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Implementing Measurement-Based Care in Behavioral Health: A Review

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Abstract

IMPORTANCE—Measurement-based care (MBC) is the systematic evaluation of patient symptoms before or during an encounter to inform behavioral health treatment. Despite MBC's demonstrated ability to enhance usual care by expediting improvements and rapidly detecting patients whose health would otherwise deteriorate, it is underused, with typically less than 20% of behavioral health practitioners integrating it into their practice. This narrative review addresses definitional issues, offers a concrete and evaluable operationalization of MBC fidelity, and summarizes the evidence base and utility of MBC. It also synthesizes the extant literature's characterization of barriers to and strategies for supporting MBC implementation, sustainment, and scale-up.

OBSERVATIONS—Barriers to implementing MBC occur at multiple levels: patient (eg, concerns about confidentiality breach), practitioner (eg, beliefs that measures are no better than clinical judgment), organization (eg, no resources for training), and system (eg, competing requirements). Implementation science—the study of methods to integrate evidence-based practices such as MBC into routine care—offers strategies to address barriers. These strategies include using measurement feedback systems, leveraging local champions, forming learning collaboratives, training leadership, improving expert consultation with clinical staff, and generating incentives.

CONCLUSIONS AND RELEVANCE—This narrative review, informed by implementation science, offers a 10-point research agenda to improve the integration of MBC into clinical practice: (1) harmonize terminology and specify MBC's core components; (2) develop criterion standard methods for monitoring fidelity and reporting quality of implementation; (3) develop algorithms for MBC to guide psychotherapy; (4) test putative mechanisms of change, particularly for psychotherapy; (5) develop brief and psychometrically strong measures for use in combination; (6) assess the critical timing of administration needed to optimize patient outcomes; (7) streamline measurement feedback systems to include only key ingredients and enhance electronic health record interoperability; (8) identify discrete strategies to support implementation; (9) make evidence-based policy decisions; and (10) align reimbursement structures.

Depression and other behavioral health disorders are increasing in the United States and worldwide. Evidence suggests that measurement-based care (MBC) or the use of patient-reported outcomes (PROs) to identify the extent of these problems and inform treatment decisions can improve usual care for these conditions.^{1–7} However, it is underused; less than 20% of practitioners (17.9% of psychiatrists,⁸ 11.1% of psychologists,⁹ and 13.9% of masters-level practitioners¹⁰) engage in MBC, and as little as 5% use it according to its empirically informed schedule¹⁰ (ie, every session). These rates reflect the status quo in the United States, the United Kingdom,¹¹ and Australia¹² despite policies recommending PRO use.

Numerous reviews and meta-analyses have summarized the evidence base for MBC,^{1–7} with a recent article¹³ highlighting MBC delivery in pragmatic trials and suggesting that its scale-

up and spread is needed. However, no reviews, to our knowledge, have sufficiently summarized the barriers to using MBC in routine care and the strategies needed to implement MBC with fidelity. This narrative re-view addresses definitional issues, describes a concrete and evaluable operationalization of MBC fidelity, and summarizes the evidence base and utility of MBC. The review also synthesizes the extant literature's characterization of barriers to MBC and strategies for supporting its implementation, sustainment, and scale-up and summarizes the learnings from the review in a 10-point research agenda to improve the integration of MBC in routine care into clinical practice.

Observations and Discussion

Operationalization of MBC Fidelity

We conceptualize MBC as the systematic evaluation of patient symptoms before or during each clinical encounter to inform behavioral health treatment.¹⁴ This assessment schedule (ie, every or most treatment sessions) makes the practice different from monitoring treatment outcomes, which is typically completed every 90 days during treatment reviews, biannually, or even annually. According to the Substance Abuse and Mental Health Services Administration, MBC is an evidence-based practice¹⁵ that mirrors traditional approaches in medicine in which reliable and valid measures (eg, blood pressure cuff) are used to inform treatment (eg, medication, diet) for biological conditions (eg, high blood pressure). In the context of behavioral health, MBC is typically composed of a PRO (eg, the Patient Health Questionnaire¹⁶) in lieu of objective measures of disorders; PROs are a data source and do not constitute MBC.

Measurement-based care can be separated into 4 core components: (1) a routinely administered symptom, outcome, or process measure (ie, PRO), ideally before each clinical encounter; (2) practitioner review of data; (3) patient review of data; and (4) collaborative reevaluation of the treatment plan informed by data.¹⁵ The practitioner and patient data review occurs in a dialogue during the clinical encounter; there is evidence of incremental utility when both parties understand the data,¹³ when patterns of data are considered over time, and when data are used to collaboratively inform care decisions. On the basis of the extant literature, MBC that involves these components may be superior to other approaches; whether tailoring monitoring to the specific case is more effective, however, remains an empirical question.

This evidence-based practice is referred to in at least 16 different ways in the literature with no discernable preference for terms across 17 countries (Table 1).^{1,3-6,9,10,13,15,17-30} Authors may refer to the core components outlined above; however, a review of the term *definitions* explicitly offered by authors revealed underspecification in which feedback to the patient and review of score trajectories were most frequently omitted although often implied. For instance, the term *progress monitoring* does not explicitly link measure administration and review of data to informing changes in treatment. Some terms explicitly include clinical decision support in their definition despite the literature being equivocal regarding its added benefit.¹ We believe that *measurement-based care* should be used because it is explicit both about the means (measurement) and the ultimate goal (care).

