BJMHR
British Journal of Medical and Health Research
Journal home page: www.bjmhr.com

A Collaborative Care Model To Manage The Comorbidity Of Depression And Chronic Non-Communicable Diseases In Rwanda

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ABSTRACT

Collaborative care interventions are one of the approaches of integration of physical and mental health care in which primary care providers, health care managers, and psychiatric consultants work together to care for patients with co-morbidity of depression and chronic non-communicable diseases (NCDs). These interventions have been shown to be both clinically-effective and cost-effective to manage this type of co-morbidity. This paper presents the adapted Collaborative Care Model to Rwandan context. This paper presents a part of a larger study which aimed to explore the situation regarding management of co-morbidity of depression and chronic NCDs in Rwanda and adapt the existing Collaborative Care Model (CCM). Action Research Sequential-explanatory design using mixed methods was employed for the larger study, while a research-practice partnership method and an iterative process was used for this part which adapted and tested the model. A new adapted Collaborative Care Model was developed with aim to integrate physical and mental health care to collaboratively care for patients with comorbidity of depression and chronic NCDs in Rwanda. Its testing revealed that the model was applicable in terms of human resource, materials and patient's acceptance. The results show the applicability of the new adapted CCM to the Rwandan context. Basing on the World Health Organization recommendation to implement the CCM to manage the co morbidity of depression and chronic NCDs we recommend the health care providers to implement this new adapted model in district hospitals for better management and life improvement of patients.

Keywords: Collaborative care, Chronic Non Communicable Diseases, Depression, Comorbidity of depression and Chronic Non Communicable Diseases

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Received 13 February 2016, Accepted 18 February 2016

Please cite this article as: Madeleine M *et al.*, Collaborative Care Model To Manage The Comorbidity Of Depression And Chronic Non-Communicable Diseases In Rwanda . British Journal of Medical and Health Research 2016.

INTRODUCTION

The comorbidity of depression and chronic NCDs is a current major global health concern [1-3] A world survey of 60 countries done by World Health Organization (WHO) revealed that an average of between 9.3% and 23% of participants with one or more chronic physical disease had depression as well [4]. The American Heart Association [5] reports that depression was found to co-occur in 17% of cardiovascular cases, 23% of cerebrovascular cases, 27% of diabetes patients and more than 40% of individuals with cancer.

Collaborative care model (CCM) is a model used by a team of medical and mental health professionals to provide holistic and evidence based care to people with chronic physical health problems and depression in primary health care setting [6-8]. Different studies have studied and confirmed the effectiveness of this model to manage this co morbidity of depression and chronic NCDs. Among these studies the Improving Mood-Promoting Access to Collaborative Treatment (IMPACT) Model comes in the first place. This model was implemented in the USA [7] . It was run over 20 sites and concentrated on depression in people over the age of 60 years with co morbidity of chronic medical disorder. Results from this study demonstrated that IMPACT participants had improvement in their depression symptoms over12 months. They also had less physical pain, better social and physical functioning, and better overall quality of life than patients in the usual care. Analysis of data from the survey showed that the benefits of the IMPACT intervention persisted one year after the intervention [7].

The strength of the IMPACT Model is in its long period of implementation (about seven years from 1993-2002), and it has also used a great number of population. IMPACT model is thus being widely used to manage the co morbidity of depression and different NCDs in different age groups of people including adolescents and its effectiveness has been indisputable [6]. We were also guided by the IMPACT Model during model adaptation. Other studies which have confirmed the effectiveness of collaborative care model in managing the co morbidity of depression and chronic NCDs include Minnesota - Diamond Project implemented by Unutzer in 2009 in the USA[9]; The Pathways Study implemented in the USA [10] ; SMaRT oncology- 1 implemented in UK [11;]Collaborative care for depression in UK primary care: a randomized controlled trial implemented in UK [12] .

The CCM has also been recommended by World Health Organization (WHO) to be implemented by all countries to manage this co morbidity [13]. Despite this recommendation , a number of countries, particularly low income countries still separate mental health care from physical care [14]. This separate treatment of this co morbidity has been linked to many negative health effects including complex medication regimens with high risk of drug

interactions and poor medication adherence; duplicative medical tests, unnecessary hospitalizations and worsening mortality as stated by different authors [6, 8, 15].

The estimated co morbidity of depression with chronic NCDs in Rwanda is alarming where the prevalence of depression among diabetic and hypertensive patients is estimated to be 27% and 29% respectively [16]. However, despite this estimated high prevalence of the co morbidity, there are no formal or recognized interventions to collaboratively manage the co morbidity. Therefore the aim of the study was to adapt the existing CCM to Rwandan context for management of co morbidity of depression and chronic NCDs.

