

# Annex I

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## Behavioural mechanisms explaining adherence

### What every health professional should know

- 1. Introduction 135
- 2. The nature of poor adherence 136
- 3. Determinants of adherence 137
- 4. Models 139
- 5. Interventions 143
- 6. Conclusions 145
- 7. References 147

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#### 1. Introduction

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Optimal outcomes in population health require both efficacious treatments and adherence to those treatments. Whether the treatment involves taking medication properly, making and keeping health care appointments, or self-managing other behaviours that influence the onset, course or prognosis of an illness; all other things being equal, success is determined by adherence behaviour. Patients, health care providers, researchers, funders and policy-makers, all have an interest in ensuring that effective bio-medical and behavioural therapies for chronic illnesses are “used as prescribed”. However, empirical studies have consistently found that levels of compliance or adherence are often far from optimal (1,2). Because the burden of illness in the population has shifted toward chronic diseases, the problem of poor adherence is of major concern to all stakeholders in the health care system. This is because the risk of poor adherence increases with the duration and complexity of treatment regimens and both long duration and complex treatment are inherent to chronic illnesses.

Across diseases, adherence is the single most important modifiable factor that compromises treatment outcome. The best treatment can be rendered ineffective by poor adherence. Our perspective is that an understanding of basic behavioural principles and models of behavioural change is relevant to adherence to treatment for all chronic medical conditions, and more helpful than a disease-specific approach to the issue.

Behavioural science offers useful theories, models and strategies that support best-practice approaches to delivering treatment. The effectiveness of adherence interventions based on behavioural principles has been demonstrated in many therapeutic areas. Examples include hypertension (3), headache (4), AIDS (5), cancer (6), heart transplantation (7,8), chronic asthma (9,10), diabetes (11), high cholesterol (12), obesity (13) and sun-protection behaviours (14) among others. Recent research has also evaluated interventions aimed at maintaining adherence to treatments targeting substance abuse in pregnancy (15); alcohol abuse (16); opioid addictions and methadone maintenance (17,18); substance dependence (19); cocaine abuse (20), and tobacco smoking (21).

Decades of behavioural research and practice have yielded proven strategies for changing people's behaviour. Such strategies can be used to help patients with diverse medical conditions (22,23), and can also be effective in changing the behaviour of health care providers (24) and health care systems (25).

Epidemiological research concerning the prevalence and correlates of poor adherence to treatment, and research on adherence to treatment for specific diseases is presented in the main text of this report. In this annex, the following are discussed from a behavioural perspective:

- the nature of poor adherence;
- a practical approach to conceptualizing and defining adherence;
- models to help explain determinants of adherence; and
- guidelines for assessment and intervention in clinical practice.

## 2. The nature of poor adherence

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Treatment effectiveness is determined jointly by the efficacy of the treatment agent and the extent of adherence to the treatment. Despite the availability of efficacious interventions, nonadherence to treatment remains a problem across therapeutic areas.

Adherence is a complex behavioural process determined by several interacting factors. These include attributes of the patient, the patient's environment (which comprises social supports, characteristics of the health care system, functioning of the health care team, and the availability and accessibility of health care resources) and characteristics of the disease in question and its treatment.

There are many specific aspects of treatment to which a patient may not adhere, for example:

- health-seeking behaviours (such as appointment-keeping);
- obtaining inoculations;
- medication use (use of appropriate agents, correct dosing and timing, filling and refilling prescriptions, consistency of use, duration of use); and
- following protocols for changing behaviour (examples include modifying diet, increasing physical activity, quitting smoking, self-monitoring of symptoms, safe food handling, dental hygiene, safer sex behaviours and safer injection practices).

The most frequently cited conceptual definition of adherence is "the extent to which a person's behaviour – taking medication, following a diet, executing lifestyle changes – follows medical advice" (26). Adherence has also been defined as "the extent to which patient behaviour corresponds with recommendations from a health care provider" (27,28). It has also been suggested that a more practical approach is to define adherence as "following treatment at a level above which treatment goals are likely to be met". However, these broad definitions belie the complexity of the issue.

In research, adherence has been operationalized in many different ways: as the degree to which a regimen is followed expressed as a percentage or ratio, a categorical phenomenon (e.g. good versus poor adherence), or as an index score synthesizing multiple behaviours. However, for clinical purposes, these definitions lack specificity, and give no clear direction for assessment and intervention.