The field would benefit from harmonization of terms and operationalization of core components to promote efforts to monitor MBC fidelity. Measurement-based care fidelity has rarely been evaluated or reported despite being a critical indicator of implementation success and necessary to ensuring that an evidence-based practice achieves its intended effects. Unlike complex psychosocial interventions for behavioral health (eg, cognitive behavioral therapy, which has a costly criterion standard fidelity-monitoring process of expert objective review of recorded sessions), MBC fidelity monitoring may be efficiently conducted using the electronic health record (eg, measures entered in session notes, objective indication of graph review, and documentation of discussion), a practice that can help support its integration at the program level.

Mechanisms of Action for MBC

In pharmacotherapy practice, MBC can detect failure to respond to treatment, which can directly inform a discrete set of focused options (eg, change medication, change dose, or consider duration). Measurement-based care seems to inform more rapid dosage increases and hasten the rate at which practitioners change medications, which in 1 study²⁰ led to a faster rate of recovery and a higher rate of response. However, the mechanisms through which MBC is associated with psychosocial care remain unclear. No such algorithm exists for psychotherapy modifications, for which there are more options (eg, consultation with supervisor, revising case conceptualization, changing session focus, increasing session frequency, and adding services). One quantitative³¹ study offered putative mechanisms for MBC in the context of psychotherapy provided to youths. In that trial, feedback was associated with an increased likelihood of focusing on a critical piece of content likely central to the youth's problem (eg, emotional or behavioral issues) and shorter duration to addressing critical content areas. Some qualitative work suggests that MBC is associated with enhanced patient engagement and patient understanding of symptoms that drive symptom change. Patient expectation of gains, therapeutic alliance, and enhanced accuracy of practitioner understanding of patient improvement are hypothesized MBC mechanisms of action that require additional investigation. Testing and articulating putative mechanisms for change in MBC are necessary for determining the active core components of MBC. An understanding of the core components will facilitate assessment of MBC fidelity, a key implementation outcome, as well as streamline MBC so that it can be more easily implemented without superfluous elements that may raise unnecessary implementation challenges. Although we specify 4 components believed to be key to MBC effectiveness above, the necessary components and frequency of MBC needed for improved treatment outcomes remain empirical problems that can be addressed by investigating MBC mechanisms of change.

Effectiveness of MBC Over Usual Care

At least 9 review articles state that MBC outperforms usual care, with significantly improved outcomes, particularly for patients deemed to be nonresponders, often reflective of medium to large (eg, 0.22– 0.70) effect sizes.^{1,6} Measurement-based care is associated with decreased likelihood of patient deterioration while in treatment¹ and costs of care.^{6,32,33} Youth who receive MBC have demonstrated faster symptom improvement.²²

Table 2^{17,18,20,22–24,28,35–48} summarizes 21 randomized clinical trials that compared MBC and usual care across a diverse range of settings (university counseling [n = 8], outpatient [n = 6], inpatient [n = 4], substance use [n = 2], and home-based care [n = 1]); populations (adults [n = 17], young adults [n = 2], and adolescents [n = 2]); disorders (anxiety [n = 11], mood [n = 13], bipolar [n = 1], somatoform [n = 4], adjustment [n = 5], eating [n = 3], substance abuse [n = 2], conduct, oppositional, and attention-deficit/hyperactivity disorder [n = 1], personality [n = 2], psychosis [n = 1], stress [n = 1], and V code [n = 1]; most studies included multiple disorders); and treatments (individual therapy [n = 17], couples therapy [n = 2], and group therapy [n = 2]). Measurement-based care can be conceptualized as atransdiagnostic and transtheoretical practice.⁸

However, a 2016 Cochrane review³⁰ of 17 randomized clinical trials in which PROs were used in the treatment of common mental health disorders in adults concluded that the evidence to date was of low quality, with high risk of bias (eg, inadequate masking, significant attrition). The review excluded studies for which measurement was used to enhance the quality of care (eg, the addition of treatment components such as medication or case management). This approach highlights the discrepancies in use of terms and definitions associated with MBC, suggesting a mismatch in the focus of the review and the process of MBC as conceptualized in this review, which explicitly involves the use of measurement to inform care decisions and treatment changes. This discrepancy may constitute another explanation for why no difference between MBC and usual care was found.

More recently, 1 study²⁸ revealed that MBC may exacerbate symptoms for patients with cluster B and not otherwise specified personality disorders enrolled in day treatment and inpatient settings. Therefore, although decades of research have elevated MBC as an evidence-based practice, research is needed to explore mechanisms of MBC to better understand the components of MBC associated with effectiveness. Hybrid designs that could simultaneously provide information on implementation processes and outcomes are encouraged.⁴⁹

Utility of MBC Across Stakeholder Levels

Measurement-based care offers benefits across multiple levels^{13,14}: patients, practitioners, and organizations. For patients, MBC encourages active involvement in the treatment process,⁵⁰ helps patients better understand their symptoms, and allows patients to more easily quantify and communicate their experience. For practitioners, MBC alerts them to patient lack of progress, which is important given evidence that practitioners typically overestimate how well patients are doing in treatment.^{51,52} Measurement-based care can direct practitioners to recognize important treatment targets (eg, sleep, suicidality), observe factors associated with change, facilitate care coordination or collaboration (between practitioners and the treatment team), and inform treatment decisions (eg, need for adjunctive services, increased dose). For organizations, aggregate data can yield practice-based evidence, data for accreditation or insurance bodies,^{53,54} and objective measures of quality improvement efforts.⁵⁵ Measurement-based care can also facilitate a population health approach.¹⁴