MATERIALS AND METHOD

This paper presents part of a larger study which explored the situation regarding management of co morbidity of depression and chronic NCDs in Rwanda and adapted the CCM to Rwandan context. Action research with mixed method-sequential explanatory design was used in the larger study. The study was ethically approved by the University of KwaZulu Natal ethics committee; University of Rwanda Institutional Review Board and Rwanda Ministry of Health. We respected ethical principles related to human participants and all participants signed informed consents after clear information regarding the purpose of the study.

For adapting the model we used the research-practice partnership method. This method helped us to come together as researchers with health practitioners to identify the problem and propose the solution, implement it and evaluate its applicability with the aim to improve quality care of patients.

A one day workshop with the research team who played a role of adaptation team was held with the purpose to adapt the CCM to the Rwandan context. We used an iterative process and the following are the steps we followed during adaptation of existing CCM to the Rwandan context: (a) the reviewing the existing model (b) the identification of potential key components of the existing model (c) mapping data for the new model; (d) designing a draft adapted model; (e) discussing the draft model (f) redrafting of the model; (g) testing the model and (h) evaluating the model.

After the model was adapted, it was implemented in one district Hospital over 12 weeks. 30 patients were chosen none purposively, conveniently and requested to allow the implementation of the model after they have signed the prospect consent forms. The implementers (collaborative care team of four health care professionals) were members of the research team working at the selected Hospital. After three months of implementation, the researcher used a semi-structured interview guide to explore the opinions and perceptions of collaborative care team about the applicability of the model; the acceptance of the model by

patients and its relevance based on short term outcomes of CCM i.e. Personalized care plan with motivational targets, adherence to treatment; reduction of pharmacology and reduction of depression symptoms. Qualitative content analysis with inductive approach was used to analyse qualitative data.

RESULTS AND DISCUSSION

Adaptation of existing CCM to the Rwandan context

Adaptation team

The adaptation work was done by a research team comprising of 14 health care professionals. The team members were considered as experts with good experiences in the problem being studied. The members of the team had been involved in identifying the gap of existing protocol/interventions to manage the co morbidity of depression and chronic NCDs in Rwanda, and they are the same members who analyzed/ reviewed the existing CCM, and also they are the same members who planned the adaptation of CCM to the Rwandan context. Table 1 indicates the profile of the adaptation team.

Table 1: Adaptation team

Participant code	Gender	Position	Institution	Experience
01	Male	Psychiatrist	Psychiatric referral hospital	13 years
02	Male	Psychiatrist	Ministry of Health	10 years
03	Male	Medical doctor	Hospital no 1	5 years
04	Male	Medical doctor	Hospital no 2	6 years
05	Male	Medical doctor	Hospital no 3	3 years
06	Female	Chief of nursing	Hospital no1	4 years
07	Female	Chief of nursing	Hospital no 2	6 years
08	Female	Chief of nursing	Hospital no 3	8 years
09	Female	Registered nurse	Hospital no 1	3 years
10	Female	Registered nurse	Hospital no 2	6 years
11	Female	Registered nurse	Hospital no 3	4 years
12	Female	Mental health nurse	Hospital no 1	6 years
13	Female	Mental health nurse	Hospital no 2	8 years
14	Female	Mental Health nurse	Hospital no 3	4 years

Adaption method: Research- Practice adaptation method

In our study we consider adaptation as the process of modifying an intervention to real-world contexts without necessarily changing the intervention's internal logic or core elements as defined by Zayas , Bellamy and Proctor [17]. We have used a research –practice partnership to adapt collaborative care for managing the co morbidity of depression and NCDs in primary health care. This method is defined as collaboration between researchers and health practitioners in identifying the problem; proposing the solution and implement it [18.] The case of research-practice partnership's adaptation of the model illustrates how a partnership approach may help maximize fit with the service context while retaining fidelity to the

model. It helps to specify how treatment adaptations benefit from local practice knowledge and how partnership may be linked to positive implementation outcomes such as acceptability, feasibility and clinical appropriateness [18].

Adaptation process

We followed an iterative process that had been previously developed by other authors [19] to develop/adapt the model. The process involved a series of systematic steps including the review of the existing CCM and studies which have adapted CCM; mapping data for the new adapted model; designing a draft of adapted CCM to be implemented in Rwanda; discussing the draft adapted CCM and redrafting the adapted CCM [19]. Ness, Karlsson, Borg, Biong, Sundet, McCormack et al.,[20] have followed these systematic steps in their study to implement the collaborative practice model for mental health care in the community.

