Changing Provider Behavior in the Context of Chronic Disease Management: Focus on Clinical Inertia

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Abstract

Widespread acceptance of evidence-based medicine has led to the proliferation of clinical practice guidelines as the primary mode of communicating current best practices across a range of chronic diseases. Despite overwhelming evidence supporting the benefits of their use, there is a long history of poor uptake by providers. Nonadherence to clinical practice guidelines is referred to as clinical inertia and represents provider failure to initiate or intensify treatment despite a clear indication to do so. Here we review evidence for the ubiquity of clinical inertia across a variety of chronic health conditions, as well as the organizational and system, patient, and provider factors that serve to maintain it. Limitations are highlighted in the emerging literature examining interventions to reduce clinical inertia. An evidence-based framework to address these limitations is proposed that uses behavior change theory and advocates for shared decision making and enhanced guideline development and dissemination.

Evidence-based medicine (EBM), whose origins date back to the mid-nineteenth century (1), is the systematic application of the scientific method into health-care practice with the goal of providing optimal clinical care to patients (2). Inherent in this definition is the expectation of explicit and judicious use of current best evidence to guide clinical decision making. EBM is a constantly evolving process; as more evidence becomes available, old tests and treatments are replaced with more accurate, powerful, effective, and safer ones. Clinical practice guidelines (CPGs) have become the primary mode of communicating current best practices across a range of clinical disorders (3). The ultimate goal of practice guidelines is to facilitate the translation of the most recent evidence into practice to improve patient care and outcomes (4).

Evidence-based medicine (EBM): a systematic application of the scientific method into health-care practice with the goal of providing optimal care to patients

Clinical practice guidelines (CPGs): systematically developed recommendations informed by a review of evidence and assessment of the benefits and harms of alternative care options

Clinical inertia: failure to initiate or intensify treatment despite a clear indication and recognition to do so

Despite their widespread availability and strong evidence supporting the benefits of their use (5–7), there is a long history of poor uptake of CPGs by providers, with many studies reporting rates of nonadherence at or exceeding 50% (8–10). Rates of provider nonadherence to guidelines are said to be responsible for up to 80% of myocardial infarctions and strokes in the context of suboptimally treated hypertension, diabetes, and dyslipidemia (11). Practice guidelines have been criticized for being overly simplistic, impractical, biased, and not broadly applicable and for representing a threat to professional autonomy and the provider-patient relationship (4, 12). However, the intention of CPGs is not to provide a black and white, cookbook approach to diagnosis and treatment, but rather to facilitate a bottom-up approach that integrates the best external evidence with clinical expertise that considers individual patients' goals, values, and preferences when making decisions about care (1).

Provider nonadherence to CPGs is increasingly referred to as clinical inertia. This term was initially introduced by Phillips et al. (13) in 2001 and defined as provider failure to initiate or intensify treatment despite a clear indication and recognition of the need to do so. Other terms have been used to describe the same behavior, including therapeutic inertia, physician inertia, and diagnostic inertia (14–16), but they are generally synonymous and reflect conscious provider inaction in the face of available and explicit evidence-based guidelines and recognition of the need to act.

In an era of chronic disease that demands the practice of EBM to achieve optimal clinical outcomes, overcoming the problem of clinical inertia is imperative. Here we review current definitions of clinical inertia and summarize its prevalence and impact across a range of chronic diseases. We also review barriers to provider adherence to CPGs and summarize the efficacy of provider-focused interventions. Finally, we propose the adoption of a theoretical framework for understanding and overcoming the problem of clinical inertia that is grounded in health behavior change theory and can be used to improve future implementation strategies.

DEFINING CLINICAL INERTIA

To consider provider behavior as reflecting clinical inertia, at least two conditions must be met: (*a*) The patient fails to meet clearly defined and measurable treatment targets, and (*b*) the patient fails to receive appropriate intensification of therapy within a defined and reasonable period of time (11). Clinical inertia may also apply to the failure to stop or reduce therapy that may no longer be needed; although this side of clinical inertia also has important clinical consequences (17), it has received far less attention.

One issue regarding the definition of clinical inertia is how to distinguish true clinical inertia from what may in fact be appropriate clinical inertia, which reflects reasonable decisions not to intensify treatment despite the available evidence. This may occur with more complex cases (e.g., a frail elderly patient with diabetes and hypertension) or when age, comorbidities, polypharmacy, and potential adverse drug reactions may render guideline-recommended therapies inappropriate

(13) or unsafe (18). More recent definitions of clinical inertia take these concerns into account (19) and suggest that true clinical inertia occurs only when the following criteria are met: The provider (*a*) is aware of the existence of implicit or explicit guidelines; (*b*) believes that this guideline applies to the patient; (*c*) has resources available to apply the guideline; and (*d*) does not follow the guideline despite awareness, belief, and available resources to do so. Although this may be the most appropriate and balanced definition of clinical inertia, most studies to date have defined clinical inertia based on observations of providers' failure to intensify treatment in the context of patients not meeting measurable therapeutic targets. However, without systematically consulting clinical data such as medical charts, it is impossible to verify the extent to which clinical inertia may be appropriate (e.g., in the context of severe comorbidities) or the result of patient nonadherence.