Barriers to MBC Implementation

Measurement-based care is underused worldwide. Although the incorporation of MBC during clinical training may encourage use in the workforce, underuse of MBC may be attributable to barriers that exist across the individual (ie, patient and/or practitioner), organizational, and system levels (Table 3).^{9,26,29,48,54,56–72} Barriers are factors that impede the adoption, implementation, or sustainment of a practice. Barriers to completing standardized measures for patients include response burden (especially if results were not discussed and integrated into treatment or if some items on a scale were not germane to a particular patient) and concerns with breach of confidentiality. Patients' symptoms (eg, acute psychiatric symptoms, such as suicidality or psychosis) and disabilities (eg, cognitive deficits, visual problems) could serve as barriers to completing PRO measures and thus engaging in MBC.^{60,61} Barriers for practitioners include increased time, effort, and cost^{9,67}; negative attitudes toward MBC (eg, believing that standardized measures are not as accurate as clinical judgment^{62,73}); and concerns that MBC data could be used punitively to inform bonuses or penalties or used to judge the skillfulness of the practitioner.^{54,68} For example, practitioners may have concerns that formally drawing attention to lack of progress might lead to a rupture in rapport with the patient and possible loss of the therapeutic relationship.

For organizations, there is a significant demand on personnel if MBC is not built into the electronic health record. For example, the practitioner or administrative staff may need to assist the patient in completing the measure and then enter the data to track scores over time. Not all behavioral health systems have an electronic health record system, especially smaller clinics or private practice, and those that do often cannot afford the cost of information technology changes to integrate MBC. Other barriers to organizations that support MBC implementation include limited resources for training, high turnover among staff trained in MBC, lack of leadership support, and insufficient organizational readiness to support MBC implementation.²⁶ For systems, there are often discrepant views on the degree to which MBC should be prioritized and which measure to use across sites. Finally, the lack of financial incentives from third-party payers makes it especially challenging to justify MBC implementation.

Strategies to Implement MBC

The existence of these multilevel barriers means that neither pure dissemination (ie, targeted packaging of materials) nor discrete implementation strategies will ensure MBC's meaningful integration and sustainment. Multifaceted or blended strategies tailored to target local barriers are needed for successful implementation. A strategy involves techniques to facilitate the adoption, implementation, or sustainment of a practice.⁷⁴ Table 3 gives a summary of the known barriers and available strategies that may support MBC implementation across a range of contexts.

Implementation science is the evaluation of methods for supporting the integration of evidence-based practices into health care to improve the quality of care delivered.⁷⁵ Studies that evaluate MBC implementation are relatively new,⁷⁶ with the first large-scale randomized implementation trial still ongoing.^{15,77} A retrospective evaluation of 2 clinics participating in a randomized clinical trial revealed that 1 clinic failed to achieve MBC

fidelity (41% of youths received 0%–10% of the intervention according to an implementation index), perhaps because key implementation strategies were missing (eg, measurement feedback system, supervision).³⁴ Implementation of MBC requires strategies that target the individual practitioner, but organizational and system-level strategies are likely critical for meaningful clinical integration.

Before MBC implementation begins, careful thought should be given to the measures used and the method of administration. Measures chosen should assess the domains most relevant to various stakeholders (eg, patients, practitioners, administrators, and funding bodies) and should be low burden for respondents (ideally taking only a few minutes to complete) and those scoring and interpreting the measure. Measure scores should be sensitive to patient change overtime, which can inform response from practitioners. Beidas et al⁵⁸ performed a review of free and low-cost standardized measures that could serve as the foundation of an MBC approach that meets these criteria. Idiographic measures (eg, client goal setting and tracking) may also be beneficial because they are tailored to clients and thus are potentially more acceptable to practitioners concerned about the relevance of standardized measures. Evidence for the effectiveness of MBC, however, is generally limited to standardized measures. Engaging patients and practitioners in measure selection is important to ensure buy-in and relevance of the chosen measures.

Although MBC can be performed with paper and pencil, measurement feedback systems (MFSs) have the potential to reduce some of the burden associated with administering and scoring measures, increase ease of access to data for review of trajectories, and facilitate outcomes collected across multiple levels (eg, individual patient, a single practitioner's caseload, or all patients in an organization).⁷⁸ Measurement feedback systems are health information technologies that support MBC implementation by enabling collection and management of routine outcome measures and provision of timely feedback (immediate scoring, automatic graph generation).⁵³ A small randomized trial⁷⁶ recently demonstrated that practitioners with MFSs had significant increases in MBC practices (ie, measure administration and feedback) compared with controls.

When selecting an MFS, it is important to consider the fit between the MFS and the target context and adapt the MFS to minimize barriers associated with the implementation of new technology. Lyon et al⁶⁶ described an MFS adaptation process that draws on user-centered design principles that consider data from and about the end users. Although the specific capabilities of MFSs that best support MBC remain an empirical unknown,⁷⁸ feedback intervention theory suggests that MFSs should provide feedback to users that is timely, easy to interpret, specific, and paired with clinical decision support tools that suggest clear behavioral changes that a practitioner can make in response to feedback.⁷⁹ Harmon et al⁴³ found that clients of therapists who received decision support experienced enhanced outcomes compared with patients whose therapists did not receive decision support. Research on MFS implementation highlights the importance of integrating MFSs with organizations' existing electronic health records. Steinfeld et al²⁶ found that although practitioners recognized the utility of MBC, they rarely checked scores and shared data with patients because the MFS platform was separate from the electronic health record. However, when practitioners entered data directly into the electronic health record, they reported

administering measures in 90% of sessions and reviewing scores with patients in 75% of sessions.