Table 2. Adaptation process

Systematic steps	Activities	Results
The review of the existing CCM and studies which have adapted CCM	Power point presentation of the CCM Model analysis/review using four constructs of ResQue evaluation framework	Description of the existing CCM CCM reviewed
Mapping data for the new adapted model	The team used the existing information about the CCM to map a diagram representation of the new adapted model	A diagram representation of the new adapted model
Designing a draft of adapted CCM to be implemented in Rwanda	The team used the diagram representation to design a draft of the new adapted model	Draft of adapted CCM to Rwandan context
Discussing the draft adapted CCM	The team took time to discuss the concepts of the drafted CCM	Every concept of the drafted adapted CCM was discussed
Redraft the adapted CCM	The team proposed some comments, additions and reductions to the first model	The adapted model was redrafted

Adaptation elements

Adaptations 1: Practice setting

In the IMPACT model, collaborative care is implemented in the primary care. However the adapted CCM to the Rwandan context will be implemented at district level; this because this level is the level where medical doctors, mental nurses and registered nurses are available; also it is at this level that patients with NCDs consult in endocrinology service; furthermore it is at this level where are located doctors and nurses who have been trained to care for patients with NCDs. Additionally this level is considered as second primary level in Rwanda, where the first primary level is Health care centers. The model could not be implemented at this primary health care level in Rwanda based on the reasons cited above particularly the unavailability of personnel to implement the model and the unavailability of patients with

NCDs as they consult at district level. The CCM is recommended by WHO to be used in primary care settings to manage the co morbidity of depression and NCDs [13]. The same authors explain well that CCM should be implemented at primary health care level for early diagnosis and treatment of depression in patients with NCDs. Furthermore different authors confirm that CCM has been designed to be implemented at primary health care to attack depression at early stage [6, 8, 13, 15.]

Adaptation 2: Target population

Extensive literature supports the use of collaborative care models for managing the co morbidity of depression and NCDs within primary medical settings [13, 20-23]. The aim of this study was also to adapt CCM to the Rwandan context to manage this co morbidity. Specifically the new adapted model will be used in Rwandan context at the district health care level to care for patients who have the co morbidity of depression and one or more NCDs. This collaborative care in Rwandan context will help to improve the quality care of patients with mental problem and chronic diseases, therefore improving their quality of life by reducing and or preventing health complications related to separate treatment of co morbidities.

Adaptation 3: The collaborative care team

Based on collaborative care team of CCM which include a primary health care provider, a case manager and a psychiatric consultant [8,13], the research team decided that the collaborative care team in Rwandan context will include a medical doctor, a registered nurse, a mental health nurse and a psychiatric consultant. Different studies which have implemented collaborative care model in other settings have used three health care professionals including medical doctor mental health nurse and a consultant psychiatrist [7,9-12]. However Eghaneyan, Sanchez and Mitschke [24] in implementing the collaborative care model, they used a Licensed Masters Social Worker as case manager in place of a registered nurse.

In the current study, the three team members of the initial CCM will be maintained including a medical doctor who will play a role of primary health care provider; a mental nurse who will play a role of a case manager; a psychiatrist who will play a role of consultant psychiatrist; then a fourth member: a registered nurse with training about non communicable diseases will be added and will play a role of patient's orientation.

Adaptation 4: Collaborative care aspects/Principles

The new adapted model will respect the three aspects/principles of CCM which include Population-based care; measurement based care and stepped care [6, 8].

Population -based care:

According to Kilbourne et al.,[23] population based care is an approach to planning and delivering care to defined patient populations that tries to ensure that effective interventions reach all patients who need them. For the new adapted model the population –based care will be ensured by practicing systematic diagnosis of depression and tracking its outcomes in patients with NCDs using PHQ-9 questionnaire. This questionnaire has been chosen because it is an easy tool recommended to diagnose and monitor depression in primary health care and has been widely used to diagnoses depression in patients with chronic illnesses [8, 25].

Measurement based-care:

The new adapted model will assure the measurement based-care treatment by planning treatment based on individual care needs; regularly monitoring the diseases progress using registries and monitoring patient's visits, adherence to treatment and dosages of medications regularly. Different authors [26, 27] explain that measurement based-care target each patient's treatment plan; clearly articulates personal goals and clinical outcomes that are routinely measured by evidence-based tools like the PHQ-9 depression scale.

Steeped care:

The new adapted model will practice stepped care by adjusting treatment of each patient based on patient's progress. In this case, the team will opt either to increase the dose, change medication or even refer the patients without progress or with complications. Monthly report about patient's clinical progress will be provided. According to Unützer and Park (28) in stepped care treatments are actively changed if patients are not improving as expected until the clinical goals are achieved. Stepped care improves decision-making by improving Primary health care provider's ability to follow treatment guidelines to achieve more desirable treatment responses [23, 28].

