

ALGORITHMS IN PSYCHIATRY: STATE OF THE ART

Miroslava Jašović-Gašić^{1,2}, Bojana Dunjic-Kostić³, Maja Pantović³, Tijana Cvetić³,
Nadja P. Marić^{1,3} & Aleksandar A. Jovanović^{1,3}

¹School of Medicine, University of Belgrade, Belgrade, Serbia

²Academy of Medical Science, Serbian Medical Society, Belgrade, Serbia

³Clinic of Psychiatry, Clinical Centre of Serbia, Belgrade, Serbia

SUMMARY

Introduction: In literature, algorithms (guidelines) are often synonymous with problem-solving procedures. The importance of using algorithms in psychiatry can be seen in many areas. For physicians, algorithms ease clinical decision making, provide an adequate clinical basis for therapy, stimulate research, and stimulate sources of financing. For users of psychiatric services, algorithms tailor treatment to the individual, enhance the standard of care by using efficient therapeutic techniques, improve outcome, cut costs, and provide continuity of care after hospital treatment.

Aim: Our goal with this paper is to present the advantages of using algorithms, but also to advise caution in their application. It is important to be aware and critical of limitations present in algorithm use.

Methods: A MEDLINE and KOBSON search was conducted combining the following key words and phrases: "treatment guidelines"; "algorithms"; "psychiatry"; "bipolar"; "depression"; "schizophrenia".

Results: We investigated the advantages and disadvantages of algorithms presented in the publications we found in our search.

Conclusion: We consider algorithms to be a necessary component in the treatment of psychiatric patients, but recommend that one should maintain a critical attitude and remember that guideline proposed therapy should always be tailored to the individual.

Key words: algorithms – guidelines – psychiatry – schizophrenia – bipolar disorder – depression

* * * * *

INTRODUCTION

Algorithms (guidelines) provide clear and targeted indices for diagnosing and treating different mental disorders. In the last few decades, a considerable advance in our knowledge of the etiology of psychiatric disorders and in the development of novel treatments has favored the introduction of treatment algorithms in clinical decision making. Having a mental disorder has been and remains a strong obstacle to effective medical care. Most mental illnesses such as schizophrenia, bipolar disorder, and depression are associated with high morbidity and mortality. An evaluation of mental and physical health to assess significant psychiatric and medical comorbid conditions, psychosocial circumstances, and quality of life should be undertaken regularly. This process consists of three steps: synthesizing evidence; translating evidence into recommendations; and implementing recommendations (Michie et al. 2007).

Recommendations for medical care have been present in medical practice for centuries. However, they usually have not been sustained by evidence, their development was not documented, and there was no formal review or revision method identified. Over the last two decades, a number of treatment guidelines have been created to assist clinicians in clinical decision making and to reduce difficulties in the decision making process. Guidelines have been developed by governmental agencies, professional associations, insurance companies, health care provi-

ders and caregivers' associations. The procedures used in developing recommendations within these guidelines differ extensively. Some were evidence-based, some reflected an expert consensus, while others referred to the opinions of one or more authors. Despite considerable efforts to develop and disseminate evidence-based guidelines and their importance, guidelines still differ to varying degrees and remain unequally implemented (Divac et al. 2009).

In this paper, we will briefly present the importance and advantages of the use of algorithms in psychiatry, their current application in major psychiatric disorders (schizophrenia, bipolar disorder and major depression), as well as limitations to their application in everyday practice.

METHODS

A search of MEDLINE and KOBSON databases was conducted to identify relevant studies and reviews using the key words and phrases: "treatment guidelines"; "algorithms"; "psychiatry"; "bipolar"; "depression"; "schizophrenia".

Reference lists from the identified articles were taken into consideration. Original studies, meta-analyses, and review articles were evaluated for their quality of evidence and also to assess the conclusions of others about the importance of these studies. Only studies published in English were examined. Master's and doctoral theses regarding the use of algorithms in psychiatry were not taken into consideration.