Identifying and leveraging local champions (ie, practitioners who actively associate themselves with the evidence-based practice) is a strategy that can improve practitioner attitudes toward MBC.²⁹ Studies^{48,80} have found that the presence of champions was associated with greater use of MBC. The influence of champions can be amplified when strategically integrated into the implementation effort. Champions can be identified with surveys.¹⁰ Using champions and opinion leaders (ie, individuals who informally influence the public opinion, attitudes, and behaviors of their peers⁸¹) may enhance MBC adoption further. Opinion leaders can be identified through a variety of methods: self-report surveys, observations, expert selection, and peer nominations from sociometric surveys. These individuals can be invited to participate in implementation initiatives, such as coleading (aspects of) training or joining implementation teams.

Implementation teams can use the unique insights of those within the organization to identify and overcome barriers to MBC, increase buy-in, and initiate change.⁷⁰ Implementation teams may be composed of representatives from all stakeholder groups (eg, practitioners, administrative staff, leadership, and patients), including champions and opinion leaders as described above. Implementation teams typically require facilitation by an external change agent who is expert in MBC or implementation more broadly. The facilitator offers technical assistance by anticipating known barriers, systematically identifying emergent barriers, and informing the selection of strategies to support MBC delivery. Whether implementation teams outperform external facilitation that works directly with organizational leadership is unknown, but there is some evidence that participating in implementation teams reduces practitioner turnover.⁷⁰ It is essential that leadership not only buys into MBC but has a style (eg, proactive, knowledgeable, supportive, and perseverant) that is supportive of implementation.^{71,80} An ongoing trial is testing the utility of implementation teams to support the tailored implementation of MBC in community behavioral health settings.¹⁵

Training in MBC can alleviate several individual-level barriers associated with implementation. Training has been shown to increase positive practitioner attitudes toward MBC, MBC knowledge, and self-efficacy.⁶³ A recent study compared tailored vs standardized training for community mental health practitioners and found that training increases practitioner intention to use MBC immediately after training across conditions, but the type of training (tailored vs standardized) had no differential association with training outcome (H. Kassab et al, unpublished data, November 5, 2018). This finding suggests that standardized training in MBC, with the incorporation of active learning strategies (ie, discussion, demonstration, and role play with feedback), can promote MBC adoption. However, training alone is insufficient for changing practitioner behavior and should be followed by ongoing consultation, supervision, or general implementation support. Persons et al⁸² found that a 1-time, 60-minute orientation followed by four 90-minute online classes increased MBC use among practitioners immediately after training (65%) with sustained use of any measures up to a year after training (57%). Consultation can occur in person or through webbased platforms to increase access. Clinic-based supervisors who are MBC

champions may also provide a useful form of ongoing support for implementation because of their influential position and insider perspective of the unique challenges faced by practitioners in their own organization. A supervisor can also work to hold practitioners accountable for new learning by incorporating discussion into supervision (eg, asking practitioners to provide patient scores when discussing cases).⁸³

Rewards or incentives for the use of MBC is a promising implementation strategy.⁸⁴ This approach, often called pay for performance, has been widely used in the medical field with varying degrees of success and to a limited extent in behavioral health.⁸⁵ Unützer et al⁶⁴ found that incentivizing quality indicators, such as timely follow-up with patients and psychiatric consultation when patients do not improve, increased the likelihood of depression symptom reduction and decreased time to symptom improvement. However, although the Patient Health Questionnaire 9 was administered to assess for changes in depressive symptoms, administration of the questionnaire was not specifically incentivized in this study. Although incentivizing MBC makes intuitive sense, pay for performance strategies should be initiated with care because of potential negative consequences, such as disproportionate focus on incentivized behaviors at the expense of other clinically important behaviors, practitioners gaming the system, and reduced intrinsic motivation. Glasziou et al⁸⁶ described a useful checklist for determining the appropriateness of engaging in pay for performance. Eijkenaar et al⁸⁷ also described several factors that have been associated with successful pay for performance in health care, such as directing incentives toward individuals and small groups, using new funds rather than reallocating existing funds, providing the incentive soon after the desired behavior, and engaging practitioners in the development of the pay for performance initiative.

Furthermore, most MBC research comes from large integrated health care systems. As such, MBC implementation into small practices may pose unique challenges (eg, no electronic health record for data collection and tracking, no auxiliary staff to administer measures) and necessitate differing strategies (eg, free applications on smartphones for measure administration and tracking). Kroenke and Unützer⁸⁸ reported a compilation of practical strategies to consider when implementing MBC in small practices.

This narrative review informed a 10-point research agenda with practical implications (Box). Although framed as an agenda to focus future research, each point is built on the extant literature and itself offers practical guidance. That is, the 10 points suggest critical areas for consideration when implementing MBC.

Conclusions

Despite decades of research affirming MBC as an evidence-based practice capable of improving patient behavioral health outcomes, several empirical gaps remain. This narrative review informed a 10-point agenda aimed to address practical, clinical questions that will support MBC use. Recommended points emphasize the need for research on MBC in the context of psychotherapy given that less work has been completed in this area in comparison with pharmacotherapy.

