight into the uptake of iCBT and ccVC in real world settings. Clinical effectiveness is defined in MasterMind to be clinical improvement of depressive symptoms according to routine practice. Acceptability refers to the perception among stakeholders that the treatment is satisfactory. Appropriateness relates to the perceived fit in addressing the mental disorder (Proctor et al., 2011). The actual cost for implementing the intervention will be estimated in terms of both the

investment and recurrent costs (direct and indirect) a healthcare organisation bears when implementing iCBT and/or ccVC. Sustainability is the extent to which the intervention in routine practice is maintained (Proctor et al., 2011).

Although purposive sampling for patients and healthcare professionals is applied, we do not set forth a specific definition of implementation success in terms of the number of patients treated or therapists recruited. In that sense the sites that have obtained the quota are as interesting to this study as those who do not reach the number of patients we currently envisage the site should be able to treat (based on previous experiences, reach of routine healthcare services, etc.). Rather, we aim to identify the differences between sites that do and those that do not meet their quota and to elucidate the possible factors contributing to those differences.

Table 2 provides an overview of the research questions in relation to the MAST domains and the instruments that will be used to measure the operationalized indicators. The indicators and items are rooted in existing literature in Implementation Science, notably the Consolidated Framework for Implementation Research (Damschroder et al., 2009), the Conceptual model of Implementation Research (Proctor et al., 2009), and the Determinants of Innovations (MIDI) developed by Fleuren et al. (2010, 2014).

2.4.1. Patient-level outcomes

Patient level outcomes are reach, acceptability and appropriateness of the treatment in alleviating depressive symptoms. Reach will be calculated by dividing the number of patients that received iCBT and/or were treated by using ccVC, by the number of people in the general population that would normally receive treatment for depression. These numbers will be estimated on the basis of existing epidemiological data available from e.g. World Health Organization (WHO) and Eurostat, and regional/national statistics. Acceptability is the perception among patients that the received treatment is agreeable, palatable, or satisfactory (Proctor et al., 2011) and includes the safety of the
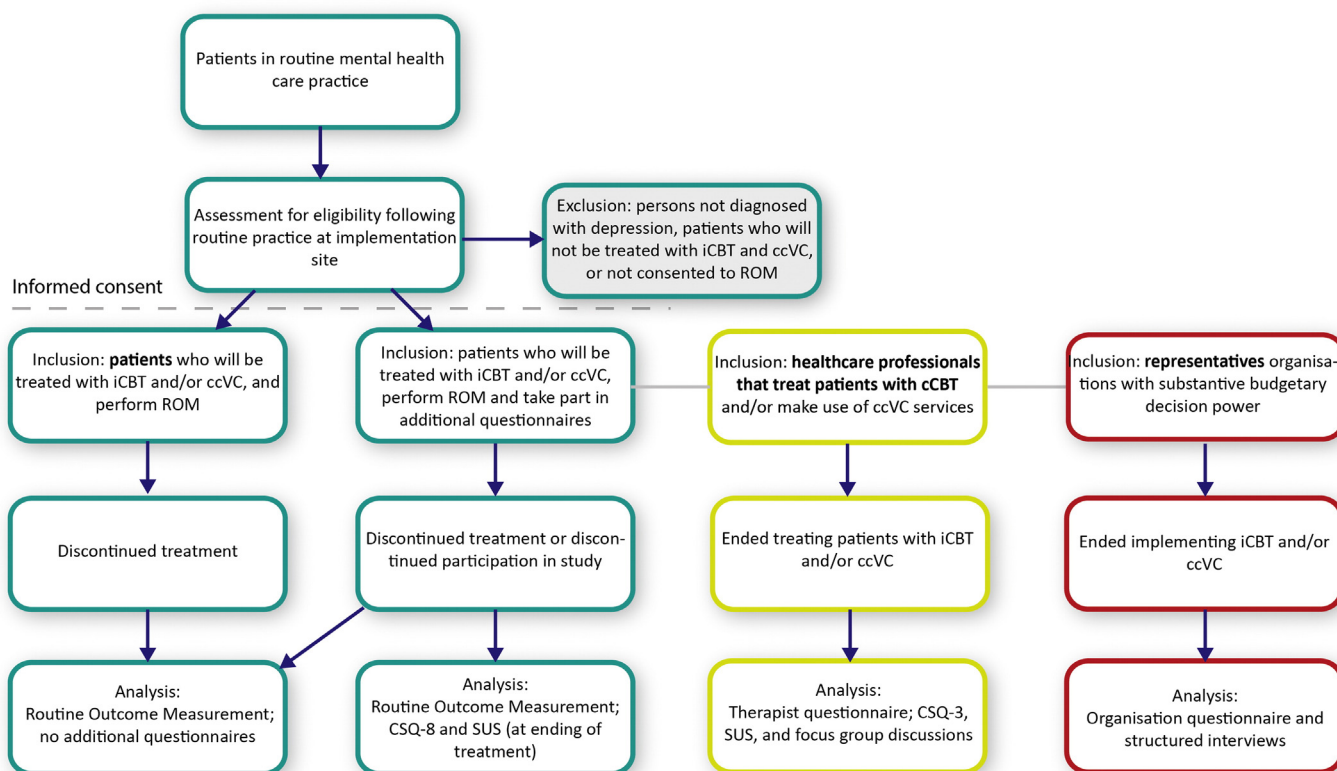

