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# Advances of Computers in Psychiatry

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**Abstract**

*Computers have been in use of psychiatry since the early 1950, computers cannot replace the careful attention and compassion of human contact but they can perform standardized operations much faster and more accurately.*

*The current interest in computer use is associated with two phenomena: one is the availability at home, office and portable computers; and the other is the exponential growth in the information that has to be processed in order to deliver optimal care. Computers have advanced patient care through improvements in documentation, evaluation and treatment modalities. They have advanced education by providing convenient access to academic resources, adding decision support modules to electronic records, and by introducing educational software. Research was promoted through the use of sophisticated statistical tools, the convenience of access to clinical databases, and through the introduction of new evaluation and treatment modalities.*

## Introduction

Communication on the Internet has significantly improved all aspects of psychiatric practice. They have advanced education by providing convenient access to academic resources, adding decision support modules to electronic records, and by introducing educational software. Research was promoted through the use of sophisticated statistical tools, the convenience of access to clinical databases, and through the introduction of new evaluation and treatment modalities. Communication on the Internet has significantly improved all aspects of psychiatric practice.

## Application in diagnostic assessments

Structured diagnostic interview are important in research as they offer reliable and valid diagnosis for psychiatric research, routine clinical care. They require much staff training, much time for administration and result biasing. To reduce such problems numbers of diagnostic interviews in psychiatry have been computerized. Diagnostic Interview Schedule-Diagnostic Interview Schedule (DIS)[1], computer screening interview used to generate DSM diagnoses has been computerized to the extent that patient response is fed into the computer and diagnosis is made by the computer, using the traditional interviewer administered DIS (T-DIS) as the standard. An abbreviated version of DIS, known as DIS screening interview (DISSI) has been developed and computerized. The screening interview was either self-administered (S-DISSI) with the subject keying in responses, or interviewer-administered (I-DISSI).These instruments is available in both desktop computer and interactive computerized voice response versions. It has two components; the first is a patient's self-administered questionnaire which has screening questions for Common mental disorders.

In the second component, physician administers clinician evaluation guide to patients who score positive on patient administered questionnaire[2]. PRIME-MD (Primary Care

Evaluation of Mental Disorders) Primary Care Evaluation of Mental Disorders (PRIME-MD) was the first instrument [3] designed for use in primary care to diagnose specific psychiatric disorders using diagnostic criteria of Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)[3]. This instrument is available in both desktop computer and interactive computerized voice response versions. It has two components, the first is a patient's self-administered questionnaire which has screening questions for Common mental disorders. In the second component, physician administers clinician evaluation guide to patients who score positive on patient administered questionnaire. PRIME-MD (Primary Care Evaluation of Mental Disorders)- Primary Care Evaluation of Mental Disorders (PRIME-MD) was the first instrument designed for use in primary care to diagnose specific psychiatric disorders. Composite International Diagnostic Interview (CIDI-Auto).

It has been computerised and studied in context of major depression and anxiety disorders, computerised version showed high sensitivity but low specificity. Computerisation of CIDI-auto can be of much assistance in research and epidemiological context[4]. Diagnostic Interview for Children and Adolescents Revised *(*DICA-R*)* -For the assessment of psychopathology in children a self-administered ,computerized version of the DICA-R was developed, with separate version for children aged 13-18 years, and for parents of children aged 6-18 years. The test retest reliability was found to be modest and comparable with reliability coefficients reported with clinician-conducted interview. Computer-administered clinical rating scales- Computer-administered versions of clinician-administered scales are available for the assessment of depression, anxiety, obsessive-compulsive disorder, and social phobia[5].

**Application of YBOCS, HAM-D, HAM-A scales in computer**

Validation studies support the reliability, validity and equivalence of these scales. Patient reaction has been positive, with patients generally more honest with and often preferring the computer for assessing sensitive areas such as suicide, alcohol or drug abuse, sexual behavior, or HIV related symptoms [6,7,8].