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Box.**Implementation Science–Informed Research Agenda and Recommendations for Clinical Practice**

1. Terminology and core components: harmonize terms and clearly specify core components.
2. Fidelity monitoring: develop criterion standard method for monitoring fidelity that balances internal and external validity.
3. Mechanisms of change: test putative mechanisms of change in multiple trials and contexts.
4. Develop algorithms: psychotherapy, in particular, could benefit from identification of active ingredients and algorithms that leverage MBC to inform care.
5. Measures: develop brief and psychometrically strong measures to be used in combination.
6. Timing of administration: assess the critical timing of administration to achieve improved patient outcomes.
7. Measurement feedback systems: streamline measurement feedback systems to its key ingredients and enhance EHR interoperability.
8. Implementation strategies: identify discrete evidence-based strategies needed to support implementation regardless of setting.
9. Policy: make evidence-based policy decisions regarding frequency of administration and how data can be used to inform care.
10. Pay for performance: align reimbursement structures to incentivize evidence-based practices, such as MBC.

Abbreviations: EHR, electronic health record; MBC, measurement-based care.

Table 1.

Measurement-Based Care Terms and Core Components

Source	Country	Term Used	Components					
			Administer Measure	Feedback From Practitioner	Feedback From Practitioner and Client	Review Score	Clinical Decision Support	Modify Treatment
Reese et al, ¹⁷ 2010	United States	Continuous assessment, client feedback, patient-focused research	Yes (DI)	Yes (DI)	Yes (P)	Yes (P)	Yes (P)	Yes (D)
van Oenen et al, ¹⁸ 2016	The Netherlands	Feedback-informed treatment	Yes (P)	Yes (D)	Yes (D)	Yes (P)	Yes (PI)	Yes (P)
Tam and Roman, ⁵ 2017	United States, Australia, Ireland, United Kingdom	Feedback-informed treatment	Yes (DI)	Yes (D)	Yes (P)	Yes (P)	Not sure	Yes (D)
Lewis et al, ¹⁵ 2015	United States	Measurement-based care	Yes (D)	Yes (DI)	Yes (P)	Yes (P)	Yes (P)	Yes (DI)
Elmqvist et al, ¹⁹ 2010	United States, United Kingdom	Measurement-based care	Yes (D)	Yes (DI)	No	Yes (D)	No	Yes (P)
Guo et al, ²⁰ 2015	China	Measurement-based care	Yes (P)	Yes (P)	No	No	Yes (P)	Yes (D)
Fortney et al, ¹³ 2017	United States	Measurement-based care	Yes (D)	Yes (DI)	Yes (P)	Yes (P)	No	Yes (D)
Arbuckle et al, ²¹ 2013	United States	Measurement-based care	Yes (DI)	Yes (DI)	Yes (PI)	Yes (D)	No	Yes (D)
Jensen-Doss et al, ¹⁰ 2018	United States	Monitoring treatment progress, providing feedback, routinely monitoring client progress	Yes (D)	Yes (D)	Yes (P)	Yes (PI)	No	Yes (D)
Hatfield and Ogles, ⁹ 2007	United States	Outcome assessment and outcome measures	Yes (P)	Yes (P)	No	Yes (PI)	No	Yes (P)
Bickman et al, ²² 2011	United States	Outcome monitoring and feedback	Yes (D)	Yes (D)	No	Yes (P)	Yes (P)	Yes (D)
Lambert et al, ⁶ 2003	United States	Patient-focused research	Yes (DI)	Yes (D)	Yes (P)	Yes (P)	Yes (P)	Yes (D)
Shimokawa et al, ¹ 2010	United States	Patient-focused research	Yes (DI)	Yes (D)	Yes (P)	Yes (P)	Yes (D)	Yes (D)
Anker et al, ²³ 2009	Norway	Patient-focused research and practice-based evidence	Yes (DI)	Yes (DI)	Yes (P)	Yes (P)	Yes (P)	Yes (D)
Cris-Christoph et al, ²⁴ 2012	United States	Patient-level feedback	Yes (P)	Yes (P)	No	No	Yes (P)	Yes (P)
Boyce and Browne, ²⁵ 2013	United States, United Kingdom, the Netherlands, Germany	Patient-reported outcome measures	Yes (D)	Yes (D)	Yes (DI)	No	No	Yes (DI)
Krägeloh et al, ³ 2015	United States, Germany, the Netherlands, United Kingdom, Sweden, Australia, Norway, Ireland, Spain, Switzerland	Patient-reported outcome measures	Yes (D)	Yes (P)	Yes (P)	Yes (P)	Yes (P)	Yes (P)
Williams et al, ⁴ 2016	Australia, New Zealand, United Kingdom, Ireland, United States, Canada, France, Germany, the	Patient-reported outcome measures	Yes (D)	Yes (P)	Yes (PI)	Yes (P)	Yes (P)	Yes (P)

