A telepsychiatry model to support psychiatric outreach in the public sector in South Africa

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Abstract
The access of rural Mental Health Care Users in South Africa to specialist psychiatrists and quality mental health care is currently sub-optimal. Health professionals and planners working in psychiatry lack a well-defined and feasible outreach model to facilitate the delivery of services to remote and rural areas. In response to this challenge, a three-year action research telepsychiatry study was undertaken by the Departments of Psychiatry and TeleHealth at the University of KwaZulu-Natal, to develop a telepsychiatry outreach model based on local research and international evidence. The Model draws on needs and infrastructure assessments of the designated psychiatric hospitals in the province, a review of the published international evidence on telepsychiatry and videoconference-based education, and an evaluation of local clinical and educational telepsychiatry implementations in KwaZulu-Natal. The Model proposed is ''virtual'', i.e. not bound to provincial or district referral patterns, aims not to add to the burden on the current workforce and is intended to be integrated into psychiatry outreach services and policy. The Model should be subjected to in situ testing for validation and implementation. It is hoped that an implementation of this Model will improve the access of Mental Health Care Users to specialist psychiatry care.

Keywords: Videoconferencing; Psychiatry; Model; Telepsychiatry; South Africa

Received: 09-10-2011
Accepted: 21-05-2012
doi: http://dx.doi.org/10.4314/ajpsy.v15i4.34

Introduction

South Africa has 50 million people, of whom 42.5 % live in rural areas.[1] There is a heavy burden of psychiatric disorders in all provinces[2] yet mental health services are in a state of neglect and suffering from a lack of resources, including psychiatrists.[3,4] To address the extreme shortfall of delivery of psychiatry services in South Africa, it is essential that health services make optimal use of the limited available resources of both public and private psychiatrists as well as engage in task shifting to other health workers.[5] Telepsychiatry, the practice of psychiatry over distance using information and communication technologies has the potential to assist in addressing the shortage of psychiatrists and is one of the most successful forms of telemedicine.[6,7-10]

In South Africa, the National Department of Health has identified telemedicine as a national priority[11] and various successful telemedicine projects have been implemented.[12] In addition, the University of KwaZulu-Natal has developed a successful videoconference-based, tele-education service that is providing an average of 6.5 hours of videoconference-based medical education teaching per day.[13]

A telepsychiatry program has commenced in KwaZulu-Natal. As has been shown internationally, telepsychiatry start up services are often dependent on local champions[14-17], but the sustainability of these services and their integration into routine psychiatry remain a challenge.[18]

Achievement of a sustainable telepsychiatry service requires a sound evidence based infrastructure and service based model. No such models for telepsychiatry in the developing world exist. This paper describes a model for telepsychiatry in a low resource setting. It is hoped that the model will improve on the over-reliance on champion driven services and that the model will be adaptable to other telemedicine projects.

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Development of the model

Shore's six stages for the development of a rural telepsychiatry model were adapted to meet local needs (Table I).[19] The model development commenced with partnership organization and stakeholder engagement (stage 1) and this was maintained throughout. Additional stages were included to examine the available evidence on the feasibility and effectiveness of telepsychiatry (stage 4) and to develop guidelines (stage 5) (Table II). The pilot evaluation stage included the evaluation of two implementation projects, namely videoconference-based registrar training and an educational and clinical telepsychiatry outreach action research study (Table II). Structure configuration was done by the local services prior to implementing the telepsychiatry outreach services and was not formally included in the model development process. The Model proposed in this paper is the final stage in the development process.

