The Mood Assessment Program: a computerised diagnostic tool for deriving management plans for mood disorders

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ABSTRACT

- The Mood Assessment Program (MAP) is a computerised assessment and diagnostic program developed at the Black Dog Institute, Sydney, to assist with diagnostic subtyping and management of mood disorders.
- MAP decision rules capture the applied research, informed by clinical expertise, that has been undertaken over the past two decades.
- Preliminary validation studies suggest the MAP possesses acceptable validity for key diagnostic decisions, including determination of polarity and depressive subtype, and the presence or absence of the principal anxiety disorders.
- The MAP provides a rich set of information to help the practitioner derive a broad formulation and so shape a management plan in conjunction with broad treatment guidelines.
- The program will be rolled out over the next 6 months as a formal evaluative tool for wide assessment and application by general practitioners, and subsequently to assist a broader range of health practitioners.

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The Australian psychiatrist Barney Carroll once observed that to understand depression is to understand psychiatry.[1] Implicit to that statement is that such understanding is complex — yet people with depressive disorders are often assessed and managed by health practitioners with minimal training in psychiatry and management of these disorders. This is not a criticism of general practitioners, many of whom in Australia have accepted front-line responsibility for these patients and have to acquire knowledge across multiple clinical domains. Rather, it is an acknowledgement of the reality that acquiring the "pattern analysis" clinical skills to diagnose and manage patients with mood disorders can take psychiatrists decades.

A set of simplification strategies have largely been used in the attempt to overcome this division between training and management. Three examples of such strategies are noted here. First, "depression" has been positioned as a single condition ("major depression" or "clinical depression") rather than as a system diagnosis comprising different subtypes. Second, overarching single causal explanations, varying across different professions, have been put forward. For example, medical professionals see depression as reflecting a chemical imbalance necessitating physical treatments, while psychologists view dysfunctional thinking patterns and behaviours as central, thus requiring cognitive behaviour therapy. To psychotherapists, impaired parenting and other developmental factors are implicated and considered correctable by psychotherapy. Finally, and as a result of the previous logic, we observe treatments being positioned as equipotent across multiple depressive conditions and thus being of universal relevance. This means that the treatment provided to an individual with a particular "type" of depression is dictated more by the background training and discipline of the practitioner, rather than by any specific characteristics of the disorder.

We suggest that such simplification introduces a distinct risk of mismanagement. Australia has done well in destigmatising mood disorders and encouraging sufferers to seek professional help. However, we argue that the effectiveness of professional help is dependent on the assessment and treatment model of the practitioner, and that there is a need for greater sophistication in this, rather than simplification. For health practitioners without the benefit of extensive psychiatric training, purpose-designed tools to help bridge the divide are potentially useful. Here, we describe one such tool.

The Black Dog Institute model

There is a need to understand how mood disorders are best modelled, how they are best assessed and, respecting identification of true cause, how management can most specifically address causal determinants. Our Black Dog Institute model[2] proposes that there are different meaningful depressive subtypes, and that as some are categorical and some dimensional, no single explanatory model should logically be sought. It has been noted that it was only after "the pox" was demonstrated to be two distinct syndromes (chicken pox and smallpox) that it was possible to predict who would recover and who would be scarred for life and at risk of dying.[3] A diagnostic subtyping model for mood disorders has the same capacity to advance their clinical identification and management.

We suggest that mood disorders can be separated into bipolar and unipolar states, with bipolar I and bipolar II being categorical disorders that are distinguishable from each other by the presence of psychotic features in the former during "highs". Despite this distinction, and a high lifetime community prevalence (up to 6%),[4] detection of the bipolar disorders is low or distinctly delayed.[5] Within the depressive disorders, there are two categorical types — psychotic and melancholic depression — possessing type-specific clinical features and responding preferentially to physical treatments, but differentially to different classes of antidepressants.[6] Additionally, there is a residual class of non-melancholic disorders, reflecting the dimensional impact of life-event stressors and different predisposing personality styles. Management of these disorders may focus on negating the impact of either the causal stressors (eg, through counselling or problem-solving approaches) or the predisposing personality (where quite variable therapeutic approaches may be beneficial, depending on their potential to address the determinants).