Components										
Source	Country	Term Used	Administer Measure	Feedback From Practitioner	Feedback From Practitioner and Client	Review Score	Clinical Decision Support	Modify Treatment		
	Netherlands, Sweden, Finland, Norway, and Denmark									
Steinfeld et al. ²⁶ 2016	United States	Progress monitoring	Yes (D)	Yes (DI)	Yes (P)	Yes (P)	Yes (P)	Yes (PI)		
Goodman et al. ²⁷ 2013	United States, United Kingdom, Germany, Australia, Canada, France, the Netherlands, New Zealand, Scotland	Progress monitoring, measurement-based care	Yes (D)	Yes (D)	Yes (P)	Yes (P)	Yes (P)	Yes (P)		
de Jong et al. ²⁸ 2017	The Netherlands	Routine outcome monitoring	Yes (DI)	Yes (DI)	Yes (P)	Yes (P)	Yes (P)	Yes (P)		
Boswell et al. ²⁹ 2015	United States	Routine outcome monitoring	Yes (D)	Yes (DI)	Yes (PI)	Yes (D)	Yes (P)	Yes (D)		
Kendrick et al. ³⁰ 2016	United States, Germany, the Netherlands, Sweden, Norway, Ireland	Routine outcome monitoring, patient-reported outcome measures	Yes (DI)	Yes (P)	Yes (P)	Yes (P)	Yes (P)	Yes (P)		

Abbreviations: D, the component was explicitly stated in the definition of the term; DI, the component was implied but not explicitly stated in the definition; P, the component was explicitly addressed in the publication; PI, the component was implied but not explicitly stated in the publication.

Table 2.

Studies That Compared MBC Effectiveness and Treatment as Usual

Source	Country	Setting	Population	Disorder	Conditions	Symptom Reduction	Additional Outcomes
Bickman et al., ³⁴ 2016	United States	Outpatient	Adolescents	All eligible	MBC (n = 132 ^a), TAU (n = 125 ^b), FbT every 6 mo	Results differed by clinic because of implementation differences; clinic U: both conditions had significant reductions in global symptom severity across client, parent, and practitioner report; clinic R: both conditions had significant reductions in global symptom severity across client and parent report; only MBC had a significant reduction in global symptom severity per clinician report	Clinic U: no dose response for amount of feedback was found; clinic R: significant dose response for amount of feedback per client and practitioner report
Guo et al., ²⁰ 2015	China	Outpatient	Adults	Nonpsychotic major depression	MBC (n = 61), TAU (n = 59)	No baseline differences, but at 24 weeks, MBC had significantly greater change in HAM-D scores than the usual care group ($d = -3.11$)	MBC's mean time to response was 4.5 wk compared with 8.1 wk for usual care group
Simon et al., ³⁵ 2013	United States	Inpatient	Adults	Eating disorders	MBC (n = 69), TAU (n = 64)	Both conditions had improvements in self-reported mental health (pre-post TAU $d = 1.15$; MBC $d = 1.41$); MBC outperformed TAU ($d = .30$)	Clients in MBC met criteria for clinically significant change with greater frequency than TAU (52.95% vs 28.6%)
de Jong et al., ²⁸ 2017	The Netherlands	Inpatient	Adults	Severe personality disorders	MBC-FbT OT (n = 12), NOT (n = 35), MBC-FbTP OT (n = 17), NOT (n = 39), TAU OT (n = 20), NOT (n = 35)	For cluster B patients, the FbTP group had significantly higher OQ-45 scores than those in the NFb and FbT groups at 13 weeks; this difference remained at 26 weeks for the NFb group and not the FbT group	Afterly in cluster C patients, the FbT group had a significantly greater decrease in scores than NFb, and there were no significant differences between FbTP and FbT and NFb
Reese et al., ³⁶ 2009	United States	University counseling	Study 1: young adults; study 2: adults	Not specified	Study 1: MBC (n = 50), TAU (n = 24); study 2: MBC (n = 20), NOT (n = 24)	Significant therapy gains across both conditions (and studies); MBC condition had statistically significantly more change than TAU with medium to	More clients who received MBC experienced reliable change; MBC condition experienced somewhat

Source	Country	Setting	Population	Disorder	Conditions	Symptom Reduction	Additional Outcomes
Reese et al, ¹⁷ 2010	United States	University counseling	Heterosexual couples	Not specified	MBC (n = 45), TAU (n = 29)	Clients in the MBC condition improved significantly more than TAU ($d = 0.48$)	Couples in MBC improved more quickly than TAU; more clients in MBC obtained reliable change
Bickman et al, ²² 2011	United States	Home-based care	Adolescents	ADHD, conduct or oppositional disorder, depression, and/or anxiety	MBC (n = 173), TAU (n = 167)	Practitioners, caregivers, and youths reported that youths in MBC condition experienced significantly faster improvement than youths in TAU ($P < .01$); MBC effect sizes: 0.18, 0.24, and 0.27 for youths, practitioners, and caregivers, respectively	
Anker et al, ²³ 2009	Norway	Outpatient	Heterosexual couples	Not specified	MBC (n = 204), TAU (n = 206)	Couples who received MBC reported statistically significantly higher ORS scores than couples in TAU ($d = 0.50$); at a 6-mo follow-up after treatment completion, the effect size remained strong ($d = 0.44$)	Four times as many couples achieved clinically significant change in MBC; more couples at risk for not progressing achieved reliable change in MBC
Probst et al, ³⁷ 2013	Germany	Inpatient	Adults	Depression, somatoform disorders, and anxiety disorders	MBC NOT (n = 23), TAU NOT (n = 20)	Both conditions experienced similar and significant symptom change between t1 and t2; however, the MBC group had significantly more improvement in outcomes than TAU between t1 and t3 ($d = 0.23$)	Inpatients at risk had a significantly improved outcome (adjusted effect size from t1 to t3: $d = 0.54$) when feedback on progress was provided to therapists weekly
Probst et al, ³⁸ 2015	Germany	Inpatient	Adults	Depression, somatoform disorders, and anxiety disorders	MBC OT (n = 111), TAU OT (n = 98)	Symptom improvement on OQ-45 was statistically significant for TAU across all time points ($P < .01$); MBC group did not show a statistically different course in any weeks; from t2 to t5, there were no significant differences between conditions on the change in OQ-45	A significant feedback effect on OT patients was found only on 1 of the 4 OQ-45 scales (OQ-45 symptom distress scale) but only lasted from t2 to t3 and reached a small effect size ($d = 0.12$)