Background

Challenges and problems influencing mental health conditions in South Africa have been well described.[20] Foremost of these, is the treatment gap experienced by Mental Health Care Users[5] and the ongoing shortage of psychiatrists which may be addressed by implementation of a widespread telepsychiatry service. Systematic reviews suggest that there is reasonable, good quality, international evidence that telepsychiatry is effective and feasible.[21] A model for successful implementation should aim to integrate telepsychiatry into the local South African context taking into account local health systems including human, technical and organizational factors, and prevalent local mental health conditions.[22]

Human Factors

Notable human factors include fear of technology, lack of awareness of telepsychiatry, and attitudes of Mental Health Care Practitioners towards telepsychiatry.[23,24] As internet penetration in South Africa is estimated at only 13.9%[25], health care practitioners may have limited exposure to and knowledge of information and communication technologies and a lack of comfort with technology.[26] Psychiatry is also viewed as a specialty reliant on interpersonal contact and with a limited need for technology. This may contribute to a lack of champions for the technology.[16]

Technical Factors

Technical factors are also a major consideration in any model development. In an e-health readiness survey in KwaZulu-Natal, hospital managers generally did not feel that their facilities and infrastructure were technically ready for e-health.[27] In addition, poor information and communication technology infrastructure, limited bandwidth and inconsistent power supply present further challenges. Most of the videoconferencing units in public hospitals in South Africa use fixed telephone line ISDN (Integrated Services Digital Network) services. ISDN is used as the majority of public hospitals are provided with 128kbps of Internet Protocol (IP) bandwidth for all hospital activities including human resource management, finance, supply management and other core functions, leaving insufficient dedicated IP bandwidth for telemedicine activities.

A minimum bandwidth of 384kbps is recommended for clinical telepsychiatry, but 128kbps is acceptable as an alternative.[28,29] For tele-education, psychiatrists have been satisfaction with connections at 128kbps.[30]

Of 34 videoconferencing sites in KwaZulu-Natal hospitals, only seven have access to 384kbps or above. It is anticipated that future plans to increase bandwidth in public sector hospitals together with improvements in web-based desktop videoconferencing will facilitate the uptake of clinical telepsychiatry.

Organizational Factors

These include the local and national organization of telepsychiatry services and the need to integrate telepsychiatry into routine clinical care and practice. Public health services in South Africa already suffer from inequity and inefficiency[20] and it is essential that a model for telepsychiatry in the public sector be developed as an integral part of clinical and outreach psychiatric services and telehealth strategies.

The Telepsychiatry model

For the model to be useful in the context of South Africa, it is based on the following principles:

1. The model should be based on the clinical needs of Mental Health Care Users and Mental Health Care Practitioners involved in mental health care delivery at local health services.

Table 1: Model development stages

Shore's model development stages[19]	*Model Development Stages*
1. Needs Identification 2. Infrastructure Survey 3. Partnership organization 4. Structure Configuration 5. Pilot Evaluation 6. Solidification	1. Partnership organization and stakeholder engagement 2. Needs identification 3. Infrastructure and E-Health Readiness Surveys 4. Review of evidence a. Videoconference-based education b. Clinical telepsychiatry 5. Guideline Development 6. Pilot Evaluation a. Implementation and Evaluation of Psychiatric Registrar Training b. Implementation and evaluation of telepsychiatry educational and clinical outreach services in KwaZulu-Natal 7. Solidification (Model configuration)

Table II: Findings from preliminary stages of Model development

Stage 1: Partnership Organization and Stakeholder Engagement
A telepsychiatry research team was established consisting of a consultant psychiatrist, a telehealth physician and a PhD student. A stakeholder group was identified consisting of psychiatrists and medical officers in rural areas of KwaZulu-Natal.

Stage 2: Needs Identification[40]
The South African Mental Health Care Act (the Act) No. 17 of 2002 stipulates that regional and district hospitals be designated to admit, observe and treat Mental Health Care Users for 72 hours before they are transferred to a psychiatric hospital. The aim of the study was to establish a baseline of needs in terms of the Act and to assess the potential role for telepsychiatry.
Study: Survey of 36 /50 designated psychiatric hospitals
Findings: Eleven (30.6%) of the hospitals stated that their staff had received adequate support to provide 72-hour observation. Nearly half of the hospitals ranked training in the Act and management of Mental Health Care Users as potentially helpful.

Stage 3: Infrastructure and E-Health Readiness Surveys[27]
The aim of these audits was to assess the preparedness of health districts and designated hospitals for proposed telepsychiatry programs.
Study: Surveys of 45/58 hospitals providing psychiatry care and 10/11 health districts
Findings: Despite nearly 50% of provincial hospitals having videoconferencing equipment, low levels of e-health readiness were found. Telehealth policies and an awareness program are required to facilitate the change management which is required to implement telehealth or telepsychiatry services.