THE PROBLEM OF CLINICAL INERTIA: PREVALENCE AND IMPACT

Evidence for clinical inertia comes from epidemiological studies, direct observation, or an analysis of provider behavior during clinical visits. The challenge in reporting prevalence rates of clinical inertia is that it has been defined inconsistently and measured imprecisely across studies. In general, it is easier to measure clinical inertia in relation to conditions where treatment targets, intensifications, and timelines are well defined, such as diabetes, hypertension, and dyslipidemia. Rates of clinical inertia have been studied most extensively within the context of these conditions and to a lesser extent in the context of asthma and chronic obstructive pulmonary disease (COPD) and are typically quantified as instances when providers fail to intensify treatment among diagnosed patients who are not meeting targets. These cases do not consider the reasons for provider inaction, some of which may be appropriate, representing a major limitation in this area of research.

Diabetes

There is little question that the timely initiation and intensification of insulin, glucose-lowering medication, or both in diabetes is associated with clinically relevant benefits, including improved glycemic control and a reduction in microvascular complications (20–23). Despite this, a review by Phillips et al. (13) revealed that in the United States, only 65% of patients were diagnosed accurately, and among those, only 73% were given pharmacological therapy. It is not surprising, therefore, that hemoglobin A1c values met American Diabetes Association targets in only 7% of patients. A more recent study using a retrospective cohort of more than 81,000 patients with type 2 diabetes from the United Kingdom reported that over 50% of patients with poor glycemic control did not receive intensification of oral antidiabetic medication within 7 years of treatment (24). Finally, a study from Canada using administrative data from more than 80,000 patients compared 4-month drug intensification by specialists and general practitioners among 2,652 matched cases with uncontrolled diabetes (25). Although specialists intensified treatment in a greater proportion of cases (45.1%) than general practitioners did (37.4%), overall rates were less than 50% (26).

Hypertension

Similar to diabetes, clinical inertia is prevalent in the management of hypertension. The review by Phillips et al. (13) indicated that in the United States, only 69% of patients were diagnosed accurately, and among those, just over half (53%) were given pharmacological therapy. This explains why only about 45% of patients had adequate blood pressure (BP) control. In a more recent study of more than 21,000 respondents of a nationally representative survey in five European countries and the United States, Wolf-Maier et al. (27) reported that among those with poorly

controlled BP, only 14–26% of patients in Europe and 32% of patients in the United States received treatment intensification. Finally, in a study conducted within Veteran Affairs (VA) primary care clinics, clinical inertia was identified in 66% of cases. Moreover, among victims of clinical inertia, nearly one-quarter had no follow-up appointment scheduled, and nearly 77% of those who did see their provider did so after a delay of 45 days (range: 29–78 days) (28).

Suboptimal management of hypertension has been shown to have a major impact on BP control. For example, in a sample of more than 7,000 hypertensive patients from the United States who were followed for an average of 6.4 appointments over the course of a year, Okonofua et al. (16) calculated that clinical inertia accounted for 19% of the variance in BP control. Furthermore, the authors estimated that BP could be controlled in 20% more patients (an increase from 45.1% to 65.9%) in one year if clinical inertia could be reduced by 50%.

Dyslipidemia

Clinical inertia is also common in the context of dyslipidemia, for which the review by Phillips et al. (13) revealed that only 47% of patients in the United States were diagnosed accurately, and among those, the minority (17–23%) were given pharmacological therapy. This helps to explain why low-density lipoprotein cholesterol (LDL-C) levels reach National Cholesterol Education Program targets in only 14–38% of patients. More recently, clinical inertia in dyslipidemia was evaluated in a sample of 22,888 patients with cardiovascular disease (CVD) (29). Only 32% of the 6,538 patients who failed to meet treatment targets (LDL-C $\geq$ 100 mg/dL) received intensification of cholesterol-lowering therapy within 45 days of their elevated laboratory test. Finally, an 18-month, retrospective cohort study (30) used medical records from 253,238 members of the Kaiser Permanente Medical Care Program who had poor control of dyslipidemia, diabetes, or BP to quantify clinical inertia, which was defined as the failure of the provider to intensify pharmacotherapy within 6 months. Clinical inertia was observed in 41.4% of patients with elevated LDL-C levels, as well as 30.3% of patients with elevated hemoglobin A1c levels, 28.8% with elevated systolic BP, and 17.6% with elevated diastolic BP.

Asthma

In developed countries, asthma is often the most prevalent chronic disease in children and one of the most common conditions affecting adults (31, 32). Despite the availability of guidelines for the treatment of asthma and robust evidence that following guideline recommendations improves outcomes (33, 34), provider adherence to CPGs to manage asthma is poor. For example, a retrospective study of asthma care delivered to 345 patients at a tertiary adult emergency department (ED) in Canada reported 69.6% overall compliance with guidelines (35). Controller (i.e., inhaled corticosteroid) use was prescribed in only one-third of children and adults in the ED and on discharge. Studies have also shown that in the nonacute care setting, few physicians prescribe ongoing daily controller medication or written self-management plans, even in adults and children with a recent acute care visit for asthma (36). Moreover, even when they are prescribed, the cumulative duration of available prescriptions covers less than 50% of the follow-up period (37).