Applications using Interactive Voice Response (IVR) technology facilitate longitudinal monitoring of patients without requiring office visits to collect data, increase the accessibility of information to the clinician, and the quality of patient care through more informed decision making [9]. When used in accordance with established ethical guidelines, computers offer a reliable, inexpensive, accessible, and time-efficient means of assessing.

Bagley et al. reported that a computerized questionnaire elicited significantly more recall of prior sexual abuse in a population of young adult males. Kennedy et al. reported self-administration of a battery of mental acuity tests used in screening for fitness-for-duty or for persons who may be exposed to environmental stress, toxic agents, or disease [10]. The Global Mental Health Assessment Tool – Primary Care Version (GMHAT/PC) is a computerized clinical assessment tool developed to assess and identify a wide range of mental health problems

in primary care. It generates a computer diagnosis, a symptom rating, a self-harm risk assessment, and a referral letter. It has been developed to assist general practitioners and other health professionals to make a quick, convenient, yet reasonably comprehensive standardized mental health assessment. GMHAT/PC has been translated into various languages including Hindi It was used in the first study conducted in India, using the Hindi version GMHAT/PC for assessing its validity in different cultures at the Psychiatric clinic of a General Hospital and an outpatient (Neurology) clinic in the Teaching General Hospital in Jaipur, India by Vimal K Sharma et al. The mean duration of interview was under 17 minutes. The agreement between psychologists GMHAT/PC interview diagnoses and psychiatrist's clinical diagnoses was excellent (Kappa 0.96, sensitivity 1.00, and specificity 0.94). GMHAT/PC Hindi version detected mental disorders accurately and it was feasible to use GMHAT/PC in Indian settings[11].

**Computer use in treatment monitoring and outcome measurement**

Assessment of outcome can be standardized and obtained readily in automated systems. The severity of symptoms, level of functioning, response to treatment, and cost can be followed over time. developed a monitoring system that generated a weekly status report for each patient allowing the clinician to identify potential problems regarding drug treatment and discharge decisions. Hammond et al. developed an automated reminder system that improves physicians monitoring of patients receiving neurcoleptics by promoting early recognition and treatment of tardive dyskinesia[12]. The above applications have legal implications and are particularly useful in managed care environment. Computer software has recently been developed with the potential to provide psychotherapy to the patient with limited or no human supervision such software principle employs a cognitive behaviour therapy or other behaviour therapy principles. This is because behaviour therapy is highly structured, comprises well-delineated procedures that that may need to be repetitive, targets specific symptoms and behaviour and proceeds in a systematic fashion. While such non-human interventions will never have the flexibility, the intuitiveness and the innovativeness of a human therapist, nor ever be able to provide the non-specific benefits deriving from such a person to person therapeutic relationshipbased cognitive behaviour therapy for depression. The program, called overcoming depression, which he has developed to provide cognitive therapy for mild to moderate depression, the program interacts with patient users in a dialogue mode and gives feedback based on seven structured lessons. The program is designed to make cognitive techniques available more widely and less costly to patients than a human could provide. Colby argues that the program is not intended to replace therapists but to provide an intervention based on a learning experience about depression. Computer The program is commercially available, and the developer reports positive feedback from a follow-up study of users. Colby is currently conducting a more formal study to examine the rate of relapse after using the program. In addition to the approach of simulating physician

interview and dialogue, several researchers have begun to explore the role of virtual-reality simulation.

Computer assisted cognitive behaviour therapy for generalized anxiety disorder. Newman et al have outlined a computer program for generalized anxiety disorder .The program comprises four modules: assessment, cognitive therapy, relaxation training and exposure.The computer as a therapist for phobic disorder, a recent development in the behavioral treatment of specific phobias is providing exposure through virtual reality (VR). Clients are not confronted with real anxiety provoking stimuli but with their virtual counterparts. Virtual reality integrates real-time computer graphics, body tracking devices, visual displays and other sensory input devices to immerse patients in a computer generated virtual environment[13].Controlled studies to date show VRET may be an effective exposure delivery method for treating panic disorder (Botella et al. social phobia (Harris, Kemmerling, & North, 2002; Klinger et al., 2005), PTSD (Difede et al., in press) fear of flying (Krijn et al., 2007; Maltby, Kirsch, Mayers, & Allen, 2002; Rothbaum et al., 2006; Rothbaum, Hodges, Smith, Lee, & Price, 2000), fear of spiders (Garcia-Palacios, Hoffman, Carlin, Furness, &Botella, 2002). fear of heights (Emmelkamp et al., 2002; Krijn, Emmelkamp, Biemond et al., 2004; Rothbaum et al., 1995)[14].

