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# An introduction to computer diagnosis in psychiatry

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The concept of computer diagnosis in medicine is not new. As early as 1971, a computer program was demonstrated to be more accurate than a senior clinician at diagnosing acute abdominal pain before surgery. In psychiatry, however, the problems surrounding diagnosis and classification are more complex than in other branches of medicine, depending as they do on the clinical interview and some agreed classificatory system in the absence of external validating criteria. Reliability has been improved by the application of standardised interview techniques and by the use of operationalised diagnostic criteria but such tools are lengthy and their use requires specialist training. Consequently they tend to be reserved for research purposes rather than routine clinical use. The potential contribution of computer technology to the vexed question of psychiatric diagnosis is here evaluated.

## **Interviewer-administered computer questionnaires**

Computer programs able to generate standardised psychiatric diagnoses from the data supplied by an interviewer have been available for some time. The CATEGO program uses information obtained from the Present State Examination (PSE), the most recent being CATEGO-5 for use with the Schedules for Clinical Assessment in Neuropsychiatry (SCAN). In addition to making ICD-10 diagnoses this modified program can produce DSM-III-R and Research Diagnostic Criteria (RDC) diagnoses (Wing *et al.*, 1990). SCAN also contains a glossary which aids clinical examination providing definitions independent of any algorithms. Similarly, AGE-CAT (Automated Geriatric Examination) employs both decision trees or 'top down' and combination and comparison of levels of symptoms or 'bottom up' classifications to obtain diagnoses. These are examples of computer diagnostic programs based on deterministic diagnostic systems. Statistical techniques have been used, but have not received such wide acceptance, proving less reliable when compared with a clinician. Most current diagnostic programs employ a decision tree method.

A consultation aid currently being developed is 'Psyxpert' (Overby, 1987). This is an example of an expert system which does not require special-

ist training or the administration of a standardised interview. Psyxpert asks the user a set of initial questions, the answers to which are the facts upon which all subsequent inference procedures are based. The program uses the DSM-III decision tree and produces a diagnostic report with certainty factors and treatment recommendations. It is, however, limited in that it addresses only psychotic disorders.

## **Self-administered computer questionnaires**

Computer-patient interviews eliminate observer bias both in eliciting and interpreting information. Computer-elicited case histories have been found to be at least as accurate as clinician-elicited histories and computers found to be better than clinicians at predicting further suicide attempts. It may be that patients do not perceive computers as judgemental.

The next step has been the development of computer programs to administer the interview and to analyse the data. This appears to have several advantages. As well as reducing observer bias and information transfer errors, it is possible to standardise the diagnostic rules based on an agreed classificatory system. The earliest self-administered diagnostic program was based on an extensively modified version of the Hamilton Depression Rating Scale (HDRS), and was found to discriminate between patients and controls when a suitable cut-off score was chosen. A later version of the program called INTERACT has been used in a variety of settings including psychiatric hospitals, drug trials, general hospitals and general practice (Ancill *et al.*, 1985).

In practical terms computers are well suited to branching and complex diagnostic algorithms and thus it is possible to reduce the number of unnecessary questions as well as to provide a comprehensive diagnostic interview. This technique is utilised in the more recent programs.

Computer diagnostic programs based on standardised interviews and operationalised diagnostic criteria include the computerised Diagnostic Interview Schedule (cDIS), which is claimed to be as reliable as the standard DIS at generating

some DSM-III-R diagnoses. However it is not comprehensive in its coverage of diagnoses. The cDIS has recently been updated and is available commercially (Levitan *et al*, 1991).

The screening version of the DIS, the DISSI, has been computerised in two forms, one a self-administered version (cDISSI) and the other a version which prompts the interviewer to ask all the questions (pDISSI). These have been compared with the DIS and the computerised DIS and found to have acceptable validity but no significant saving of administration time.

Although some self-administered computer interviews have been shown to have acceptable reliability and validity, for certain groups of patients they are obviously inappropriate. Certain abnormalities in mental state appear to affect scoring. Patients with severe retarded depression were found to have an artificially low score on the INTERACT program and the effectiveness of self-administered questionnaires at eliciting current psychotic symptoms has yet to be demonstrated.

### Computer diagnosis in primary care

In terms of psychiatric morbidity in primary care, it is known that a considerable proportion of cases of affective disorder remains unrecognised and there is evidence that knowledge of both the precise diagnosis and severity of depression is required to select appropriate treatment.

PROQSY (Programmable Questionnaire System) has been developed as a screening instrument to determine the likelihood of neurotic disorder in primary care (Lewis *et al*, 1988). It is based on the Clinical Interview Schedule (CIS) and its reliability and validity are comparable to a clinician administered CIS.

The Barnet Program is a self-administered interview for the screening and diagnosis of mood disorders, currently being field tested in general practice. The program is based on DSM-III-R diagnostic algorithms and also provides a measure of the severity of depression using a self-administered version of the HDRS. Other potential applications are as a diagnostic aid in the out-patient clinic and as a way of improving the standardisation of entry criteria for clinical trials of treatments for depression.

### Acceptability to patients

An important consideration is the acceptability of such computer administered interviews to patients. Patients found the cDIS generally easy to use and operate and after the cDIS felt their

level of expertise in computing had improved. General questioning following both the INTERACT program and the PROQSY program have suggested favourable attitudes.

### Conclusion

Although computer-aided diagnosis is routinely employed by some researchers it has not gained wider acceptance, despite the generally acknowledged need to improve diagnostic reliability. Computer technology has certainly not proved to be "the fourth quantum advance in psychiatry" as optimistically predicted in the 1960s. Some of the diagnostic programs described above have been demonstrated to have acceptable reliability, to save clinician time and to be acceptable to patients and yet their application has not been extended beyond the teams who developed them. One probable explanation for this apparent lack of enthusiasm, particularly among British psychiatrists, is the limited access most clinicians have had to computer systems in their workplace. With the introduction of computer systems in most hospitals and the pressure for accurate audit in psychiatry, now is the time to seize the opportunities provided by the new technology.

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