One possible explanation for these high rates of clinical inertia may be diagnostic inertia. Lougheed et al. (38) assessed ED management of asthma in 2,671 children and 2,078 adults treated at 16 Ontario hospitals by means of questionnaires and chart reviews. Objective measures of airflow rate were documented in only 27.2% of pediatric visits and 44.3% of adult visits. Given that CPGs make specific recommendations about treatment intensification based on lung function (39, 40), the failure to measure this at the point of care will make it difficult to implement guideline-recommended therapy.

Chronic Obstructive Pulmonary Disease

Chronic obstructive pulmonary disease (COPD) affects 65 million people worldwide (41) and is the third-leading cause of death in the United States after CVD and cancer (42). Although studied less extensively than in other diseases, diagnostic and clinical inertia in COPD are also prevalent concerns. A comprehensive review by Cooke et al. (43) in 2012 reports that in 2002, only 10 million adults in the United States were diagnosed with COPD, despite Third National Health and Nutrition Examination Survey estimates that 24 million adults had impaired lung function. The most common reason for the underdiagnosis of COPD was the lack of objective lung function testing (spirometry). One survey of primary care practices revealed that despite 66% of providers owning a spirometer, 38% said they were unfamiliar with the test and 34% said they were not trained to administer or interpret it (44).

With regards to clinical inertia, Cooke et al. (43) reported that 23–38% of COPD patients fail to receive any guideline-recommended drug therapy (45–47). However, these rates vary depending on disease stage, with one study reporting higher rates of treatment (81%) among patients with severe COPD compared to those with moderate (72%) and mild (44%) disease (48). Among those receiving treatment, one study conducted among patients seen at a university-based family medicine clinic reported that treatment intensity is often suboptimal, with only 55% of patients receiving stage-recommended therapy (49). Specifically, Chavez & Shokar (49) reported that only 22%, 5%, 28%, and 13% of patients with mild, moderate, severe, and very severe COPD, respectively, were being treated at stage-recommended levels.

FACTORS ASSOCIATED WITH CLINICAL INERTIA

To address the problem of clinical inertia, factors that explain its high prevalence must be elucidated. Reasons for clinical inertia involve a complex interaction between three types of factors: organizational and system, patient, and provider factors, for which previous reports have estimated their relative contributions at 20%, 30%, and 50%, respectively (11) (see **Figure 1**). Reviews (4, 11, 13, 15, 50) and textbooks (19) that detail these factors have been published, so we consider them only briefly here with an emphasis on modifiable, provider-related factors.

Organizational and System Factors

Time constraints are one of the most cited organizational and system-related factors associated with clinical inertia. Providers often have several competing demands [e.g., high patient volumes, teaching and research responsibilities, acquiring continuing medical education (CME) credits, office management, staff supervision] (13, 14, 51) that may interfere with the ability to keep up with constantly evolving clinical guidelines and prevent the thorough assessment, diagnosis, and timely provision of treatment initiation or intensification (52). This may be complicated further by the *lack of available resources* to implement guideline-recommended therapy (e.g., limited support staff, diagnostic equipment, access to laboratory services, office space), as well as *inadequate reimbursement* for implementing guideline-recommended therapy (4). Factors associated with the *practice setting* (e.g., primary care, inner-city or rural setting, lack of or limited access to multidisciplinary expertise or specialists) may also contribute to clinical inertia (50). For example, some researchers have argued that the lack of availability of multidisciplinary team–based care, which is often the case in primary care, may be an important factor associated with increased clinical inertia in primary (relative to tertiary) care settings (50, 53–55). Finally, *access to care*, *prescription drugs*, *or insurance* (which may also be considered a patient factor) is an important contributor to