Fig. 1. Enrolment of participants. Adult patients with depression in routine care will be offered iCBT and/or ccVC and invited to take part in the study.

Table 2

Overview of the research questions in relation to the MAST domains and the instruments that will be used for measuring the operationalized indicators.

Research question	MAST domain	Instrument
1. To what extent do patients' depressive symptoms improve when treated with iCBT and ccVC in routine practice?	3. Clinical effectiveness	ROM[a]; treatment platform; MANSA[b] questionnaire
2. What costs are associated with implementing and up-scaling of iCBT and ccVC for treating depression in routine practice?	5. Economic aspects; 6. Organisational aspects.	Questionnaire; semi-structured interview
3. How is the patients' safety in terms of their mental health when provided with iCBT and ccVC operationalized in routine practice?	2. Safety; 3. Clinical effectiveness	ROM; technical platform; questionnaire
4. To what extent are patients satisfied with the iCBT treatment and ccVC services and do they find the interventions usable in relation to their needs?	4. Patient and healthcare professional perspectives; 6. Organisational aspects; 7. Socio, ethical and legal aspects.	For satisfaction: CSQ-8[c] (patient) and CSQ-3[c] (healthcare professional); For usability: SUS[d]
5. To what extent are healthcare professionals satisfied with the iCBT treatment and ccVC services and do they find the interventions usable in terms of their professional needs?		
6. How many and what sort of patients are reached by the iCBT treatment and ccVC services in routine practice?	1. Health problem and general characteristics.	ROM[a]; treatment platform; questionnaire.

[a] ROM stands for Routine Outcome Measurements and refers to a standardised set of instruments used in routine care with the aim to systematically and periodically measure the effect of and satisfaction with the treatment received.

[b] MANSA stands for the *Manchester* Short Assessment of Quality of Life used to measure quality of life.

[c] CSQ is the abbreviation for Client Satisfaction Questionnaire used to measure satisfaction with the services.

[d] SUS stands for the System Usability Scale and is used for measuring the perceived usability of the services.

treatment. Appropriateness is the perceived fit, relevance, or compatibility of the treatment for the patient in addressing his or her mental disorder (Proctor et al., 2011). Acceptability and appropriateness will be measured through (a) establishing improvement in depressive symptoms and quality of life, (b) establishing perceived satisfaction with the treatment, (c) establishing the perceived usability of the treatment and (d) treatment attrition. The method for measuring the symptoms of depression will adhere to routine practice and will be registered in terms of: clinical interview, professional clinical judgement, or a symptom questionnaire. Symptoms are recorded in terms of no, mild, moderate, severe, and very severe symptoms according to routine practice diagnostic procedures. Quality of life will be measured using an adapted version of the Manchester Short Assessment of Quality of Life (MANSA) (Priebe et al., 1999). The questionnaire consists of two questions about patients' satisfaction with their health in general and their mental health specifically. The MANSA showed satisfactory psychometric properties (Björkman and Svensson, 2005). Patient Satisfaction will be measured with the 8 items Client Satisfaction Questionnaire (CSQ-8) (Larsen et al., 1979). The CSQ-8 is a Likert scale with 8 items and is a very brief instrument to investigate client satisfaction with the delivered services. It has good psychometric properties, and it has been tested in numerous studies on diverse client samples (Attkisson and Zwick, 1982). Usability will be measured with the System Usability Scale (SUS) (Brooke, 1996). The SUS is a 10-item Likert scale and a brief instrument to measure perceived system usability. It is proven to have good psychometric properties (Brooke, 2013; Lewis and Sauro, 2009). Attrition is the phenomenon of participants stopping to use the treatment and/or being lost to post-treatment assessment (Eysenbach, 2005). Attrition will be measured by dropout rates in

relation to the number of online therapeutic sessions ended successfully. Where possible, reasons for dropout will be included as well.