Adaptation 5: Collaborative care interventions

Different authors [9, 13, 22, 23, 29] have explained that Collaborative care models are one approach to integration in which **primary care providers**, **care managers**, and **psychiatric consultants** work together to provide care and monitor patients' progress by performing the following activities: coordination and care management; regular/proactive monitoring and treatment to target using validated clinical rating scales and regular consultation for patients who do not show clinical improvement. The new adapted model has specified specific interventions for each member of collaborative care team:

A medical doctor : will play a role of primary health care provider; he/she will be responsible for the medical diagnosis of non-communicable disease, pharmacotherapy, and initial diagnosis of depression using the PHQ-9 questionnaire and referring the patient to the mental nurse. He/she will also be responsible for monitoring the medical condition outcomes;

adjusting medical treatment and proposing the referral of the patient to the tertiary level considering the medical disease condition. These activities of a medical doctor in our study are the similar of a primary health care provider in the initial CCM [13, 30]. Also in different adapted CCMs the same activities were performed by the primary health provider [7, 10-12].

Mental health nurse:

This one will play a role of a depression care manager. He/she responsible for initial treatment of depression, psychotherapy and all activities related to mental health care of the patient. She will monitor depression outcomes using PHQ-9 Questionnaire. She will also be responsible of planning and preparing the psychiatric visits and will play a liaison role between patients and psychiatrist. These are the same activities of a care manager in the initial CCM (13, 30). Among activities of a care manger in IMPACT model include consistent use of a standardized tool (the PHQ9) for assessing and monitoring depression; systematic patient follow-up tracking and monitoring ; educate, monitor and coordinate care for patients and schedule psychiatric caseload review [21, 31].

The involvement of the community and or the family by the mental health nurse if necessary was suggested by the participants. The involvement of community in collaborative care model is one of its principles. According to Goodrich, Kilbourne, Nord, and Bauer [32] collaborative care models are team-based intervention to improve patient care through organizational leadership support, provider decision support, clinical information systems as well as engaging patients and their communities in their self-care management. Also Unützer et al., [13] states that among core services of CCMs include individual and family support, which includes authorized representatives.

Consulting psychiatrist:

The research team members in our study decided that the psychiatrists will be responsible to advise the team once in three months about difficult cases; will adjust depression treatment for patients without improvement; and refer the patient to the psychiatrist referral hospital if necessary. These activities are the same activities of a consulting psychiatrist in initial CCM as stated by Unützer et al.,[13] and Katon [30]. In IMPACT model implemented by Unützer et al., [7] the activities of a consulting psychiatrist include caseload consultation for the care manager and general practice, diagnostic consultation for more difficult cases, consultation focused on patients not improving as expected and recommendation for additional treatment/ referral according to evidence based guidelines. In their study [24] which implemented the CCM in a community health center, the consulting psychiatrists played a major role about treatments recommendations for difficult cases and those without improvement.

Adaptation 6: Collaborative care components

The seven collaborative care components which will guide the new adapted CCM including the regular monitoring of depression, the systematic patient's follow up, the treatment intensification for patients who do not improve, the relapse prevention; patient's education and community involvement, a care manager to educate patients, scheduled regular psychiatrist supervision and monthly reports of overall progress of each patients were adapted from IPMACT Model implemented by [7].

In the original CCM, psychiatric caseload review are scheduled weekly. However in the new adapted model, the psychiatrist will supervise the primary health care team once in three months, but the team can contact the psychiatrist before that period if necessary. For Rwanda context, it is not possible for the psychiatrist to supervise the district team weekly considering the short number of psychiatrists in the country. Still this does not cause any problem as the mental nurse in our new adapted model is considered specialist in the profession; also the mental nurse may communicate with the psychiatrist through other communication channels including telephone, email [13, 30]

Adaptation 7: Collaborative care outcomes

The new adapted collaborative care outcomes will be divided in two categories:

PRIMARY OUTCOMES

Improvement of depression symptoms:

The new adapted collaborative care model to the Rwandan context will target to improve the symptoms of depression. The early diagnosis and treatment of depression will help depressed patients to get improvement from this disease. Thota et al.,[22] reported that many reviewed have reported improvement of depression symptoms as the primary outcome of the care. Improvement of depression symptoms is also considered as a primary outcome of the original CCM [8, 9, 13].

Response to treatment:

In the new adapted model, every patient should get care based to his/her need. Treatment planning based to patients' need should be part of new adapted model, adjustment and change of treatment for patients who do not show improvement and use of evidence-based protocol to care for patients will help patients to respond to treatment. According to Unützer et al., [7] and Katon [8] in CCM patients are offered treatments with credible research evidence to support their efficacy in treating the target condition. Response to treatment has been reported by different researchers who have implemented the CCM [7, 10, 11, 33]. It is also considered as a primary outcome of the original CCM[8, 13.]

Remission and recovery:

Another outcome of new adapted CCM is to help patients recover from depression and show improvement for their medical disease. This will be indicated by diminution of disease related complications such as coma caused by hyper or hypoglycaemia; reduced emergency attendance for those patients treated with collaborative care; decrease of drugs as well as reduced doses. Different studies have reported remission and recovery from depression as primary outcome of CCM [22.]