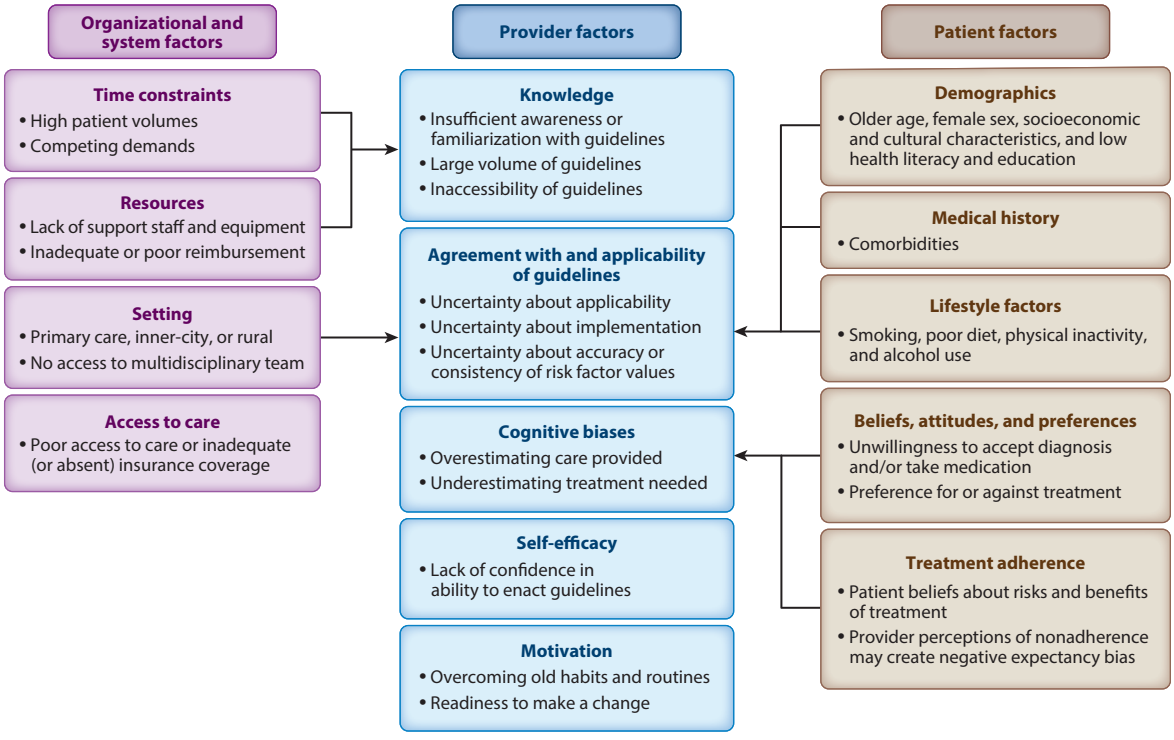

Figure 1

Organizational and system, provider, and patient factors associated with clinical inertia.

clinical inertia. In one study, 38% of patients with COPD reported that insurance-related issues limited access to prescription drugs and 14% reported limited access to physician office visits (48). Furthermore, 58–67% of providers reported that insurance coverage for needed treatment was inadequate or unreasonable (48). However, it is noteworthy that clinical inertia is common in VA hospitals and in countries such as Canada, where medication costs may be less of an issue (37, 56).

Patient Factors

Patient-related factors may also underlie clinical inertia. One such factor involves patient *demographics*, including older age, female sex, and socioeconomic or cultural background (which may undermine health literacy) (50). For example, in a cross-sectional retrospective study of 1,729 medical and insurance claims, Nau & Mallya (57) reported that among patients with diabetes, men were more likely than women to receive lipid tests (82.4% versus 79.4%) and lipid-lowering medication (45.5% versus 33.2%). Furthermore, patients with more education and better health literacy appear less likely to experience clinical inertia (50).

Another factor relates to patients' *medical history*. Many studies have indicated that treatment is less likely to be initiated or intensified if patients have complex comorbidities (e.g., a psychiatric or neurological disorder, substance abuse, terminal illness) because this may raise questions about the applicability or appropriateness of existing guidelines (50).

Patient-related *beliefs, attitudes, and preferences* have also been linked to clinical inertia. For example, clinical inertia may reflect a patient's unwillingness to accept their diagnosis or take a

medication to manage what they may experience as an asymptomatic disease (e.g., hypertension and dyslipidemia) (50). EBM emphasizes patient preferences, and in some cases, patients may opt for lifestyle modifications (e.g., dietary changes or increases in physical activity) prior to the initiation or intensification of medications (58).

Patient nonadherence, the reasons for which are multifactorial (e.g., medication cost, disease nonacceptance, fear of side effects, poor outcome expectancies, forgetfulness) and exacerbated by provider factors [e.g., poor communication skills (14)], may also contribute to clinical inertia. For example, medication adherence was found to predict 3-year treatment intensification in a cohort of 2,065 insured patients with type 2 diabetes newly started on hypoglycemic therapy (59). Patients in the lowest quartile of adherence were less likely to have their medication appropriately intensified than patients in the highest quartile (27% versus 37%), which equated to 53-fold lower odds of treatment intensification after having an elevated hemoglobin A1c. Established or suspected patient nonadherence by providers may also contribute to clinical inertia by creating a negative expectancy bias (50). In these cases, providers may fail to provide guideline-recommended therapy owing to low expectations of adherence and perceived helplessness to change patient behavior. Some researchers have argued that clinical inertia and lack of patient adherence go hand in hand and that this represents a shared failure to give preference to the long-term benefit of treatment intensification (60).

Finally, *lifestyle factors* (e.g., smoking, poor diet, physical inactivity), by virtue of raising the bar for achieving clinical targets, may also be linked to clinical inertia (14). For example, the EUROASPIRE study reported that, despite treatment intensification, patients with coronary heart disease failed to achieve BP targets, and nearly 50% of patients remained above target lipid levels 6 months after percutaneous intervention, coronary artery bypass graft, or hospitalization for acute ischemia or myocardial infarction (61). This study further revealed concomitant increases in obesity (from 25% to 38%) and diabetes (from 17% to 28%) between EUROASPIRE I and III, suggesting an important role for lifestyle factors in explaining the treatment failures.

Cognitive biases: systematic deviations from standards in judgment

Self-efficacy: belief or confidence in the ability to implement guidelines and enact meaningful change

Provider Factors

The strongest contributors to clinical inertia are factors related to the provider and have been the most intensely studied (4, 11, 13, 28, 50). In general, five factors have been identified: (*a*) lack of knowledge or awareness of clinical guidelines, (*b*) lack of agreement with guidelines or their applicability, (*c*) cognitive biases, (*d*) motivational factors, and (*e*) low self-efficacy to implement guidelines.