Stage 4 Review of Evidence
(a): Videoconference-based Education[41]
A systematic review of the effectiveness of videoconference-based tele-education for medical and nursing education was conducted.
Findings: Despite the methodological limitations and heterogeneity of the reviewed studies, there appears to be reasonable evidence of effectiveness to provide a rigorous Grade B evidence based recommendation of moderate support.
(b): Telepsychiatry Effectiveness and Feasibility[21]
A systematic review of the effectiveness and feasibility of videoconference-based clinical consultation for psychiatry was conducted.
Findings: There is reasonable confidence that telepsychiatry is equivalent to face to face consultation for assessment, diagnosis and treatment with reported satisfaction from users. More evidence is needed on utilization and cost of telepsychiatry, particularly from developing countries.

Stage 5: Guideline Development[35]
A set of Guidelines and Standard Operating Procedures were developed.

Stage 6
(a): Implementation and Evaluation of Videoconference-based Psychiatric Registrar Education[33]
Psychiatry registrars form the backbone of specialized psychiatric service provision in South Africa. Videoconferencing has the potential to link registrars at satellite hospitals with academic centers. The aim of the study was to evaluate the implementation of a videoconference-based psychiatry registrar education program.
Study: Standard review strategies were used to review the literature on videoconferencing in psychiatry education in the medical literature databases. To evaluate the implementation of the videoconference-based psychiatry registrar program, a pre- and post-evaluative design was used.
Findings: Videoconferencing is a cost effective method for registrar education, the time saved in not having to travel to the Medical School is substantial and means time gained for clinical duties or own study. Running a successful videoconference education program requires a paradigm shift in teaching that needs to embrace modern technology and acceptance of distributed learning.
(b): Action Research Telepsychiatry Implementation and Evaluation[30]
The aim of the study was to develop, implement and evaluate telepsychiatry educational and clinical outreach services in a resource constrained environment, through a collaborative action research project between the Departments of Telehealth and Psychiatry of the University of KwaZulu-Natal.
Findings: Telepsychiatry offers tremendous potential to facilitate the three strategies suggested by the WPA_ENREF_445 and to address the treatment gap, save time and costs and improve access to a small pool of specialist psychiatrists in resource constrained environments. To facilitate this, a sound, evidence-based, clinician-led model for Telepsychiatry in South Africa should be developed.

2. The quality of telepsychiatry clinical consultations or consultation liaison should be similar to the standard expected of in-person psychiatric services.
3. The model should be owned by the profession of psychiatry, lead by a senior psychiatrist who acts as the advocate for telepsychiatry, and integrated into routine psychiatric care and psychiatry outreach services and policy.
4. The model should be ''virtual'', i.e. decoupled from existing district and regional health referral pathways.
5. A change management plan to implement the model should be developed and funded.

Aim and Objectives

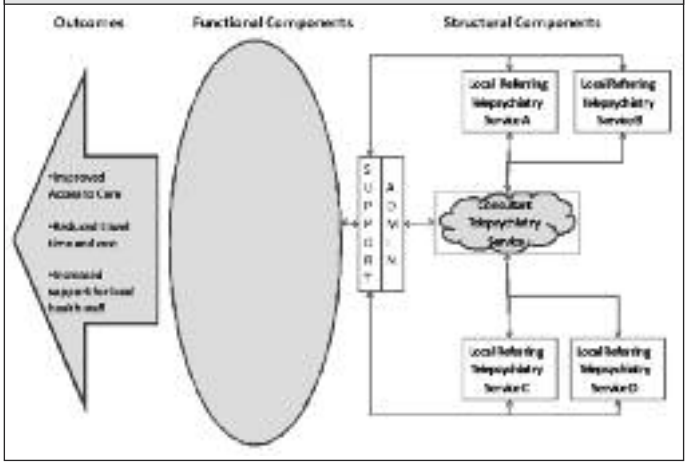
The overall aim of the model is to improve the quality and accessibility of outreach psychiatry services and to support isolated rural and remote Mental Health Care Practitioners.