Adherence to treatment:

Patients treated with collaborative care should reach a 100% adherence treatment. Education sessions and home based education by CHWs will be envisaged as well as community and family involvement in the patient's care. Patient education is believed to increase patient's adherence to treatment and many benefits including better self-management behaviour, increased patient self-efficacy and decreased symptoms [34, 35]. Also Costa and Nogueira [36] states that when patients perceive community and family support; they gain more confidence and courage to fight the disease.

Improvement of quality of life and functional status:

This is another primary outcome of new adapted CCM to help patients achieve better health. Patients treated with CCM will be taught how to maximize self- management in order to improve their life. Von Korff, Katon, Lin, Ciechanowski, Peterson, Ludman et al.,[37] confirm that an integrated/collaborative intervention for depression and chronic disease control can improve global quality of life among patients with one or more chronic NCDs. Furthermore Unützer et al.,[7] have confirmed that collaborative care improve quality of life of patients.

SECONDARY OUTCOMES OF NEW ADAPTED CCM

Patient's satisfaction with care:

This is the target of CCM; to offer the holistic care to the patient; maximizing care based to the patient's need; involving different health care professionals to tackle different health problems at the same time in the same person to achieve a high quality care in efficient and effective manner. This will surely increase the patients' satisfaction with care. In their study DiGioia, Greenhouse and Levison[38] about patient and family-centered collaborative care; they found a high level of patient satisfaction with an overall satisfaction of 91.4%. Also Cummings, O'Donohue, Hayes and Follette [39] stated that patients reported high satisfaction with collaborative care system in their study about positioning mental health practice with medical/surgical practice

The above all mentioned outcomes were adapted from the initial outcomes of CCM[9, 22] . Additionally the results from a community guide systematic review and meta-analysis done by Thota et al., [22] confirmed the above cited collaborative care outcomes.

Table 3. Elements of the designed adapted CCM to the Rwandan context

Adaptations	Elements of adaptation	Original model	Adapted model
Adaptations 1	Practice setting	Primary health care	District hospitals
Adaptation 2	Target population	Patients with comorbidity of chronic NDCs and depression	Patients with co morbidity of chronic NCDs and depression
Adaptation 3	Collaborative care team	Three health care professionals: A primary health care provider A care manager A consultant psychiatrist	Four health care professionals: A medical doctor A registered nurse A mental health nurse A supervising psychiatrist
Adaptation 4	Collaborative care aspects/principles	Population- based care measurement-based care stepped care	Population- based care measurement-based care stepped care
Adaptation 5	Collaborative care interventions	Depression screening and treatment in patients with chronic NCDs Depression monitoring Medical treatment and monitoring of patient's progress Treatment systematically adjusted and stepped up for patients not improving Patient's education Referral of patients	Depression screening and treatment in patients with chronic NCDs Depression monitoring Medical treatment and monitoring of patient's progress Treatment systematically adjusted and stepped up for patients not improving Referral of patients
Adaptation 6	Collaborative care components	**Seven components of CCM:** Use of a standardized tool for assessing and monitoring depression Systematic patient follow-up Treatment intensification for patients who do not improve Relapse prevention and involvement of community A care manager to educate, monitor and coordinate care for patients Scheduled weekly psychiatric caseload review with the primary team	Use of PHQ-9 to diagnose and monitor depression Use of registries to systematically monitor patient's progress The medical doctor will adjust medical treatment and the psychiatrist adjust the depression treatment Patient's education to prevent relapse Involvement of the family and CHWs by the mental nurse The psychiatrist will supervise the district team once in three months; the mental nurse may contact him/her other times through telephone, email,..

		Monthly report of overall progress for each patient	Medical progress will be done by the registered nurse and the mental progress by the mental nurse
Adaptation 7	Collaborative care outcomes	A personalized care plan Reduced pharmacology Increase patient's satisfaction Reduced referral to secondary care Reduce emergency attendances and admissions Improve routine screening and diagnosis of depressive increase provider use of evidence-based protocols Increase of active client/patient engagement in treatment goal-setting and self-management.	**Primary outcomes** Improvement of depression symptoms Response to treatment Remission and recovery Adherence to treatment Improvement of quality life and functional status **Secondary outcomes** Patient's satisfaction with care
Adaptations	**Elements of adaptation**	**Original model**	**Adapted model**
Adaptations 1	Practice setting	Primary health care	District hospitals
Adaptation 2	Target population	Patients with comorbidity of chronic NDCs and depression	Patients with co morbidity of chronic NCDs and depression
Adaptation 3	Collaborative care team	Three health care professionals: A primary health care provider A care manager A consultant psychiatrist	Four health care professionals: A medical doctor A registered nurse A mental health nurse A supervising psychiatrist
Adaptation 4	Collaborative care aspects/principles	Population- based care measurement-based care stepped care	Population- based care measurement-based care stepped care
Adaptation 5	Collaborative care interventions	Depression screening and treatment in patients with chronic NCDs Depression monitoring Medical treatment and monitoring of patient's progress Treatment systematically adjusted and stepped up for patients not improving Patient's education Referral of patients	Depression screening and treatment in patients with chronic NCDs Depression monitoring Medical treatment and monitoring of patient's progress Treatment systematically adjusted and stepped up for patients not improving Referral of patients