Lack of knowledge or awareness. Lack of awareness or familiarity with evidence-based guidelines for chronic disease management has been reported as a major contributor of clinical inertia (4, 50, 52, 62). In a review of 46 surveys, Cabana et al. (4) observed that lack of awareness was reported as a barrier to guideline implementation in a median of 54.5% of respondents. Similarly, 41% of respondents had not heard of nationally endorsed BP guidelines in a US survey of primary care physicians (63). In the context of COPD, only about half of primary care physicians are reportedly aware of CPGs (48), and only 25% said they used them for clinical decision making (64). Recent reviews continue to note this as an important barrier (65), which may be exacerbated by the large number of guidelines and the time required to keep them constantly updated (62).

Lack of agreement and applicability. Another important provider-related factor is lack of agreement with guidelines or their applicability to certain patients. Multiple reasons for this

problem have been identified, including doubting the credibility of the evidence, doubting that the benefits of therapy outweigh the risks, the perception that guidelines would reduce provider autonomy, and the belief that guidelines undermine the provider-patient relationship by reducing patient choice (4). Guidelines have also been criticized for being overly simplified, leading to disagreement about their applicability to individual patients or populations (4, 50). This latter claim is not entirely unfounded, given that guidelines are typically informed by randomized controlled trials with strict inclusion or exclusion criteria that may limit their applicability to certain patients. Provider beliefs about applicability may also be influenced by patient factors such as demographics (e.g., age, sex), medical history, comorbidities, patient preferences, and perceptions of patient adherence. Uncertainty regarding the accuracy, consistency, or both of risk factor values may also contribute to perceptions of guideline applicability. This is particularly prevalent in the treatment of hypertension, in which discrepancies between office and home BP are common (53). Other reasons have to do with the nature of the guideline itself. Guidelines have been criticized for being written in a way that does not always facilitate their use. Cabana et al. (4) noted that across 23 surveys, 17%, 11%, 10%, and 4.5% of physicians reported that guidelines were not easy to use, inconvenient, cumbersome, and confusing, respectively.

Cognitive biases. Cognitive biases represent systematic deviations from standards in judgment. In the context of clinical inertia, providers may have systematic cognitive biases that undermine the timely delivery and intensification of treatment. For example, providers routinely underestimate the need to intensify therapy (11). A study by el-Kebbi et al. (66) reported that physicians did not intensify diabetes therapy over a 2–3-month period among diabetic patients owing to misperceptions of control in 41% of cases—despite most patients being obese (body mass index = 32 kg/m^2). Similarly, health-care providers have been shown to overestimate the care they provide (67). In a survey about the use of CPGs for the treatment of hypertension, US primary care clinicians overestimated the proportion of patients who were prescribed guideline-recommended medication (75% perceived versus 65% actual) as well as the proportion of patients whose BP levels were below target levels set at their previous visit (68% perceived versus 43% actual) (68).

Motivational factors. Motivation reflects a general desire or willingness to engage in a particular behavior and may be influenced by both extrinsic (e.g., money, praise, status, power) and intrinsic motivators (e.g., pleasure, behavior is consistent with personal goals or values) (69). Clinical inertia may reflect a lack of provider motivation to change practice behavior. Habits are hard to change, even those related to clinical practice, where as many as 20% of providers report a lack of motivation (i.e., desire or perceived importance) as a barrier to the provision of guideline-recommended therapy (4). A related factor that may serve to undermine motivation is outcome expectancies, which is the expectation that behavior will lead to a particular outcome (70). In the review by Cabana et al. (4), 26% of providers reported negative outcome expectancies, which could be influenced by perceived lack of treatment efficacy, guideline nonapplicability, or patient nonadherence, to be a barrier to following CPGs.

Self-efficacy. Providers' belief or confidence in their ability to implement guidelines and enact meaningful practice change represents another barrier to the timely delivery or intensification of treatment. Cabana et al. (4) observed that a median of 13% of respondents across 19 surveys reported limited self-efficacy as a barrier to the implementation of CPGs. Similar results were

reported in a survey of 154 clinicians treating COPD patients (71). Self-efficacy beliefs may be influenced heavily by organizational barriers such as time and available resources.

Science-practice gap: the divide between research literature concerning clinical interventions and its application to patients

INTERVENTIONS TO REDUCE CLINICAL INERTIA

Various strategies have been employed to encourage providers to bridge the science-practice gap by changing clinical practice behavior. Interventions may be grouped into five broad categories: educational approaches, practice audit and feedback, decision support approaches, incentives, and multifaceted interventions (see **Table 1** for a summary of definitions and examples).

Educational approaches range from passive interventions, such as the dissemination of printed materials, the use of opinion leaders to impart knowledge, and traditional didactic lectures and conference presentations, to more active approaches, including academic detailing and engaging forms of CME (e.g., practical workshops). Educational approaches target provider knowledge or awareness of guideline-recommended therapy. A recent review of 105 CME studies reported that 58% of 105 studies improved physician practice behavior (e.g., prescribing), with more active forms of CME and those using multiple media formats (e.g., slides, videos), multiple instruction techniques (e.g., didactic lectures, interactive group discussions, practical exercises), and multiple exposures showing greater efficacy (72). In contrast, more passive forms of CME show smaller but reliable effects on changing practice behavior.