Source	Country	Setting	Population	Disorder	Conditions	Symptom Reduction	Additional Outcomes
Crits-Christoph et al, ²⁴ 2012	United States	Substance abuse treatment clinic	Adults	Alcohol and/or substance abuse	MBC OT (n = 85), NOT (n = 54), TAU OT (n = 165), NOT (n = 62)	NOT patients in MBC had significantly more improvement on alcohol use compared with NOT patients in TAU; at 12 weeks, alcohol use was similar to OT patients in MBC	Significant differences in rates of improvement between MBC and TAU for OQ-45 total scores ($d = 0.48$) and drug use ($d = 0.38$) but not alcohol use ($d = 0.02$)
Murphy et al, ³⁹ 2012	Ireland	University counseling	Adults	Depression or anxiety	MBC (n = 59), OT (n = 28), NOT (n = 31), TAU (n = 51), OT (n = 17), NOT (n = 34)	No significant difference between MBC and TAU conditions; both improved therapeutically, but MBC had a greater effect size ($d = 0.85$ vs $d = 0.64$)	No significant differences between conditions; however, clients with anxiety in MBC had significantly better outcomes than clients in TAU ($d = 0.70$ vs $d = 0.10$)
Hansson et al, ⁴⁰ 2013	Sweden	Outpatient	Adults	Depression, anxiety, personality disorders, and bipolar disorder	MBC (n = 136), OT (n = 99), NOT (n = 37), TAU (n = 126), OT (n = 91), NOT (n = 35)	There was a tendency that patients who received MBC improved more than those who received TAU ($P = .061$ and $d = 0.21$)	Effect sizes for outcomes related to diagnosis were not significant because of small sample sizes; effect sizes were $g = 0.33$ in depressive, $g = 0.11$ in anxiety, and $g = -0.03$ in personality disorders
Schuman et al, ⁴¹ 2015	United States	Substance abuse treatment clinic	Military soldiers	Substance abuse	MBC (n = 137), TAU (n = 126)	MBC condition had significantly more improvement on outcome rating scale ($d = 0.28$)	MBC had nearly double the percentage of clients achieve clinically significant change (28.47% vs 15.08% in TAU)
Slone et al, ⁴² 2015	United States	University counseling	Young adults	Anxiety, stress, and depression	MBC-FbTP (n = 43), TAU (n = 41)	Difference in post ORS scores between conditions was statistically significant ($\beta = -2.9$, $P = .023$); clients in MBC scored approximately 2.9 ORS points higher than clients in the TAU group	Clients in MBC achieved higher mean percentages of clinically significant change (41.9% vs 29.3% in TAU); MBC had more clients achieve reliable change compared with TAU (32.6% vs 17.1%); MBC had significantly larger pre-post group therapy gains ($d = 0.41$); MBC clients attended more sessions than clients in TAU (MBC = 8.0 and TAU = 6.6; $f_{2} = 2.4$, $P < .05$).
van Oenen et al, ¹⁸ 2016	The Netherlands	Outpatient	Adults	Adjustment disorder, depression, and/or psychosis	MBC (n = 72), TAU (n = 57)	MBC had significantly more patients who had no change or deterioration	

Source	Country	Setting	Population	Disorder	Conditions	Symptom Reduction	Additional Outcomes
Hammon et al. ⁴³ 2007	United States	University counseling	Adults	Mood disorders, adjustment disorder, anxiety disorders, eating disorders, and V code disorders	MBC-FbT OT (n = 521), NOT (n = 166), MBC-FbTP OT (n = 484), NOT (n = 203), TAU OT (n = 1159), NOT (n = 286)	Each group improved during psychotherapy (TAU $d = 0.37$; MBC-FbT $d = 0.60$; and MBC-FbTP $d = 0.55$); significant effects for the 2 progress conditions (OT vs NOT; $F_{1,2812} = 297.97$, $P < .001$) and the 3 feedback conditions (TAU/archival, MBC-FbT, MBC-FbTP; $F_{2,2812} = 33.94$, $P < .001$) on outcome; MBC outperformed the TAU/archival groups, but no difference between MBC-FbTP and MBC-FbT	A χ^2 comparison among the TAU/archival, MBC, and MBC plus CST was significant ($\chi^2_3 = 20.8$, $N = 655$); 3 MBC resulted in a 67% (7% vs 21%) reduction in deterioration compared with TAU; the use of CSTs doubled (21% vs 42.1%) the number of clients who were rated as recovered or reliably improved
Lambert et al. ⁴⁴ 2001	United States	University counseling	Adults	Mood disorders, adjustment disorders, anxiety disorders, or somatoform disorders	MBC (n = 307), OT (n = 272), NOT (n = 35), TAU (n = 302), OT (n = 271), NOT (n = 31)	NOT-Fb group had lower OQ-45 scores at termination than the NOT-NFb group (control) ($d = 0.44$); the OT-Fb and OT-NFb groups showed improvement between the point of entering treatment to termination with no differences in improvement between OT groups	
Lambert et al. ⁴⁵ 2002	United States	University counseling	Adults	Mood disorders, adjustment disorders, anxiety disorders, or somatoform disorders	MBC (n = 449), OT (n = 412), NOT (n = 116), TAU (n = 482), OT (n = 368), NOT (n = 124)	The difference in pre-post outcome between the 528 clients of MBC and the 492 clients of TAU was significant ($F_{1,1011} = 12.16$, $P = .001$); the effect size for the NOT-MBC vs NOT-TAU group was 0.40	At termination, the mean (SD) NOT-MBC OQ-45 score was 73.87 (25.34), whereas the mean (SD) NOT-TAU score was 83.72 (21.05) ($t_{23} = 2.50$, $P = .013$, $d = 0.34$).
Whipple et al. ⁴⁶ 2003	United States	University counseling	Adults	Mood disorders, adjustment disorders, anxiety disorders, or eating disorders	MBC (n = 449), OT (n = 352), NOT	NOT-MBC CST improved significantly more than NOT-MBC	