The objectives are to develop a model for the configuration, implementation and evaluation of clinical and outreach telepsychiatry services in a low resource setting. The model should provide a telepsychiatry infrastructure and service that is:

- Appropriate, feasible, cost-effective and evidence-based
- Integrated into routine clinical and educational psychiatry

outreach services and is not solely reliant on local champions for success
- Owned by the profession, is clinician-lead and does not burden the already overstretched existing public sector workforce
- Economically sustainable through shared dedicated telemedicine videoconference service coordination, the provision of equipment, training, technical support, and standard operating procedures. If possible the Model should be generic enough to be applied to other medical services.

Figure 1: The Telepsychiatry Model



Description of the Telepsychiatry model

The model draws its structure and functions from the basic premise that clinical telemedicine services do not require the patient to travel to the clinician and a consultation liaison psychiatry outreach model where specialist psychiatry services are provided to areas of need. The model provides specialist psychiatry services that are not available at local health services though videoconferencing instead of in-person consultation. The model has both structural and functional components (Figure 1).

Structural components

The structural components of the model include a consultant telepsychiatry service and a number of referring local telepsychiatry services. The consultant service is ''virtual'', i.e. decoupled from existing referral pathways, and can be located anywhere at a national or a provincial level or in another country, to allow limited human resources and expertise to be more efficiently utilized, unconstrained by any need for physical proximity. Local telepsychiatry services are referring clinics or hospitals with adequate connectivity and hardware to connect via videoconferencing to a psychiatrist. There are human resource and infrastructure issues at both the consultant and local referring telepsychiatry service sites.

• Human resources

The potential staffing and roles of the consultant and local referring telepsychiatry services are summarized in Table III. The psychiatrist links via videoconferencing from the consultant telepsychiatry service to a Mental Health Care Practitioner at a referring site, with or without the Mental

Table III: Comparison of Consultant and Local Telepsychiatry Service Structure

Consultant Telepsychiatry Service	*Local Telepsychiatry Service*
Senior Psychiatrist Leader	Mental Health Care User and Translator as required
Dedicated Telepsychiatrists: • Consultant psychiatrists (public or private) • Appointed to consultant telepsychiatry service • Full-time or session employed • Employed by Department of Health, University or private sector • Includes local registrar rotation • Trained in videoconference etiquette and use of technology	Local Mental Health Care Practitioners: • Local health staff without post-qualification psychiatry training who are providing clinical psychiatry services • Include Medical Officers, Registered Nurses or Allied Health staff. • Trained in videoconference etiquette and use of technology
A dedicated telepsychiatry clinical coordinator: • Appointed to the consultant telepsychiatry service • Should be a Mental Health Care Practitioner • Functions include: stakeholder consultation, awareness raising, support visits to local staff to promote local ownership of the service, assessments of local venues, training of local staff, ongoing monitoring and evaluation, liaison with national bodies, monitoring and evaluation of telepsychiatry services	Dedicated local telepsychiatry service coordinators: • Could be telemedicine coordinator, health practitioner, secretary or local technician who has job description modified to include local coordination of telepsychiatry. • Functions include: arranging bookings, ensuring that the Mental Health Care Users and documentation are available at the venue at the right time, establishing connections and assisting the local clinician with the teleconsultation
Dedicated Audiovisual Technicians: • Appointed to the consultant telepsychiatry service • Functions include: setting up services, liaising with local technical support persons, training and quality control	Dedicated local technology support: • Depending on the size and function of local services, technology support could be in the form of dedicated technical officers or dedicated technology support job description items for existing support personnel or super users. • Functions include: establishing connections, problem solving and quality control

Health Care User being present.[29,31] Depending on specific language needs, a translator may also be required at the referring site.