IMPORTANCE AND ADVANTAGES OF ALGORITHM USE IN PSYCHIATRY

The use of algorithms in psychiatry presumes a number of benefits. The first of these is the implementation of the most effective psychiatric treatment. Appropriately developed, evidence-based algorithms decrease the possibility of unnecessary or even harmful interventions, and support treatment that achieves the best possible outcome with a minimum risk and at a tolerable cost. Initially, guidelines relied heavily on expert opinion and descriptive studies; today, their development is founded on the careful use of first-level evidence (e.g. randomized clinical trials). Consequently, algorithms are indispensable in the education of psychiatrists, other mental health professionals, and physicians (Culleton 2009). By providing information not only to health care professionals but also to patients and their families, algorithms supplement their psychoeducation. In addition to creating a significant framework for accurate and targeted treatment, and for education, algorithms help identify gaps in knowledge and research and thereby promote development in these fields. Despite an increasing awareness of the importance of the treatment of mental disorders, the stigma of mental illness still presents a severe burden to the mentally ill, their families, and mental health care systems (disciplines, providers, institutions). One of many misperceptions about psychiatry as a medical discipline is that the treatment of mental disorders is varied and ineffective. Creating clear and evidence-based practice algorithms not only provides clear guidance and focused treatment but helps fight the stigma of mental illness in an effective way (McIntyre 2002).

PRACTICAL APPLICATION IN MAJOR PSYCHIATRIC DISORDERS

People with severe mental disorders such as schizophrenia, bipolar disorder and depression have reduced life expectancies and a lower quality of life compared to the general population and to patients presenting with less severe psychopathology (De Hert et al. 2003, Ruggeri et al. 2001). Creating guidelines to target better treatment outcomes in patients with the major psychiatric disorders has been particularly emphasized over the last decade and significant improvements have been made towards standardizing medical health care for this group of patients. However, guidelines for the major psychiatric disorders differ to some extent in their goals, focus, scope and recommendations. In this section we will briefly present the shared approaches in treating schizophrenia, bipolar disorder and major depression.

After a precise assessment of a patient's diagnosis and the establishment of a therapeutic alliance, practical steps towards treatment have to be created and

implemented. Additionally, intermittent reassessment of the diagnosis and the treatment plan is necessary. In the therapeutic management of schizophrenia such a treatment plan presumes the use various antipsychotics, combinations of antipsychotics, and augmentation strategies. Studies indicate that antipsychotic use has increased over previous decades, with a transition from first generation antipsychotics (FGAs) to second generation antipsychotics (SGAs) (Jasovic-Gasic et al. 2012). The majority of studies and meta-analyses included in the treatment algorithms indicate the preeminence of SGAs with regard to some symptom clusters and treatment continuation (particularly in first-episode patients). However, other studies underline the importance of SGA side effect profiles and call for caution. Furthermore, there is no substantial data that accounts for the general disparity between FGAs and SGAs with respect to their efficacy and effectiveness. FGAs have a higher risk of inducing neurological side effects while some SGAs and FGAs carry an increased risk for developing a metabolic syndrome frequently implying subsequent cardiovascular and endocrine diseases (Hasan et al. 2013). Beyond pharmacological interventions, some guidelines suggest a variety of psychological interventions with an emphasis on cognitive-behavioral therapy (Addington & Lecomte 2012). Recent studies evaluating algorithm based treatment in patients with schizophrenia reveal that this approach produced better symptomatic improvement than treatment-as-usual, a distinction that was statistically significant but in clinical practice not shown to be significant. Moreover, measures of cognitive functioning demonstrated more improvement in patients who were treated according to guidelines compared to the treatment-as-usual group. Cost-effectiveness did not differ between the two groups (Miller et al. 2004).

Psychopharmaceutical development has neglected bipolar disorder for a long period of time. Comparing a number of patients in randomized trials between 1988-95 Ghaemi et al. (2000) noticed that ten times as many patients with schizophrenia had been in controlled trials for atypical antipsychotics, than all drug treatments used for all phases of bipolar disorder. Another problem is that Kraepelin's strict definition of manic-depressive psychosis has been extended and bipolar disorder is now considered as a spectrum disorder (Angst 2007). Moreover, roughly less than 20% of patients originally screened for bipolar disorder are eligible for phase III randomized trials. Considering the above, creating precise algorithms for the treatment of bipolar disorder has been particularly complex. Current guidelines support monotherapy with lithium, divalproex or olanzapine during the first stage of illness. In later stages, combination therapy is strongly recommended. It is clearly stated that antidepressants should be used only in combination with antimanic agents, in order to avoid switching-off phases. The most recent guidelines emphasize the use of atypical antipsychotics for mania and lamotrigine for depression. In addition, psycho-

therapy is considered as an adjunctive treatment by most guidelines (Licht 2012, Goodwin 2009). The application of guidelines in everyday clinical practice has proven to be beneficial in the treatment of this patient group. Studies reveal that patients with a history of bipolar disorder treated according to medication algorithms showed greater initial improvement in their overall mental state compared to those who were treated with non-algorithm based approaches. Additionally, both cost-effectiveness and clinical outcome were more favorable in the algorithm group (Miller 2004).