The testing of the new adapted model in one district hospital

The model was tested for applicability in one district hospital. Two process adapted from IMPACT Model were used: systematic diagnosis and outcomes tracking and stepped care. As we have been explaining in previous pages, systematic diagnosis and outcomes tracking are core services of CCM [13]. Diagnosis and monitoring of depression was done using the PHQ-9. This questionnaire has been used in different studies which have implemented CCM [7, 24, 40].

The medical doctor who played the role of **primary health care provider** was responsible of initial diagnosis of depression, medical treatment, monitoring the progress of medical problem as well as education and guidance about medical treatment. These roles played by the medical doctor in the new adapted model are in the same lines with the recommended activities of a primary health care provider as evidenced by different authors [28, 41, 42].

In the new adapted model, **a mental nurse** who played a role of **a care manager** was responsible for patient's education and self-management support; treatment of depression(medication for moderate to severe depression and psychotherapy; as well as watchful treatment for mild depression); she was responsible for monitoring depression with PHQ-9 and was also responsible of involving the family and/or community in the care; she was the coordinator of CCM and acted as liaison of communication between team members. These roles are in accordance with the roles a care manager should play in CCM [26, 28, 43-45] .

Psychiatrist in the new adapted model advised the district team about difficult cases of depression, changed medication for cases of severe depression and referred one case with severe depression at referral psychiatric hospital. The psychiatrist supervised once in three months (face to face supervision); but he was responding and advising about cases whenever he was contacted by the mental nurse. Thielke et al.,[43] explain well that mental health specialists may be embedded in the practice or based offsite and linked to the practice through phone and other communication channels. Also different authors [13, 30] emphasized that the role of a consulting psychiatrist is to advise the primary care treatment team with a focus on patients who present diagnostic challenges or who are not showing clinical improvements; such consultation can be provided in person through the use of telemedicine (telephonic or televideo consultation).

Stepped care in the new adapted model was implemented by planning treatment based on the patient's needs, then monitoring each patient's progress and adjusting treatment based on the progress. During implementation of the model; for some patients medical drugs were reduced, increased even stopped. For depression; some patients with minimal depression were under watchful treatment with group therapy; others with moderate to severe depression were receiving medication for depression with individual therapy. The mental nurse followed

Table 4. Testing the Adapted CCM at one District Hospital (July – October 2015)

Two processes		**A team of four members**			**Intervention participants**
	A registered nurse	**A Medical Doctor**	**A Mental nurse)**	**Consulting psychiatrist**	
• Systematic diagnosis • and • outcomes tracking	• Orientating patient • Taking vital signs • Orientating and assisting patients to get their lab tests done • Assisting patients to enter the medical room • Accompanying patients to the mental unit	• Medical treatment • Monitoring the Medical condition (Hypertension or diabetes) outcomes • Education and guidance about medical treatment	• Education and self-management support every Thursday • Group psychotherapy • Individual psychotherapy by the mental nurse • Monitoring depression with PHQ-9 Questionnaire • Involving the community : • Involved the community to assist a depression case linked to poverty • Also involved the community for a severe depression case linked to genocide • Follow up • She even used the phone where it was necessary to make a follow up of cases	• Supervised once in three months • Advised on some difficult depression cases	30 patients
Stepped care	Educating patients about management of diabetes and hypertension	• Adjusted medical treatment for patients who were still having high blood pressure and or hyperglycaemia • Adjusted medications for patients who were having complicated sides effects of medication • Refereed one patient to the referral hospital because of diabetes complications	Suggested to the Psychiatrist a referral for severe depression case	• He revised the treatment for depression • Recommended for additional treatment • Advised to refer to the psychiatric referral hospital one case with severe depression	

a usual protocol for depression treatment. One case was referred to psychiatric hospital by the Psychiatrist. This is supported by different authors [6, 8, 23, 28] who explained the stepped care as care that involves intensification of care for those with adequate adherence but persistent poor disease control.

Evaluating applicability of the new adapted model and its importance based on short outcomes of CCM

Participant's opinions about applicability of the model

Human resource:

The participants confirmed that the four health care professionals who implemented the model were sufficient. Also the participants stated that the visit of a psychiatrist once in three months was appropriate.