2.4.2. Healthcare professional-level outcomes

Healthcare professional level outcomes are acceptability and appropriateness of the interventions in terms of a) perceived satisfaction with the intervention, and b) perceived usability of the treatment in their daily work. Satisfaction will be measured with the 3 items Client Satisfaction Questionnaire (CSQ-3) (Larsen et al., 1979) (see above). Usability will be measured with the System Usability Scale (SUS) (Brooke, 1996) (see above). Additionally, specific focus group discussions will be held with involved healthcare professionals on the following topics:

- Safety issues related to using the iCBT and ccVC services.
- Reasons for dropout of patients from the intervention.
- Organisational aspects such as leadership engagement, implementation strategies, and perceived innovation climate within the organisation (resources, rewards, and self-efficacy, etc.) and within the healthcare profession (knowledge, beliefs, attitude, fit, etc.) in innovating the daily mental healthcare practice.
- Socio, ethical and legal aspects such as the use of clinical guidelines and professional liability.

2.4.3. Organisation-level outcomes

The organisation level outcomes are implementation costs and sustainability of the intervention in routine care. Implementation costs are defined as the cost impact of an implementation effort (Proctor

Table 3

Patient level measurements.

Dimension	Instrument	Time burden	Base line	End of treatment	End of study
Demographics Patient	ROM[a]	± 15 min depending on routine practice	X		
Patient safety	ROM[a]		X (+ ROM[a])	X	
Depressive symptoms	ROM[a]		X (+ ROM[a])	X	
Quality of life	MANSA[b]	1 min	X (+ ROM[a])	X	
Treatment access	Questionnaire	1 min		X	
Drop-out	Technical platform/questionnaire	2 min	X	X	
Patient perceived satisfaction	CSQ-8[c]	3 min		X	
Patient perceived usability	SUS[d]	3 min		X	

[a] ROM stands for Routine Outcome Measurements and refers to a standardised set of instruments used in routine care with the aim to systematically and periodically measure the effect of and satisfaction with the treatment received.

[b] MANSA stands for the *Manchester* Short Assessment of Quality of Life used to measure quality of life.

[c] CSQ is the abbreviation for Client Satisfaction Questionnaire used to measure satisfaction with the services. The items are adapted to the specific context.

[d] SUS stands for the System Usability Scale and is used for measuring the perceived usability of the services. The items are adapted to the specific context.

Table 4
Healthcare professional level measurements.

Dimension	Instrument	Time Burdon	Base line	End of treatment	End of study
Demographics Healthcare professional	Questionnaire	3 min	X		
Professional experience	Questionnaire		X		
Healthcare professional case load	Questionnaire	2 min	X		X
Healthcare professional perceived satisfaction	CSQ-3[a]	1 min			X
Healthcare professional perceived usability	SUS[b]	3 min			X
Perceived patient safety by healthcare professional	Focus-group interview	Maximum 60 min			X
Perspective on drop-out	Focus-group interview				X
Leadership engagement (commitment)	Focus-group interview				X
Resources (time)	Focus-group interview				X
Knowledge and beliefs about intervention	Focus-group interview				X
Self efficacy	Focus-group interview				X
State of change	Focus-group interview				X
Identification with organisation	Focus-group interview				X
Support	Focus-group interview				X
Rewards	Focus-group interview				X
Priority	Focus-group interview				X
Professional liability	Focus-group interview				X

[a] CSQ is the abbreviation for Client Satisfaction Questionnaire used to measure satisfaction with the services. The items are adapted to the specific context.
[b] SUS stands for the System Usability Scale and is used for measuring the perceived usability of the services. The items are adapted to the specific context.

et al., 2011). The implementation costs will be assessed by two means. First the representatives of the healthcare organisations involved will be asked to provide actual information on the costs related to implementing the services Secondly, the issue of implementation costs will be discussed as a theme in the semi-structured interviews with the representatives of the healthcare organisations. The items for the questionnaires and semi-structured interviews assessing implementation costs are informed by relevant indicators put forward by e.g. Fleuren et al. (Fleuren et al., 2014) and the Consolidated Framework for Implementation Research (CFIR) by Damschroder et al. (2009) and include items on therapist treatment time, caseload, consultation rates, incidental expenditures for e.g. support staff, training, and materials, and recurrent operational costs (direct and indirect) for sustaining the services in routine care. The interviews will include items mechanisms (i.e. business cases, strategies, etc.) for financing incidental (implementation) costs and financing a sustainable use of the services in their practices. Both the questionnaire and the semi-structured interviews will take place at t = end of study (i.e. at the end of the inclusion period).