Medications targeting the treatment of depression have been systematically researched. Studies show that differences in efficacy among different classes of antidepressants remain insignificant (Stahl 2008). Consequently, the first line choice of antidepressant in treating major depressive disorder relies predominantly on factors other than efficacy (i.e. previous response, comorbidity, tolerability, side effects, safety, availability). The majority of guidelines support the use of SSRI, SNRI, NDRI, NaSSa as first line treatment, while MAOI use should be restricted to patients that are unresponsive to these antidepressants (NICE 2010, McIntyre 2003, Kennedy et al 2009, APA 2010). There is a significant difference between the efficacy of antidepressant therapy in controlled clinical trials and the effectiveness of treatment in clinical practice. This discrepancy may be a result of inadequate diagnosis/treatment procedure or bad compliance. To consolidate the diagnostic procedure and treatment approach, and minimize factors interfering with treatment response, first guidelines for treating major depressive disorder have been created. Studies show that adherence to treatment guidelines could increase the probability of a favorable outcome in patients with major depression to over 90% (Rush & Thase 1997). According to studies, the algorithm based approach was most effective on patients with major depressive disorder within the first three months. After a one year follow-up, patients treated according to algorithms showed substantially better maintenance results compared to other treatments. However, after one year of treatment, symptoms of depression did not resolve completely regardless of the treatment approach. Although clinical outcomes were better in the group of patients treated according to algorithms, the cost of treatment after one year was somewhat higher in this group (Miller 2004).

In summary, recent guidelines point to the value of atypical antipsychotics in schizophrenia treatment, the role of lithium, lamotrigine and olanzapine as options for maintenance therapy in bipolar disorder and the use SSRI, SNRI and more novel antidepressants (e.g. agomelatin) for major depression. Despite all the advances and a rapid increase of confirmatory controlled trials, the pharmacotherapy of major psychiatric disorders requires more development to achieve similar success rates as many non-psychiatric drug treatments. Future studies are to address both the role of cultural diversity and the impact of biological subtypes of the

disorders. Algorithms based on socio-cultural and biological principles, and which recognize the need for individually tailored approaches and therapy, will help determine choice of treatment and influence the outcome. Studies show that in patients with severe mental disorders, algorithm based approaches lead to a greater early response and sustained improvement in symptoms when compared to the non algorithm based approach (Miller et al 2004).

PLAUSIBLE LIMITATIONS AND CAUTION TO CONSIDER

The studies we reviewed clearly suggest that the use of guidelines in everyday psychiatric practice is warranted. However, their use reveals certain limitations and calls for caution in their application within clinical settings.

Treatment algorithms help avoid non evidence-based decisions, however they are apt to be quickly out-of-date and may not fully appeal to practical considerations. Their limitations can be perceived by taking into account two perspectives. The first focuses on the lack of strong data to address clinically important questions. The second focuses on the "consensus of experts" principle that is invoked because of the above mentioned situation. Caution must be employed in the use of guidelines as they are developed by expert consensus panels and may be limited due to a number of differing opinions. Algorithms developed through reviews of scientific literature and clinical trials may be more rigorous, but may be applicable only to a specific population group.

Despite their importance in setting the standards for adequate health care across cultures, guidelines in psychiatry as well as in the majority of other medical disciplines suffer from limitations mainly mirrored in the gaps in knowledge and risk of reductionism. Furthermore, they are based on scientific reality and rarely address the clinical reality in which the individual patient is anchored. Progress in pharmacotherapy is not always paralleled in guidelines, and guidelines often fail to reflect this progress in a timely manner. Guidelines are also vulnerable to a number of socio-cultural (i.e. biased panelists, patients, disorders, treatment effects, provider styles, clinical situations, inhomogeneous treatment contexts) and policy limitations (i.e. increase of cost). Importantly, on a clinical level, guidelines may trap physicians within their architecture, potentially leading to a poor treatment outcome. This demands a cautious attitude towards the generalized approach, which may be unfit to individual patients, and undermines the expertise and flexibility of the medical practitioner. Lastly, the implementation of algorithms within a health care system, as opposed to a single health care facility, needs to enlist the support of not only medical professionals, but a broad spectrum of policy makers.

CONCLUSION

We consider algorithms to be a necessary component in the treatment of psychiatric patients, but recommend that one should maintain a critical attitude and remember that guideline proposed therapy should be tailored to the individual.

Acknowledgements: None.

Conflict of interest : None to declare.