Further, some studies show VRET was effective across multiple assessment domains including domain-specific subjective distress, general subjective distress, cognitive, behavioral, and psychophysiological measures.

Meta-analysis revealed that VRET is slightly but significantly more effective than exposure in vivo, the gold standard in the field. There are a number of advantages of VRET over exposure therapy [15]. The treatment can be conducted in the therapist's office rather than the therapist and patient having to go outside to do the exposure exercises in real phobic situations. Further, VRET provides the possibility of generating more gradual assignments (sequence and intensity of treatment), and of creating idiosyncratic exposure.

In the treatment of fear of flying, the advantages of VRET over standard exposure therapy are enormous. It is highly cost effective, components of the flight can be repeated endlessly in the therapist office, and different flight destinations, different crews, and different weather conditions can be created in seconds. Another advantage is that VR treatment can also be applied to patients who are too anxious to undergo real-life exposure in vivo[16].

The program consisted of six lessons, or modules, the content of which was based closely on a CBT manual published by the **National Institute on Drug Abuse**. The modules covered the following core concepts:

1) Understanding and changing patterns of substance use

2) Coping with craving

3) Refusing offers of drugs and alcohol

4) problem-solving skills

5) Identifying and changing thoughts about drugs and alcohol, and

6) Improving decision making skills.

The first module provided a brief explanation of how to use and navigate the program; following completion of the first module, the participants could choose to access the modules in any order they preferred and repeat any section or module as many times as they wished [17,18].

**Rehabilitation**

Computers have been used in the rehabilitation process of chronic psychiatric disorders and intellectual deterioration. It is possible that communication hampered by lack of interpersonal skills can be facilitated by interaction with computers. **Brieff et al**. reported that patients at a rehabilitation program acquired skills at their own pace, showed considerable enthusiasm, and were able to overcome cognitive and motivational limitations[19]. They were taught computer applications in a vocational rehabilitation program and were able to improve their spelling, grammar, math, and vocabulary skills. Hermanutz et al. demonstrated the reduction of distraction in patients with schizophrenia using a computer-assisted attention training program.

Hoffman et al. using a PC touch-screen for cognitive rehabilitation of patients with Alzheimer's disease observed emotional activation and improvement in social competence and orientation[20]. A program to treat cognitive deficits resulting from brain damage, one such program is PSS CogReHab v.95.Brain Function Therapy- BFT-Brain Function Therapy is one of the earliest computer based cognitive retraining programs. It has been developed by the Clinical Neuropsychology unit of the Department of Clinical Psychology at the National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore[21]. Can be used in normal adults, children with ADHD, head injury patients, stroke patients, pilots, military personnel, the program is used in several clinical centers in India. BFT is a highly professional program for improving speed and accuracy of neurocognitive processes and measures the improvements in speed in terms of millisecond. Similarly complexity-difficulty levels can be changed stepwise for gradual retraining or restoration. When the program is used for clinical purposes, with brain damaged patients, or children with cognitive difficulties, it must be administered by an expert technician, until the client learns to perform the tasks by himself. Computer based cognitive restructuring of self-esteem.

**Computer based cognitive restructuring of self-esteem**

Horan examined the effects of a computer based cognitive restructuring program on rationally-mediated self-esteem in 28 male and 28 female students aged 16-19 years with below-average self-esteem were classified by gender and randomly assigned to either computer-based cognitive restructuring or a relaxation-training control condition. The computer intervention laden with multimedia features such as color video clips, stereo music, digitized speech, and engaging graphics targeted irrational beliefs linked in previous research to low self-esteem. Participants were assessed repeatedly as they progressed through the program; depending on the tenacity of each belief held, the program provided a variety of cognitive restructuring responses[22].