Maintenance concerns the extent to which the implemented treatment is maintained or institutionalized within a mental healthcare organisation's on-going, stable operations. Maintenance involves longer-term effects and is associated with organisation's funding strategies (Proctor et al., 2011). Maintenance will be measured in terms of the intended sustained use of the intervention by the organisation. Both implementation costs and the intended maintenance of the intervention in routine practice will be measured through semi-interviews with representatives of the involved mental healthcare organisations covering issues such as perceived success of implementation projects and the presence (or absence) of specific funding strategies for sustaining the intervention in daily practice.

2.4.4. Measurements

Patients enter the study at time point t = 0 and start their treatment. Treatment ends at time point t = end which depends on the specific treatment modalities in a study site, e.g. after the relapse prevention module. Patients receive a questionnaire at the start of their treatment either through their therapist, referrer or treatment platform. This questionnaire is MasterMind specific. Time points for in-between measurements follow routine monitoring modalities (e.g. ROM) in a specific study site. Patients receive an online closure questionnaire directly after their treatment ends including when they prematurely end the treatment (drop-out). This questionnaire is designed specifically for MasterMind. Healthcare professionals are invited for the focus-group discussions at the end of the study, i.e. when their last patient has been included and started the treatment. A preparing questionnaire is included in the invitation for the healthcare professionals. The semi-structured interviews with the representatives of the healthcare organisations are also scheduled at the end of the inclusion period and also they receive a questionnaire to prepare the interviews. Tables 3-5 provide an overview of the measures and their time of assessment.

All questionnaire measures, focus group discussions and interviews will be conducted in local language. When no translation is available, local implementation teams will translate the questionnaire by the forwards-backwards method. Questionnaires will be issued online. The focus-group interviews with the healthcare professionals will be held in a face-to-face setting. The structured interviews with the representative of the participating mental healthcare providers will be conducted either face-to-face or by telephone. Preceding the focus-group interviews and structured interviews, participants will be asked to fill out a short questionnaire to obtain general information about the interviewees and to prepare them for the interviews. Local interviewers and focus group leaders will be trained and provided with

Table 5
Organisational level measurements.

Dimension	Instrument	Time Burdon	Base line	End of treatment	End of study
Implementation costs	Questionnaire	Maximum 10 min			X
Operational costs	Questionnaire				X
Demographics organisation	Questionnaire				X
Maintenance	Structured interview				X
Implementation strategy	Structured interview	Maximum 30 min			X
Perspective on implementation	Structured interview				X
Guidelines	Structured interview				X
Public image/benchmarking	Structured interview				X

elaborate interview guides including tips for interview techniques as well as elaborate questions.

2.4.5. Triangulation

Credibility and validity will be ensured through cross verification (i.e. triangulation) of the outcomes of the various methods. This takes place in three ways:

a) Within healthcare professionals — therapists/referrers: confirmative research of the CSQ-3 and SUS questionnaires that are administered to healthcare professionals
b) Within healthcare professionals — team leaders: confirmative research of the CSQ-3 and SUS questionnaires that are administered to healthcare professionals
c) Between healthcare professionals and healthcare organisations — upper-level management: confirmative research of the focus groups with professionals and team leaders.

2.5. Analyses

The analyses will include both quantitative and qualitative data observed before and after the implementation of cCBT and ccVC in routine practice. Data will be analysed per local study site and combined to study and compare the outcomes on an aggregated level. Because all study sites implement comparable interventions (i.e. iCBT and ccVC), the quantitative data collected across all MAST domains will be combined and synthesised inline with the standards for Comparative Effectiveness Reviews (CER) and Individual Patient Data meta-analysis (IPDMA). Where relevant, any assumptions underlying analyses will be detailed and reported.