Materials and infrastructures:

All team members have confirmed that the model was applicable in terms of human resource, materials and infrastructures.

Acceptance by client:

The implementers confirmed that the model was very well accepted by clients because of the following reasons: (a) all patients completed all sessions; (b) patients' wishes to continue the model; short outcomes of CCM expressed by clients including improvement of depression symptoms.

Participants' opinions about importance of the model

Implementers have categorized importance of CCM in five categories: **Personalized care, improvement and less drugs, reduction of attendances and emergency admissions and reduction of depression symptoms**. Implementers explained that collaborative care has helped them to know better their patients through individual nursing care plans, complete need assessment of every patient and weekly meetings to discuss the cases. They have also confirmed that there was a visible improvement in patients who followed the program. For some patients some drugs were stopped, for others the quantity was reduced. Also implementers argued that there was improvement of some patients who followed the program based on their lab tests. Patients had significant reduction of glucose in their blood; others who were hypertensive had significant decrease of blood pressure.

Implementers confirmed that they have not received an emergency admission for any patient who was following the program; also they have stated that this was probably caused by the increase of patient's adherence to treatment in this group of patients. They have also explained that no patients among those who followed the care have come with complications of diabetes or hypertension during the period of care. Implementers have also confirmed that

some depression symptoms including insomnia, hopeless; lack of appetite and lack of pleasure which were reported by patients at the beginning of the care were not reported by patients at the end of care.

Comments and suggestions from the research team

The continuity of the care and its implementation in other districts were the main suggestions of the collaborative care team.

Outcomes of the implementation of new adapted CCM

Outcomes of the model in terms of practice change

If the implementers and patients could recognize and appreciate the health outcomes resulted from the model testing over three months only ; this imply the best likely acceptance of the model and its continuity. It is not easy to change from a usual nursing practice to another. According to NICE [46] changing is particularly challenging in healthcare because of the complex relationships between a wide range of organizations, professionals, patients and carers. However when are aware and know what need to change; have a drive and desire to improve care; perceive the benefits of any proposed change and know how best to competently carry out the change; then the change is easy and last [46]. It is also important to mention that when people who should change are involved in change process including identification of need of change; adoption of new skills and learn advantages as disadvantages of the new behaviour; this facilitate the change [47-49]. The collaborative care team in this study were totally involved in all steps of the study.

Outcomes of the model in terms of knowledge production

Birks, Chapman and Francis [50] state that knowledge derived from action research is grounded in actual practice situations. In this study, a collaborative care model was adapted to be used at district health care level. This model was adapted to Rwandan context following the gap existing in Rwanda concerning the management of comorbidity of depression and NCDs. The research team who adapted the model was the one who explored and confirmed that gap, therefore it is the same team who proposed the solution to the gap ensuring that the model was much needed. The evaluation of the implementation cycle revealed no changes to the adapted model. Being involved in all steps of this research improved the knowledge of research team members about collaborative care. Action research which has guided the study encouraged participants to be critical of their own practice and to determine ways of improving (51).

BARRIERS TO THE IMPLEMENTATION OF CCM

BARRIERS RELATED TO PATIENTS

Financial concerns:

During implementation of the model patients had financial concerns including consultations costs, transport costs, drug costs and sometimes costs for lab tests. Financial barriers have been reported in other studies which have implemented the collaborative care model [6,24]. Home visits were proposed by the team as solution to reduce patient's visits at the Hospital.

Lack of knowledge about mental services:

During our study, many patients expressed that they were unaware of mental services. Eghaneyan et al.,[24] has also reported lack of knowledge about mental services by patient as a barrier to implement collaborative care. To overcome this barrier, the team has proposed to conduct educational sessions about mental services for all present patients.

Beliefs about acceptability and effectiveness of psychological treatment:

During or study, we observed that some patients did not believe in psychological treatment and thought depression can't be treated. This is mostly caused that psychotherapy is not known and understood by many patients [52]. Lack of education about mental illness and its treatment is among top barriers to seeking mental health care by patients [53]. To overcome this barrier, the collaborative care team particularly mental nurse has to conduct several educational sessions to explain what psychotherapy is and how it can help people with mental problems.

Fear of family disapproval/Stigma:

The team has also raised another barrier, that many patients see psychotherapy as a treatment of "crazy people", therefore considering the treatment as not accepted by the family and by the community. Other studies relate this fear to stigma experienced by people who seek treatment in mental health services [52, 53]. To overcome this barrier, the team has proposed also to conduct educational session at both hospital and community level to explain mental services and its benefits.