While arguing for a more sophisticated diagnostic and management model for mood disorders, we have also sought to develop diagnostic and treatment algorithms over the past two decades. We commenced development of the Mood Assessment Program (MAP) 4 years ago, and are currently in the process of conducting

Patient information in the report generated by the Mood Assessment Program for the referring medical practitioner

- Sociodemographic details
- Current depression severity
- Depressive history
- Depressive symptoms (and severity) experienced during the patient's worst episode
- Prototypic symptoms (for diagnostic subtyping)
- Presence of psychotic features
- Stressful events experienced over (a) preceding 12 months and (b) lifetime
- Overall functioning
- Background psychosocial factors, family history of mood disorders
- Medical factors, drug and alcohol history
- Lifetime and current anxiety disorders
- Past and current medical conditions
- Past and current treatments (medications and psychological therapies), their effectiveness and any side effects necessitating cessation
- Medication adherence
- Personality style (for those personality styles providing risk to depression), disordered personality functioning ◆

the final pilot as part of a 6-month roll-out plan. Its objectives, properties and potential are outlined below.

The Mood Assessment Program

The MAP is a computerised assessment program designed specifically to assist GPs with diagnosis and management of mood disorders. A patient with a current or previous mood disorder referred by a health practitioner enters information into the program at a MAP Centre (pilot centres have recently been established in Sydney and rural New South Wales), a process that takes up to 1 hour. A report covering the domains shown in the Box is then generated and forwarded to the referring medical practitioner.

The MAP report includes a number of algorithm-derived subtyping diagnoses: bipolar versus unipolar disorder; melancholic versus non-melancholic depression; and the presence or absence of five anxiety disorders (social phobia, generalised anxiety disorder, obsessive compulsive disorder, panic disorder, and agoraphobia). Report annotations inform the practitioner about diagnostic decision accuracy and how each section is best interpreted. Finally, a treatment summary table provides broad management guidelines for bipolar I and II disorders, psychotic and melancholic depression, and for the more "fuzzy" set of non-melancholic disorders, based on empirical studies and clinical decisions developed at the Black Dog Institute and detailed elsewhere.[7]

Objectives of the MAP

The MAP report provides four important domains of information. First, it covers the territory required to comprehensively assess an individual with a mood disorder — present and past symptoms, family and developmental factors, impact of stressful and other factors (medical, drug or alcohol) that might cause or contribute to a mood state and its trajectory, depression severity and level of disability, and the phenomenology of the mood disorder and any anxiety disorders. The MAP thus reduces the risk of salient information being missed and provides a dataset to formulate "why this person has this type of depression at this time".

Second, it provides the practitioner with a comprehensive report of all previously trialled and current interventions, as well as their effectiveness and any ceased due to side effects (which is alone of considerable use to practitioners).

Third, it generates major subtyping diagnostic decisions — reflecting decision rules progressively developed by the clinician research team of the Black Dog Institute (including its predecessor, the Mood Disorders Unit) over two decades — thus overcoming the practical difficulties faced by practitioners who lack detailed and extensive training in mood disorder assessment.

Finally, by linking management guidelines to major diagnostic decisions, the practitioner is provided with a logical management plan. In essence, the MAP provides a rich set of information from which the practitioner can derive a broad formulation, with decision rules capturing the clinical wisdom and applied research of Institute staff.

MAP diagnostic decision accuracy

All key diagnostic decisions in the MAP have been formally tested by pilot studies of earlier prototypes of the program over the past 2 years, including identifying changes to items or analytical approaches. Results are briefly summarised here.