References

1. De Hert M, Dekker JM, Wood D, Kahl KG, Holt RI, Möller HJ: Cardiovascular disease and diabetes in people with severe mental illness position statement from the European Psychiatric Association (EPA), supported by the European Association for the Study of Diabetes (EASD) and the European Society of Cardiology (ESC). *Eur Psychiatry* 2009; 24:412-24.
2. Ruggeri M, Bisoffi G, Fontecedro L: Subjective and objective dimensions of quality of life in psychiatric patients: a factor analytical approach. The South Verona Outcome Project 4. *Br J Psychiatry* 2001; 178:268-275
3. Hasan A, Falkai P, Wobrock T, Lieberman J, Glenthøj B, Gattaz WF, Thibaut F, Möller HJ; WFSBP Task force on Treatment Guidelines for Schizophrenia: World Federation of Societies of Biological Psychiatry (WFSBP) guidelines for biological treatment of schizophrenia, part 2: update 2012 on the long-term treatment of schizophrenia and management of antipsychotic-induced side effects. *World J Biol Psychiatry* 2013; 14:2-44.
4. Divac N, Marić NP, Damjanović A, Jovanović AA, Jašović-Gašić M, Prostran M: Use or underuse of therapeutic guidelines in psychiatry? *Psychiatr Danub* 2009; 21:224-9.
5. Jašović-Gašić M, Vuković O, Pantović M, Cvetić T, Marić-Bojović N: Antipsychotics - history of development and field of indication, new wine-old glassess. *Psychiatr Danub* 2012; 24:S342-345.
6. Miller AL, Crismon ML, Rush AJ, Chiles J, Kashner M, Toprac M, Carmody T, Biggs M, Shores-Wilson K, Chiles J, Witte B, Bow-Thomas C, Velligan DI, Trivedi M, Suppes T & Shon S: "The Texas Medication Algorithm Project: Clinical Results for Schizophrenia." *Schizophr Bull* 2004; 30:627-647.
7. Addington J & Lecomte T: Cognitive behaviour therapy for schizophrenia. *Med Rep* 2012; 4:6.
8. Ghaemi SN, Boiman EE, & Goodwin FK: Diagnosing bipolar disorder and the effect of antidepressants: a naturalistic study. *J Clin Psychiatry* 2000; 61:804-808.
9. Angst J: The bipolar spectrum. *Br J Psychiatry* 2007; 190:189-191.
10. Licht R: Lithium: Still a Major Option in the Management of Bipolar Disorder. *CNS Neuroscience & Therapeutics* 2012; 18:219-226.
11. Goodwin G: Evidence-based guidelines for treating bipolar disorder: revised second edition—recommendations from the British Association for Psychopharmacology. *J Psychopharmacol* 2009; 23:346-388.
12. American Psychiatric Association: Practice guidelines for the treatment of patients with Major depressive disorder. American Psychiatric Association, Washington, DC, 2010.
13. Kennedy SH, Milev R, Giacobbe P, Ramasubbu R, Lam RW, Parikh SV, et al.: Canadian Network for Mood and Anxiety Treatments (CANMAT) clinical guidelines for the management of major depressive disorder in adults. IV. Neurostimulation therapies. *J Affect Disord* 2009; 117:S44-S53.
14. McIntyre R, Müller A, Mancini D, Silver E: What to do if an initial antidepressant fails? *Can Fam Physician* 2003; 49:449-457.
15. Stahl SM: *Stahl's Essential Psychopharmacology*. Cambridge University Press, Cambridge, 2008.
16. NICE (National Institute for Health and Clinical Excellence): Depression: the treatment and management of depression in adults (update). The British Psychological Society and the Royal College of Psychiatrists, 2010.
17. Rush AJ, Thase ME: Strategies and tactics in the treatment of chronic depression. *J Clin Psychiatry* 1997; 58:14-22.
18. Culleton B: Development and limitations of clinical practice guidelines. *Methods Mol Biol* 2009; 473:251-61.
19. McIntyre J: Usefulness and limitations of treatment guidelines in psychiatry. *World Psychiatry* 2002; 1:3.
20. Michie S, Pilling S, Garety P, Whitty P, Eccles M, Johnston M, et al.: Difficulties implementing a mental health guideline: an exploratory investigation using psychological theory. *Implement Sci* 2007; 2:8.

Correspondence:

Professor Miroslava Jašović-Gašić, MD, PhD
Academy of Medical Science, Serbian Medical Society
Džordža Vašingtona 19, 11000 Belgrade, Serbia
E-mail: mjasovicgasic0@gmail.com