2.5.1. Analyses at the level of patients

Descriptive statistics will be used to analyse all study outcomes. Appropriate GLM models will be used to compare clinical improvement, perceived sustainability and usability of the services, across implementation sites, with terms for services (interventions) and implementation sites, reported as odds ratios with 95% confidence intervals (CI). Within-group and sub-group comparisons will be performed and an effect size Cohen's d will be calculated to determine the size of the clinical improvement. Heterogeneity between sites will be determined by fitting fixed interaction terms between services and implementation sites, while overall service effect will be reported with implementation site treated as a fixed effect and time treated as a random effect. Sensitivity analyses will be conducted adjusting for important baseline covariates. To be able to come to a comprehensive summative evaluation of the implementation projects, missing data, due to for example dropout is important information in the interpretation of client satisfaction and usability. Hence, no imputation techniques will be applied. Participants that prematurely dropout of treatment and/or the study, will be requested to provide the healthcare professionals with information about the reasons for dropout and the issue of dropout will be included as a theme in the focus-group discussions with the healthcare professionals.

2.5.2. Analyses at the level of healthcare professionals

Analysis of the perceived satisfaction and usability of the iCBT and ccVC services by the healthcare professional follows the same procedure as patient level analyses. For the data collection and analysis of qualitative data, both inductive and deductive methods will be applied. The qualitative evaluation aligns to a constructivist understanding of the factors that facilitate or hinder implementation as the focus is on the meanings that groups of healthcare professionals and individuals on managerial positions hold towards implementing cCBT and ccVC. Building on existing work such as the Consolidated Framework for Implementation Research (CFIR) (Damschroder et al., 2009),

Measurements for Determining Innovation (MIDI), (Fleuren et al., 2014), RE-AIM (Glasgow et al., 1999) and the Normalisation Process Theory (NPT) (May and Finch, 2009) the initial themes within the MAST domains are identified. Saturation of themes will be achieved inductively in a pilot study and purposive sampling will be applied to obtain data saturation. For each theme, a combination of a predetermined set of replies and open-answering approach will be applied. Thematic analysis will be used to analyse the qualitative data from the focus group discussions. Semantic units of meaning related to the study objectives will be identified inductively within the qualitative data and coded and included in the overall analysis (Braun and Clarke, 2006). Analysis on combined data will be of a descriptive nature rather than to average out the heterogeneity between levels and contexts of sites. This will be done by narrative summaries in the form of simple descriptions and tables of disaggregated data (Dixon-Woods et al., 2005).

2.5.3. Analyses at the level of mental healthcare organisations

Descriptive statistics will be used to analyse the data on implementation costs. The qualitative data obtained by the semi-structured interviews with the representatives of the mental healthcare organisations will be analysed in the same way as the data from the healthcare professionals.

3. Study status

All first wave implementation sites have presented the study protocol to relevant medical ethical committees and relating regulatory agencies. Independently from each other, the committees have decided to exempt the local trials from further scrutiny to ethical regulations for medical or social research. The committees concluded that this study is to be regarded as implementing evidence-based interventions and no human or animal experiments are involved. Second wave implementation sites are in the process of obtaining approval or exempt from relevant medical ethical committees. First wave implementation sites started to enrol patients from the 1st of January 2015. Second wave implementation sites expect to start enrolling the first patients in the study at 1st of October 2015. Enrolment for both wave 1 and wave 2 sites will end in December 31st of 2016. Analyses will be finalised in February 2017 and reporting follows subsequently.

4. Discussion

Depression has a large impact on people and society. However, despite the growing emphasis on applying evidence-based interventions in treating depression, limited progress has been made with respect to reducing the actual burden of depression in routine practice. Therefore, the aim of the current study is to implement at scale evidence-based treatment for depression and to learn from this.

4.1. Strengths and limitations

Routine practice is MasterMind's laboratory, and one of the strengths of the present study lies in the attempt to capture the heterogeneity of the target population on all three levels: patients, healthcare professionals and mental healthcare organisations and within a variety of European mental healthcare systems. Through in-depth mixed-methods a rich picture of the processes and impact of implementation and sustainability in different contexts will be provided. By doing so for multiple levels and systems, we might be able to shed light on the interactive environment in which different stakeholders operate in daily life while attempting to implement innovative clinical services. For example, a better understanding of the way the innovation culture in an organisation and within the healthcare profession can promote or inhibit the uptake of evidence-based interventions by individual therapists might be helpful in developing more successful implementation strategies. Knowing to what extend iCBT and ccVC services are palatable

to healthcare professionals and fit within their daily activities, will enable us to more effectively and efficiently innovate practice to the ultimate benefit of the patient.