**Telepsychiatry**

Telepsychiatry is the use of online video conferencing for delivery of psychiatric services, and was found to be valuable. Telepsychiatry is the use of telemedicine for psychiatric purposes. It involves healthcare applications of telecommunications technologies, including videoconferencing, television, telephony, FAX, and the Internet. Telepsychiatry thus applies telecommunications technologies to consultation, treatment, education, administrative meetings and research at distant sites. This can include providing medical care to patients at a distance, the use of live interactive video to examine patients in remote locations or cable TV to provide in-home service for homebound patients. It also includes electronic transmission of patient records and X-rays, expert consultations to distant sites and distance learning for health professionals and patient education. Telemedicine can extend healthcare applications to remote rural locations and to medically underserved areas

**Applications of computers in investigations**

Radiological procedures, such as computerized tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET) and Electrophysiological procedures, such as electroencephalography (computerised EEG), evoked potentials, electrophysiological brain mapping and other investigations like Clinical laboratory procedure, such as chromatography and assays for estimation of drug, hormone, neurotransmitter and other levels[23].

**Applications of computers in administrative psychiatry**

The storage of patient record in a suitably constructed database-it requires use of database software; these programs help to store data. It eliminates the need of paper based records. Confidentiality and security of records can be maintained with greater efficiency. Useful in hospitals, research, individual practice as well. Helps to save time, ease the collection and analysis of data for statistical purposes and research. Common database programs include Dbase, Foxbase, FoxPro, Assess and Approach. The computation of statistics and accounting data with the help of computers in research the analysis of data is rendered ridiculously easy, the computations might otherwise have taken weeks or months can be completed within hours or less using appropriate statistical software. Common spreadsheet and statistical packages include Lotus123, Excel, and Statistical Package for Social Sciences (SPSS), Stat Graft and Systat. Online monitoring of drug utilization patterns it helps to identify overuse, underuse of drugs, inappropriate prescriptions in drug dosage, long term audit in drug utilization pattern which might be used to provide a feedback to clinicians in order to beneficially alter prescription patterns.

**Other Applications**

Education-Computer software and programs are educative in nature, in neurosciences computerized brain maps have been developed to facilitate learning, neuroimaging procedures and surgical procedures requiring neuroimaging. These brain maps are advantageous in depicting three dimensional representations, to study structural and functional relationship in human brain at

macroscopic and microscopic level, to study variations in gross morphology. In literature searches computerised databases are ideal resh, all articles published in specified journals during a specified period can be rapidly and conveniently identified and extracted. Major databases, journals and textbooks are now available on disk as an alternative to hardcopy.

Source for conducting literature searches are available such as Medline, Embase and Psyclit by using specific key words**.**

**Advantages**

Advantages include improved access to evidence-based treatments for patients as well as cost-effectiveness compared face-to-face treatment. Furthermore, since patients can return to the program at their convenience to access treatment information, this may facilitate learning and retention.

With the assistance of automated software features, therapists can monitor patient progress and outcomes and proactively support patients before a crisis develops. This means that patients in an Internet intervention may receive support from a therapist faster than would have been the case if they were receiving only weekly visits.

**Disadvantages**

There is limited knowledge about the characteristics of patients who are likely to benefit because there are common negative attitudes of clinician and patient towards Internet intervention. Though these are relatively new nature of the fields, therefore how legal and ethical regulations apply to online clinician-patient interaction are still not clear for each countries.

**Limitations**

Confidentiality of electronically stored patient data is one of the limitations of computer use in psychiatric settings. These concerns have been addressed by implementing sophisticated data protection systems (e.g., use of passwords, encryptor and firewalls).

Some clinicians are resisting its integration into their practice because they concerned that the essential component of human contact will be insufficient or lost therefore it is important to emphasize that computers function as an extension of the clinician's abilities, not a replacement.

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