Bipolar versus unipolar disorder

Polarity decisions are obtained from the patient's responses to the 46-item Mood Swings Survey (MSS-46) embedded within the MAP.[8] During its initial development, the MSS-46 was shown to have considerable utility in distinguishing composite bipolar (bipolar I or II) patients from unipolar patients, with receiver operating characteristic analyses yielding an area under the curve of 0.93, with sensitivity of 84.3% and specificity of 92.6%.[8]

A recent validation study, using an independent sample of 247 patients from the Black Dog Institute Depression Clinic, re-examined the accuracy of the MSS-46.[9] All patients underwent clinical assessment with two independent psychiatrists who were blind to MAP decisions, and a subsample of 87 patients completed the widely used Mood Disorder Questionnaire (MDQ).[10] The MSS-46, as embedded in the MAP, correctly classified 82.2% of cases when compared with clinician diagnoses ($\kappa = 0.60$, $P < 0.001$) and, compared with the MDQ, demonstrated comparable sensitivity (86.5% v 78.8%) and specificity (60.0% v 71.4%) when using pre-established cut-off scores. In essence, the MSS-46 has a slightly greater "false positive" risk (ie, of incorrectly classifying a unipolar condition as bipolar). If a bipolar disorder is suggested, the clinician should clarify (by assessment of the features of the "high") whether it is likely to be a bipolar I or II condition.

The diagnostic utility of the MSS-46 will be further evaluated in different clinical and community samples.

Melancholic versus non-melancholic depression

A diagnostic algorithm, underlying a Q-sort strategy within the MAP, determines the likelihood of a melancholic or non-melancholic disorder, based on patient ranking of prototypic depressive

symptoms (as opposed to rating symptom severity). Our most recent validation study undertook testing of this algorithm with 228 patients diagnosed with a unipolar disorder attending the Depression Clinic. Logistic regression analyses correctly classified 81.6% of the total sample compared with clinician diagnoses ($\kappa = 0.53$, $P < 0.001$) (unpublished data).

Further validation of the algorithm was undertaken with a subsample of patients, using the Newcastle Index ($n = 187$) and a semistructured interview assessing criteria for melancholia from the *Diagnostic and statistical manual of mental disorders*, fourth edition (DSM-IV)[11] ($n = 107$). Agreement between the algorithm-derived diagnoses and the Newcastle Index was moderate ($\kappa = 0.40$, $P < 0.001$), while agreement with DSM-IV diagnoses was low ($\kappa = 0.21$, $P < 0.05$). Further validation of this diagnostic algorithm is currently being undertaken. While the algorithm has been found to be less accurate for those with bipolar disorder, this is of less relevance as bipolar depression is typically melancholic or psychotic in nature.

Anxiety

Preliminary validation of lifetime anxiety disorder algorithms within the MAP was undertaken with patients attending the Depression Clinic. MAP diagnoses were compared with clinician diagnoses ($n = 138$), and the Composite International Diagnostic Interview (CIDI)[12] — a comprehensive, fully structured, computerised interview developed by the World Health Organization that derives DSM-IV[11] diagnoses ($n = 188$). Diagnostic agreement between the MAP and the CIDI was generally moderate, with overall correct classification rates ranging from 50% to 70%. Similar results were obtained when comparing MAP diagnoses with clinician diagnoses (60%–70% overall correct classification), with κ values of up to 0.40.

Assessment of state–trait anxiety presents difficulties, given the non-categorical nature of the disorder. As such disorders are rarely "pristine", particularly in those with mood disorders (with depression often contributing to inflated anxiety scores), this is reflected in the relatively high rate of false positives obtained by the MAP when compared with clinician diagnosis. It should be noted that standardised assessments based on patient responses generally display a similarly high rate of false positives — an example[13] is that of CIDI agreement with longitudinal, expert, all data (LEAD)[14] diagnoses, yielding a κ value of 0.40. Thus, our data suggest that MAP diagnostic decisions for anxiety disorders have comparable validity to currently accepted measures in a population of patients with mood disorders.

Conclusion

Subject to GPs finding the MAP to be of assistance in diagnosing and managing mood disorders during the current pilot phase, along with the resolution of any pilot-generated problems, the MAP will be rolled out as a formal evaluative tool for wide assessment and use by a broader range of health practitioners.

We feel there is a need to move beyond homogenising diagnostic terms such as major depression. The MAP aims to provide GPs with a richer and more sophisticated set of diagnostic and management information than generally suggested by current trends in psychiatric diagnosis. We believe that the MAP has the potential to simplify management of patients with mood disorders, by providing disorder-specific information rather than a non-specific, universal treatment model that risks inappropriate management for many individuals.

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Competing interests

None identified.

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