BARRIERS RELATED TO PROVIDERS

Perceptions of CCM need in the Rwandan context:

In order for CCM to be successful, the collaborative care team should well understand the need of the model to manage the co morbidity of depression and NCDs. De Silva [47] explain that change is facilitated by the good understanding of why the change and how to change by people involved in the change. For the team who participated in the study, there is no problem of perceiving the need. However, if the model would be implemented in other district hospitals, it is a must for collaborative care teams to be trained about the benefits of CCM. In some studies which have adapted CCM, the training of team about collaborative care has been done by [22].

Limited human resource: As discussed in previous pages, in Rwanda the health personnel

still low compared to the number of patients. This also affect the collaborative care model. The limited human resource has been also reported by other authors who adapted Collaborative care model Ngo et al.[6] and Eghaneyan et al.,[24]. To overcome this, the team decided that following the stepped care, depression will be treated based on its severity. For mild depression, patients will receive group educational therapy and watchful waiting. According to Van Rijswijk, Van Hout, Van de Lisdonk, Zitman and Van Weel, [54] patients with mild depression improve after a period of watchful waiting, education about physical exercises and self hep -groups. Also the psychiatrist will visit once in three months. However he/she should communicate with the district team using other communication channels as we have seen in previous pages. The implementers will advocate to the hospital management for the possibility to recruit other staff for collaborative care model.

New adapted CCM to the Rwandan context

After the testing of the new adapted model and evaluating its applicability; the researcher invited the team to revise again the model for any changes .There were changes made and the new adapted model was finalized as the final new adapted CCM to the Rwandan context.

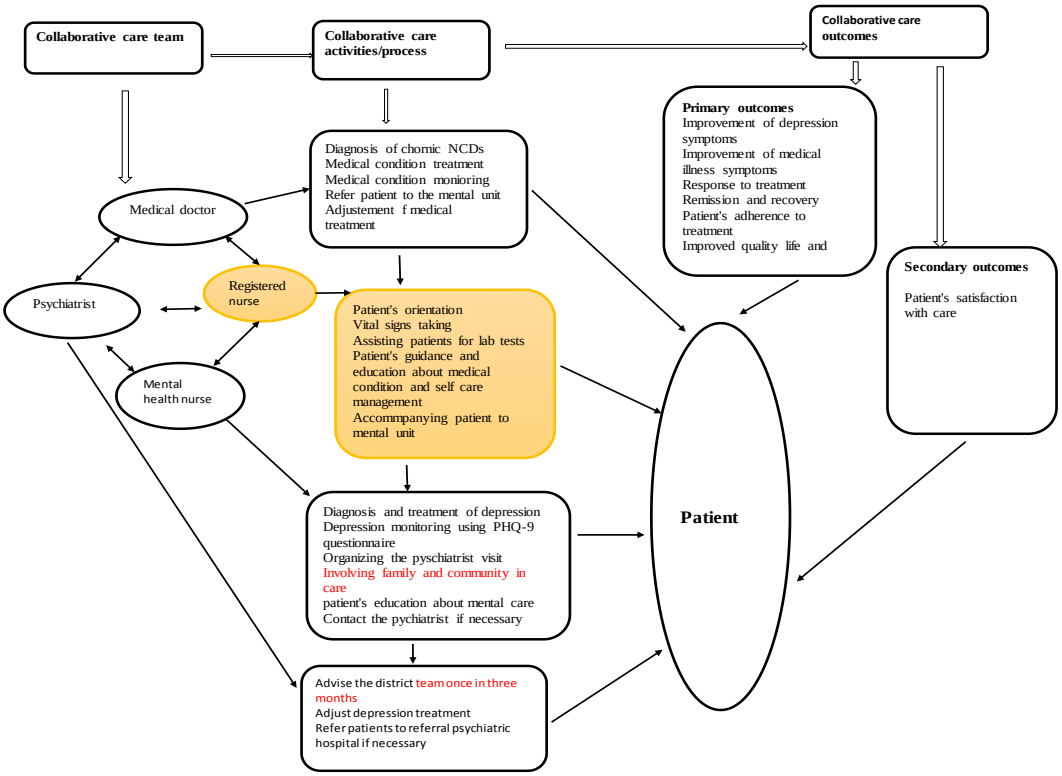

Figure 1: New adapted Collaborative Care Model to Rwandan Context

CONCLUSION

A team of 14 mental and medical health professionals has adapted the existing Collaborative Care Model to the Rwandan context; therefore a new adapted Collaborative Care Model to

manage the co morbidity of depression and Chronic NCDs in Rwanda health district level was developed and tested for the applicability. We recommend the use of this model by district hospitals in Rwanda.

ACKNOWLEDGEMENTS

Our sincere gratitude to the Educational Board of Rwanda which supported the study. Our deep thanks goes to the University of KwaZulu Natal, Rwanda Ministry of Health and Rwanda College of Medicine and Health Sciences Institutional Review Board for their ethical approval to conduct the study.

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