To address local administrative problems such as potential booking conflicts and other scheduling issues[30], it is recommended that both the consultant and local referring telepsychiatry services have administrative support and coordination staff.[23] International studies strongly indicate that telepsychiatry requires central planning and coordination[30,32],_ENREF_38 and local referring service sites should have site coordinators to ensure sustainability.[33]

Dedicated technical staff at the consultant telepsychiatry service and technical support at the local referring service sites are also essential for success. Experience in KwaZulu-Natal has supported findings that technical issues at startup are the most frequently mentioned problems in process evaluations.[34]

• Infrastructure

Local referring services access the consultant telepsychiatric services by videoconference using cost effective videoconferencing solutions. Connectivity may be via fixed telephone lines, fibre optic cable, satellite, wireless and wireless cellular telephony. In resource constrained settings videoconferencing facilities should be multipurpose venues used for other educational and telehealth activities in order to be cost-effective. Appropriate equipment and facilities for telepsychiatry and recommendations for use are included in the Guidelines for Telepsychiatry developed for South Africa.[35] Administrative infrastructure should include the use of referral sheets, booking and recording systems[30] or web-based scheduling systems.[23]

Functional components

The functional component of the model includes leadership and management, clinical consultation, education and training and technical and administrative support for the delivery of telepsychiatry services.

• Leadership and Management

Telepsychiatry services requires the support and vision of senior management.[36] At the consultant telepsychiatry service level, a senior psychiatrist should buy-in to the new service and lead the telepsychiatry service. Telepsychiatry should be a core component of clinical and outreach psychiatry. Part of the role of the senior psychiatrist would be to lobby for the integration of telepsychiatry in national and provincial mental health policy and find ways of using telepsychiatry to facilitate task shifting to non-psychiatric trained staff at peripheral hospitals.[30] During the developmental phase of telepsychiatry it may be necessary to establish telepsychiatry units in the academic departments of psychiatry and in local departments of health and telepsychiatry special interest groups in professional associations.

The National Department of Health has endorsed telemedicine[11] and it is essential to ensure that telepsychiatry is consistent with any national telemedicine strategic plans and government policy documents on infrastructure, technology and clinical service planning. To improve planning and implementation, telepsychiatry stakeholders should seek representation on national and provincial telemedicine planning and steering committees to drive telepsychiatry activities in the Public Sector. Telepsychiatry implementation will be facilitated by integration with telemedicine strategies such as dedicated local telemedicine service coordinators at referring hospitals, technical support positions at these hospitals and modifications of health worker job descriptions to include the practice of telemedicine.

• Clinical Consultation Services

These services may include clinical consultations to both psychiatric outpatient clinics and inpatient units in designated hospitals admitting Mental Health Care Users for 72 hours for observation under the Act. For new services, follow up telepsychiatry sessions for review of medication[24], and some emergency one-off sessions are also anticipated. Thereafter it is likely that the most common telepsychiatry clinical consultations will relate to problem cases with requests for second opinions and mentoring of medical practitioners based at designated hospitals[30], but consultations could include assessment, diagnosis, confirmation of treatment and medication management and follow up. Short-term coverage of rural inpatient psychiatric units for staff on holiday, training or illness is also possible using telepsychiatry.[37]

• Education and Training Services

Telepsychiatry education and training includes formal psychiatric registrar supervision and education[33], preparation for specialist examinations[38] and informal education to support health staff at local services by providing ongoing in-service training on the Mental Health Care Act and the management of Mental Health Care Users.[30] A systematic review of the effectiveness of training programs for health staff without post-qualification psychiatry training found that despite the differences in training programs, training in mental health may improve outcomes in mental health in low and middle income countries.[35] Continuing medical education (CME) via videoconferencing has been proven to be very successful in other specialties[12] and it would be prudent to adopt this mode of education delivery for psychiatry.

• Technical and Administrative Support

For successful telepsychiatry services, adequate administrative and technical support is required. This is discussed in detail in the Clinical Guidelines for Telepsychiatry in South Africa.[35]

Model Implementation

The authors recommend the following steps for the successful implementation of the proposed model:

1. **Situational Analysis and Needs Assessment:** Before the model is implemented, a situational analysis and needs assessment should be conducted. This would include the identification of the current treatment gap and the factors contributing to this at the local health services.
2. **Adoption of a Telepsychiatry Solution:** Once the

situational analysis and the needs assessments are concluded, a determination should be made concerning the need for a telepsychiatry service. Furthermore, an assessment of the feasibility, sustainability, advantages and disadvantages of addressing the needs using telepsychiatry is required.[39] Various solutions including telepsychiatry could be proposed and considered.