It should be noted that the MasterMind study is active against the backdrop of the current state of the theoretical underpinning of psychological interventions through the Internet (Ritterband et al., 2009; De Los Reyes and Kazdin, 2006). Advancements in the current understanding of working mechanisms in Internet interventions will enable more targeted adaptations of interventions to their context, which might also lead to higher adoption and implementation rates.

Having two interrelated implementations waves is a strong aspect of the present study as this enables studying the differences between organisations with more and those with less experience in using iCBT and ccVC in practice and the impact on the implementation outcomes.

Another strength of this study is that the measurements for obtaining data for the evaluation are designed to have the lowest possible burden on participants. It is important that implementation research does not interfere with the process of implementing a new service because this might lead to a distorted picture of reality (Proctor et al., 2009). However, this immediately poses some limitations on the study, as the data might not be sufficient to explain causality with absolute certainty. We do not set out to answer a specific hypothesis. The evaluation aligns to a constructivist understanding of the factors that facilitate or hinder the implementation and up-scaling of cCBT and ccVC in routine care practice. Consequently, the present study is limited in being decisive in determining the clinical or cost-effectiveness of the treatments.

Rather, MasterMind attempts to bridge the apparent gap between routine practice and effectiveness research by providing knowledge of the factors involved in implementing Internet interventions in routine care so to maximise the intended benefits of evidence-based eMental health. This knowledge needs to be specific and informative to the mental healthcare context in which the innovation is to be implemented so it can to support policy and decision-making to develop specific implementation strategies describing the planned effort and tools to perform the work that is needed to implement innovations in routine care in an effective and efficient manner.

Abbreviations

ccVC	collaborative care facilitated by videoconferencing
CSQ	Client Satisfaction Questionnaire
iCBT	Internet-based Cognitive Behavioural Therapy
ICT	Information and Communication Technology
MANSA	Manchester Short Assessment of Quality of Life
ROM	Routine Outcome Measurement
SUS	System Usability Scale

Competing interests

All the authors declare to have no competing interests.

Authors' contributions

- CV, AK, RP, CP JS, HR, conceived of the study, and participated in its design and coordination.
- CV, AK, SB, EB, MC, SC, ED, DE, AE, GF, AF, NK, SM, KM, VM, KP, RP, AS, JS, HR and the MasterMind consortium contributed to the design of the study
- CV, SC, ED, DE, AE, AF, NK, KM, BM, MM, VM, JJ, KP, RP, AS, and the MasterMind consortium contributed to the operationalization of instruments and measurements.
- CV, EB, MC, AC, ED, DE, AE, AF, NK, KM, VM, MM, JJ, KP, RP, AS, CW and the MasterMind consortium translated the generic study protocol into local protocols and detailing the local needs.

- CV and AK drafted the manuscript.
- All authors read and approved the final manuscript.

Authors' information

The partners included in MasterMind can be grouped in three categories: 1) regional/local health authorities, 2) mental healthcare providers, 3) competence centres in integrated care, e-mental health, chronicity, ICT, 4) patients and professionals associations, and 5) Business consultant and project management specialist. All the partners have their own specialties and added value resulting in a unique multidisciplinary project. The partners are:

I. Regional/Local Health Authorities

- Region Syddanmark (Denmark)
- NHS 24 (Scotland, UK)
- Powys Health Board (Wales, UK)
- Servicio Aragones de Salud (Spain)
- Servicio Vasco de Salud (Spain)
- Servizo Galego de Saúde (Spain)
- U.L.S.S. 9 di Treviso (Italy)
- Azienda Sanitaria Locale Torino 3 (Italy)
- Ministry of Health and Infrastructure-Agency for Health and Prevention (Greenland)

II. Healthcare providers

- GGZ inGeest (The Netherlands)
- Badalona Serveis Assistencials SA (Spain)
- Schoen Clinic (Germany)

III. Competence centres in integrated care, mental care and chronicity

- Kronikgune (Spain)
- VU University Amsterdam (The Netherlands)
- Institute of Rural Health (Wales, UK)
- Middle East Technical University (Turkey)
- Friedrich-Alexander-Universität Erlangen-Nürnberg (Germany)
- Norwegian Centre for Integrated Care and Telemedicine (Norway)
- Tallinn University of Technology (Estonia)
- CSI Piemonte (Italy)

IV. Patients and professionals associations

- GAMIAN Europe (Belgium)
- European Alliance Against Depression (Germany)

V. Business consultant and project management specialist

- Health Information Management (Belgium)

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