Audit and feedback involves reviewing clinical performance over a specific period of time via chart audits, patient surveys, or direct observation and giving providers specific feedback on the quality of their performance. This approach helps providers recognize cognitive biases (e.g., overestimation of care). According to reviews by Mostofian et al. (73) and Yen (74), audit and feedback has been associated with a range of effects on provider behavior, with studies showing small (16% decrease in physician compliance) to large effects (70% increase in physician compliance). Furthermore, the larger positive effects (74) were associated with lower baseline compliance among providers, and feedback was most effective when delivered prior to making decisions about clinical care (73).

Decision support approaches are information systems designed to improve clinical decision making by analyzing patient-specific variables (e.g., clinical data) and using the data provided to generate treatment recommendations. These approaches are passive and often involve reminders or simplified decision algorithms for preventive interventions, prescribing, and dosing. They target provider knowledge or awareness of guideline-recommended therapy, cognitive biases, and self-efficacy. Decision support systems reportedly improved provider performance in 64% of studies (75) and were particularly effective when triggered automatically during clinic practice (68% of studies) (76). Reminders can also have large effects on practice behavior. One review reported that computerized prompts for prevention activities improved physician performance in 76% of trials (75). However, decision support systems need sufficient data to code and trigger a response and the support system and reminders in place to trigger appropriate provider behavior.

Incentives come in the form of financial or other rewards (e.g., institutional accreditation). Incentives target provider motivation. Although effective in 70% of studies (77), this approach targets extrinsic rather than intrinsic motivations, meaning that the behavior may extinguish in the absence of ongoing reinforcement.

Multifaceted interventions do not encompass a single approach but rather seek to combine multiple approaches to optimize efficacy. In general, approaches that combine more than one strategy (e.g., education, audit and feedback, reminders, simplification of treatment regimens) have been found to be highly effective in changing physician practice behavior, with overall success rates exceeding 70% (74, 78, 79).

Table 1 Characteristics of interventions to reduce clinical inertia

Behavior change method	Definition	Behavior change theory	Approach	Provider barriers addressed	Efficacy	Example	Other considerations
Educational approaches							
Printed educational materials	Distribution of printed recommendations for clinical care (e.g., practice guidelines)	None	Passive	Lack of knowledge and awareness	Low	Mailed guidelines and mailed guidelines plus education outreach did not change prescription of NSAIDs relative to no intervention (90).	Highly variable and difficult to determine qualities of more successful interventions (91)
Local opinion leaders	Transmission of opinions of health-care providers who are deemed influential	None	Passive	Lack of knowledge and awareness	Low	A one-page, disease-specific summary endorsed by an opinion leader showed small improvements in physician prescription of cardiovascular medication (92).	Effectively used with other strategies; highly variable and difficult to determine best way to optimize use (93)
Academic detailing	Active information transfer through presentations by a trained person	None	Passive	Lack of knowledge and awareness	Low	Relative to control, electronic and direct (face-to-face) academic detailing increased likelihood of lipid testing for diabetics (94).	Produces small but reliable effects when used alone or combined with other methods (95)
CME	Passive forms include information provided via educational conferences, lectures, or meetings; active forms include tailored learning and practical workshops	Variable	Active or passive	Passive: lack of knowledge and awareness Active: multiple	Moderate	Two 2–3-h interactive seminars to improve communication with children with asthma increased use of controller medication and reduced asthma-related hospital visits (96).	Most effective when (*a*) both interactive and didactic, (*b*) highly attended, and (*c*) changing simple behaviors (97)
Audit and feedback approaches							
Audit and feedback	Results of reviews of clinical performance (e.g., charts, surveys, observation) are fed back to the provider	None	Active	Cognitive biases	Moderate	Audits of acute asthma procedures were anonymized and fed back to providers, which increased use of peak flow by 45% (98).	Most effective when (*a*) delivered by a supervisor or colleague, (*b*) performance is low to begin with, (*c*) provided multiple times, and (*d*) clear targets are used (99)
Decision support approaches							
Analysis of patient data	New clinical information collected directly from patients and given to the provider	None	Passive	Lack of knowledge and awareness	Moderate	Patient self-reports of depressed mood in unrecognized depressed patients were fed back to physicians, which improved 12-month recognition and treatment of depression (100).	The circumstances under which this strategy is most efficacious are not yet known

Decision support systems	Information systems that analyze patient-specific clinical variables (e.g., preventive care, disease management, prescribing)	None	Passive	Lack of knowledge and awareness, lack of agreement	Moderate	Relative to usual care, a computer-assisted decision support program targeted and reduced the prescribing of 9 inappropriate medications in an ED setting (101).	Most effective when (*a*) advice given for patients and practitioners, (*b*) requiring provider reason for override, and (*c*) evaluated by developers (76, 102) Limitations: alerts may be disruptive, provider may not agree with advice, and contingent upon quality of data (15)
Reminders	Manual or computerized prompts directing physicians to perform a specific clinical action	None	Passive	Lack of knowledge and awareness	Moderate	Computerized reminders of patient-specific recommendations for elevated glucose improved the timely intensification of treatment (103).	Used effectively with other strategies (104)
Simplification of regimen	The use of simplified decision algorithms for treatment regimens	None	Passive	Lack of knowledge and awareness (guideline complexity)	Moderate	A simplified four-step algorithm to manage hypertension improved timely intensification of antihypertensive medications (105).	The circumstances under which this strategy is most efficacious are not yet known
Incentive approaches							
Economic incentives	Financial rewards or penalties for engaging in specific clinical practices	Learning theory (positive reinforcement or punishment)	Passive	Lack of motivation	Moderate	Provider financial bonus (e.g., $1,000 for a 20% improvement) improved physician immunization behavior by 25.3% (106).	Effects do not transfer to patient outcomes (77)
Multifaceted approaches							
Multifaceted	Use of two or more interventions	Variable depending on interventions used	Active and passive	Multiple	High	Educational outreach, audit and feedback, reminders, opinion leader education, and regimen simplification improved the adoption of targeted practices in treatment ICUs (107).	Has been rated as the most successful intervention strategy to change physician behavior for a desired outcome (73)

Abbreviations: CME, continuing medical education; ED, emergency department; ICU, intensive care unit; NSAID, nonsteroidal anti-inflammatory drug.