3. **Planning to implement the model:** Once telepsychiatry is selected as the most feasible solution, a strategic plan should be developed to assess the infrastructure and costs implications for the configuration and implementation of both the consultant and the local referring telepsychiatry sites.
4. **Infrastructure Assessment:** An understanding of the existing technological, organizational, and programmatic infrastructure required for telepsychiatry is essential to determine whether the infrastructure is adequate.[19] A review is also required of the local referring mental health services and whether the local services can support possible consultant psychiatrists' recommendations for care.[39]
5. **Cost projections of Proposed model:** An economic assessment of the proposed consultant and local referral telepsychiatry services should be conducted. The implications of reimbursement models for telepsychiatry in the National Health Insurance (NHI) and Private Health Insurance are not clear at present. At the consultant telepsychiatry service, consideration should be given to dedicating at least one post to telepsychiatry.
6. **Consultant and Referring Telepsychiatry Services Configuration:**[19] This process should ensure that the type of referral telepsychiatry services are determined[39], the roles and responsibilities of the stakeholders are delineated, organizational roles and responsibilities are identified[19], new healthcare processes and clinician roles designed and duty statements are adapted.[31] Local protocols should be adapted from the national Guidelines for Telepsychiatry[35] and, where appropriate, adaptation of local policies for registrar deployment and training, and referral should be done.
7. **Training to support the model:** To support the model, awareness needs to be raised, technical capacity needs to be developed, and training programs conducted for all service coordinators, technical support personnel and potential users of the service. All coordinators should also be trained in the technical and procedural aspects of the service, including referral guidelines and data security.[17]
8. **Monitoring and Evaluation Planning:** Evaluation and monitoring will ensure that the model is being implemented the way it is intended and that both providers and Mental Health Care Users are satisfied with the services. To this end, quality and clinical outcome indicators should be developed for both the consultant and the local telepsychiatry services.[39]

Change Management is central to Implementation

Traditionally, psychiatric services are provided around fixed referral patterns in a district/area/regional model. To move from traditional outreach psychiatry to a telepsychiatry outreach service requires a paradigm shift and presents major change management challenges. As with any new program, the introduction of telepsychiatry may also be disruptive and intrusive in the work environment and resistance to change can occur at the practitioner, planning and organizational levels.[32] To facilitate implementation, a formal change management plan is therefore needed.

Stakeholder engagement or partnership organization is central to all phases of implementation to ensure adequate commitment and support and strong central leadership. Senior and clinician-level support is critical to the success and sustainability of telepsychiatry services in health-care organizations[32], and requires a shared vision, committed leaders, enthusiastic and flexible health practitioners and support staff to ensure viability of telepsychiatry.[14]

Model outcomes

Any model implementation should be subject to monitoring and evaluation. The following outcomes of the model are anticipated and performance indicators should be develop to monitor and evaluate any implementation:

- Improved access for Mental Health Care Users at local hospitals to specialist psychiatric services with a resultant decrease in unplanned transfers to psychiatric hospitals.
- Increased contact through supervision and continuing education between local health staff without post-qualification psychiatry training and psychiatry specialists resulting in decreased isolation and increased mental health skills and competencies.
- Reduced time and cost of outreach travel for consultant psychiatrists.

Conclusion

At the commencement of the study comprising the research content of the current series of papers in this edition of *African Journal of Psychiatry*, no telepsychiatry services were functioning in South Africa. Now viable educational telepsychiatry registrar programs have been established, functional clinical telepsychiatry services are starting and an evidence-based model has been proposed for outreach telepsychiatry in South Africa supported by detailed clinical guidelines and standard operating procedures. The model will need further evaluation and refinement and possible use in other aspects of telemedicine.

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