Source	Country	Setting	Population	Disorder	Conditions	Symptom Reduction	Additional Outcomes
Hawkins et al. ⁴⁷ 2004	United States	Outpatient	Adults	Mood disorders, anxiety disorders	MBC-FbT (n = 40), OT (n = 59), TAU (n = 482), OT (n = 351), NOT (n = 131)	(mean [SD] difference = 6.60 [3.78], $P < .05$), and NOT-MBC improved significantly more than NOT-TAU (mean [SD] difference = 5.19 [3.77], $P < .05$); effect size was 0.70 for NOT-MBC CST vs NOT-TAU and 0.28 for NOT-MBC vs NOT-TAU	MBC-FbT (mean [SD] = 17.38 [21.01]) and MBC-FbTP (mean [SD] = 23.86 [19.98]) vs TAU (mean [SD] = 15.05 [16.61]) was significant ($F_{1,196} = 4.75$, $P < .05$) and resulted in a moderate effect size ($r^2 = .02$); MBC-FbT vs MBC-FbTP was also significant ($F_{1,96} = 4.95$, $P < .05$), with moderate effect size as well ($r^2 = .02$)

Abbreviations: ADHD, attention-deficit/hyperactivity disorder; CST, clinical support tool; FbT, feedback to therapist; FbTP, feedback to therapist and patient; HAM-D, Hamilton Depression Rating Scale; MBC, measurement-based care; Nfb, no feedback; NOT, not-on-track patients; ORS, Outcome Rating Scale; OT, on-track patients; OQ-45, Outcome Questionnaire 45; t, time; TAU, treatment as usual.

^a study randomized at the client level such that therapists participated in both the TAU and MBC conditions.

Table 3.

Barriers to Using MBC and Strategies to Implement With Fidelity

Barrier	Implementation Strategies
Individual (Patient)	
Time for completing measures ⁵⁶	Measurement feedback system with adaptive testing, ⁵⁷ measurement-feedback system that prompts patients to complete measures at home prior to appointment, ⁵⁷ choice of pragmatic measures ⁵⁸
Breach of confidentiality ⁵⁶	Use HIPAA- and HL7-compliant technologies
Reported outcomes (eg, satisfaction survey) might affect relationship with practitioners ⁵⁹	Develop outcome-based organizational culture
Patient symptoms (eg, delusional, personality disordered) and/or disability (eg, cognitive impairment) ^{60,61}	Use consumer navigator or engagement specialist, provide alternative formats (eg, on tablet enabling large print, administered via interview)
Individual (Practitioner)	
Attitudes (eg, standardized measures no better than clinical judgment) ⁶²	Train with active learning components and consultation, ⁶³ use local champions, ⁴⁸ provide incentives, ^{9,64} engage in group discussion, teach different levels of stakeholders (eg, paraprofessionals, clinicians, and administrators) principles of MBC ⁶⁵
Knowledge and self-efficacy ⁶³	Train with active learning components, ⁶³ develop consultation protocol that focuses on understanding MBC data, ⁶⁵ observe or shadow others
Lack of clarity on the clinical utility (eg, concerns that scales do not fit patients well) ⁶⁶	Provide training and consultation, describe complex case examples with associated data
Administrative burden: time (ie, competing priorities), human resources, and financial support ⁶⁷	Adapt measurement feedback system to organizational context, ⁶⁶ embed in EHR, ^{26,57} adjust billing requirements ⁶⁵
Concern with how the data will be used (eg, to inform bonuses or to judge the skillfulness of the practitioner) ^{54,68}	Provide training and consultation, communicate a clear rationale with documented purpose, engage leadership
Organizational	
Guidance on selecting standardized self-report measures ⁶⁹	Access open-source resources, ³⁸ form or join learning collaborative
Resources for training ²⁶	Apply for additional funding
Staff turnover	Form implementation teams ⁷⁰
Leadership support	Use key opinion leaders, train leadership for implementation, ⁷¹ provide facilitation, form implementation teams
Organizational norms, culture, and climate	Use local champions
System	
Lack of incentives from third payers ²⁹	Engage in value-based care
Lack of consensus on relative benefits	Hold consensus discussions
Lack of understanding on what MBC is at the system level ⁷²	Engage leadership, train leadership for implementation

Abbreviations: EHR, electronic health record; HIPAA, Health Insurance Portability and Accountability Act; HL7, Health Level 7; MBC, measurement-based care.

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