LIMITATIONS OF CURRENT APPROACHES TO OVERCOMING CLINICAL INERTIA

Behavior change theory (BCT): the application of theoretically informed methods to target identified barriers and bring about desired behavior change

Shared decision making (SDM): empowering patients to assume a central or shared role in making decisions about their medical care

Despite the existence of several provider-focused interventions and evidence for their efficacy, current rates of clinical inertia suggest that they remain inadequate for changing practice behavior. An examination of the objectives, designs, and intervention strategies employed across approaches reveals several limitations. As summarized in **Table 1**, with the exception of some multifaceted interventions, most approaches have been designed to address a single provider barrier. Given the range of provider factors associated with clinical inertia, those focusing on a single barrier may be less likely to succeed than those that aim to address a range of provider factors because of one major flaw: They make the assumption that the targeted barrier is the problem, when, in fact, barriers may be multiple and vary across providers. Furthermore, the majority of approaches reviewed involve the passive dissemination of knowledge, which is less effective than more active approaches (e.g., practice audits with feedback) that involve provider participation (73).

Most approaches to date have targeted one barrier in particular: provider knowledge or awareness of CPGs. Interventions that target behavior change should logically be inspired by behavior change theories (BCTs); however, with the exception of incentives [which are inspired by learning theory and operant conditioning (80)] and possibly some forms of active CME, few approaches appear to be based on BCTs. In fact, a study of 110 accredited CME programs offered to physicians in Canada reported that 96%, 47%, and 26% used strategies that targeted knowledge, comprehension, and practice skills, respectively. Finally, few approaches address barriers inherent in implementing guidelines (e.g., impractical, inconvenient, or biased guidelines) (4, 12).

TOWARD THE USE OF AN EVIDENCE-BASED FRAMEWORK FOR OVERCOMING CLINICAL INERTIA

We propose the use of an evidence-based framework to adequately address clinical inertia that emphasizes the use of BCT. We also make recommendations for integrating strategies for overcoming patient-level barriers that promote shared decision making (SDM) and suggest a framework for improving guideline development and dissemination.

Overcoming Provider Barriers Using Behavior Change Theory

BCT provides a framework for designing interventions that address specific behavior gaps in the context of clinical inertia. First, BCT can help us understand what barriers should be targeted. For example, behavioral assessment can be used to identify whether CPGs are not being adopted for reasons related to lack of knowledge or awareness, lack of agreement, cognitive biases, lack of motivation, lack of self-efficacy, or a combination of these reasons. This information can be used to group providers in terms of their barriers and offer interventions that target those issues.

Second, BCT offers a framework for overcoming particular barriers. For example, BCT would recommend adopting motivational approaches (e.g., motivational interviewing, inspired by self-determination theory) (81) that are designed to enhance intrinsic motivation and confidence (82) to overcome barriers in motivation or self-efficacy. For a complete list of BCT-inspired approaches that could be used to overcome specific provider barriers, see **Table 2**.

Finally, BCT provides a mechanism for understanding why some interventions fail. For example, although some audit and feedback approaches have been successful, others have actually decreased physician compliance with CPGs. This may be explained by learning theory, which posits that receiving negative feedback about poor performance may be experienced

Table 2 Provider interventions to overcome clinical inertia

Provider barrier	Intervention type	Behavior change theory	Definition	Strategies
Lack of knowledge and awareness	Education	NA	The process of learning via the acquisition of knowledge	Printed materials, lectures, conferences, academic detailing, the Internet, and webinars
Lack of agreement	Attitude or behavior change	Cognitive behavioral theory (108)	Behavior is the result of our interpretations (thoughts) of our environment (external stimuli).	Cognitive restructuring
		Health belief model (109)	Behavior change is influenced by perceived susceptibility to a problem, seriousness, benefits of action, and barriers.	
Cognitive biases	Attitude or behavior change	Cognitive behavioral theory (108)		Cognitive restructuring
		Health belief model (109)		
Lack of motivation	Attitude or behavior change	Self-determination theory (81)	Behavior is determined by the degree to which it is driven autonomously and consistent with an individual's goals and values.	Motivational interviewing (69)
		Transtheoretical model (110)	Level of readiness to change determines behavior change. We move through five stages of change: precontemplation, contemplation, preparation, action, and maintenance, the latter three of which indicate readiness.	Motivational interviewing (69)

(*Continued*)

Table 2 (*Continued*)

Provider barrier	Intervention type	Behavior change theory	Definition	Strategies
		Theory of planned behavior (111)	Intention is influenced by attitude toward the behavior, subjective norms, and perceived behavioral control.	Motivational interviewing (69)
		Regulatory focus theory (112)	Behavior is determined fundamentally by the desire to pursue pleasure (positive outcomes) and avoid pain (negative outcomes)	Personally relevant incentives
		Social cognitive theory (70)	Behavior is influenced by modeling others we identify with, positive outcome expectancies, and confidence (self-efficacy) in our ability to successfully engage in a behavior.	Motivational interviewing (69), cognitive restructuring, exposure (behavioral experiments), and goal setting and problem solving
Lack of self-efficacy	Attitude or behavior change	Cognitive behavioral therapy (108)		Cognitive restructuring
		Theory of planned behavior (111)		Motivational interviewing (69)

Abbreviation: NA, not applicable.

negatively (as a punishment) and result in reduced motivation and frequency of enacting the target behavior. Anticipation of negative feedback may also create anxiety and lead to avoidance of participating in such interventions. Similarly, according to self-determination theory, incentive-based interventions would only be expected to work if (*a*) providers were highly motivated by financial rewards, (*b*) accepting financial rewards did not conflict with other values, and (*c*) the financial rewards are offered. Furthermore, behavior change strategies that rely on extrinsic rewards may undermine behavior change for intrinsic reasons (i.e., I want to practice EBM because I value excellence, altruism, and accountability) and may not be feasible in the long term.

Overcoming Patient Barriers by Promoting Shared Decision Making

Two important, modifiable, patient-related factors associated with clinical inertia are treatment nonadherence and unhealthy lifestyle behaviors. One of the most promising methods for improving patient adherence (both to therapy and lifestyle recommendations) is adopting an SDM approach (83). SDM aims to empower patients to assume a central role in decision making about their care and includes the following elements: (*a*) reciprocal exchange of information between the patient and provider, (*b*) negotiation of treatment options and outcomes, and (*c*) reaching consensus about the course of action. This approach has succeeded at increasing patient adherence across a variety of conditions (84, 85), and although it may appear to undermine the practice of EBM, we argue that this is not the case. In fact, integrating SDM into EBM may actually enhance both provider compliance and patient adherence to guideline-recommended therapies by helping to simultaneously overcome barriers related to provider knowledge and agreement with the applicability of guidelines, as well as cognitive biases related to overestimates of the quality of care.

Overcoming Guideline-Related Barriers via Improved Development and Dissemination

Often overlooked are limitations inherent to guidelines themselves. Improving the way in which we develop and disseminate guidelines may have a major, positive, and rapid impact on guideline uptake. Rogers (86) describes guideline characteristics that affect provider adoption and could be used to guide intervention development and dissemination practices. They include relative advantage (is the new recommendation significantly superior to the previous one?), compatibility (is the guideline consistent with the provider's beliefs and values?), complexity (how difficult is it to understand and implement the guideline?), trialability (can the provider test some or all of the recommendations with relative ease?), and observability (are there opportunities for the provider to observe the results of guideline implementation among respected peers?). One study validated these criteria in 23 trials and reported that trialability, observability, and low complexity were the three guideline characteristics associated with greater guideline adoption (87). This knowledge could be used to improve guideline development and dissemination strategies in conjunction with existing frameworks. For example, the Guidelines International Network, which represents 103 organizations from 47 countries, maintains a database of more than 6,100 guidelines and offers a Guideline for Guidelines that includes training materials (88). This group has also made available the Appraisal of Guidelines for Research and Evaluation (AGREE I and II) instruments for guideline evaluation (89). The GuideLine Implementability Appraisal (GLIA) instrument is also available for assessing the quality of guideline implementation.

CONCLUSIONS AND FUTURE DIRECTIONS

Clinical inertia is a major barrier to achieving optimal clinical outcomes among patients with a wide range of chronic diseases. CPGs are not without their limitations, and development and dissemination strategies could be improved by simplifying them and making them more accessible for trial purposes. In an effort to improve the effectiveness of provider-focused intervention strategies, we propose using an evidence-based framework that incorporates BCT that identifies what barriers to target and how to target them. The fact that most provider-focused interventions to date have not been inspired by any evidence-based BCT is a major limitation of current approaches. Adherence to CPGs by providers does not guarantee good outcomes. Strategies that engage patients in the treatment process are also important for overcoming clinical inertia, and we propose adopting an SDM model to optimize both patient and provider adherence to guideline-recommended therapies.

SUMMARY POINTS

1. Despite the widespread availability of CPGs and strong evidence supporting the benefits of their use, provider nonadherence to CPGs is prevalent in chronic diseases such as hypertension, diabetes, and dyslipidemia, with rates that exceed 50%.
2. True clinical inertia occurs when a patient fails to meet clearly defined and measurable treatment targets and their provider does not intensify treatment in accordance with guideline recommendations despite awareness of the guidelines, belief in their applicability, and available resources to do so.
3. Clinical inertia involves a complex interaction between organizational and system factors, patient factors, and provider factors, with their relative contributions at 20%, 30%, and 50%, respectively.
4. Provider-focused interventions to change clinical practice behavior have had modest success, but most often target one particular barrier: provider knowledge or awareness of CPGs.
5. Interventions designed to improve clinical inertia should be grounded in BCT and incorporate SDM and improved guideline development and dissemination.

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