The treatments that patients are asked to follow vary according to the nature of the demands they impose. They range from requiring relatively simple and familiar behaviours, to more complex and novel ones. Some treatments involve one behaviour, while others carry multiple behavioural requirements. Protocols also vary in terms of the length of time for which they must be followed. This means that the nature and meaning of adherence change according to the specific treatment demands of a particular protocol. Assessment and intervention strategies will differ according to *the circumstances and/or intensity of the recommendations*. All treatments make demands of one type or another on patients. Patients differ in their ability to meet those demands, and the resources available and the environmental contexts outlined earlier also differ. Perhaps adherence might be better understood as reflecting the process of efforts, occurring over the course of an illness, to meet the treatment-related behavioural demands imposed by that illness. This behavioural conceptualization allows us to define adherence more explicitly according to the type of behaviour, an acceptable frequency, consistency, intensity and/or accuracy.

### 3. Determinants of adherence

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A considerable amount of empirical, descriptive, research has identified correlates and predictors of adherence and nonadherence. These include aspects of the complexity and duration of treatment, characteristics of the illness, iatrogenic effects of treatment, costs of treatment, characteristics of health service provision, interaction between practitioner and patient, and sociodemographic variables. Many of these variables are static, and may not be amenable to intervention. They have been well described in the main text of this report and will not be discussed further here. While such findings help to identify risk factors, they tend to be discrete and atheoretical, and not very helpful in guiding a clinical approach to this problem.

This section describes several important variables that are behavioural in nature and are also dynamic, and therefore amenable to intervention. First we identify key behaviours of health care providers, health system factors and attributes of patients. Then we discuss promising behavioural science theories and models that help to explain behavioural change. These serve as helpful heuristics both for understanding nonadherence and for addressing it.

#### A. Provider behaviours

Variables related to how health care providers interact and communicate with their patients are key determinants of adherence and patient health outcomes (4,6,17,29,30). The health care providers prescribe the medical regimen, interpret it, monitor clinical outcomes and provide feedback to patients (31).

Correlational studies have revealed positive relationships between adherence of patients to their treatment and provider communication styles characterized by, providing information, “positive talk” and asking patients specific questions about adherence (32). The clarity of diagnostic and treatment advice has been correlated with adherence to short-term but not to long-term regimens and chronic illnesses. Continuity of care (follow-up) is a positive correlate of adherence. Patients who view themselves as partners in the treatment process and who are actively engaged in the care process have better adherence behaviour and health outcomes (33). Warmth and empathy of the clinician emerge time and again as being central factors (34). Their patients of providers who share information, build partnerships, and provide emotional support have better outcomes than the patients of providers who do not interact in this manner (35). Patients who are satisfied with their provider and medical regimen adhere more dili-

gently to treatment recommendations (36). Findings such as these can guide providers to create a treatment relationship that reflects a partnership with their patients and supports the discussion of therapeutic options, the negotiation of the regimen and clear discussion of adherence.

Health care providers often try to supply information to patients and to motivate them, and recognize the importance of behavioural skills in improving health. However, there is evidence that, in practice, they give limited information (37), lack skills in motivational enhancement (38), and lack knowledge and experience frustration in teaching patients behavioural skills (39). More structured, thoughtful and sophisticated interactions between provider and patient are essential if improvements in adherence are to be realized.

## B. Health system factors

The health care delivery system has great potential to influence the adherence behaviour of patients. The policies and procedures of the health system itself control access to, and quality of, care. System variables include the availability and accessibility of services, support for education of patients, data collection and information management, provision of feedback to patients and health care providers, community supports available to patients, and the training provided to health service providers. Systems direct providers' schedules, dictate appointment lengths, allocate resources, set fee structures and establish organizational priorities. The functioning of the health system influences patients' behaviour in many ways.

- *Systems direct appointment length and duration of treatment*, and providers often report that their schedules allow insufficient time to address adherence behaviour adequately (40).
- *Health systems determine reimbursements and/or fee structures*, and many health systems lack financial coverage for patient counselling and education: this threatens or precludes many adherence-focused interventions.
- *Systems allocate resources* in ways that may result in heightened stress for, and increased demands upon, providers and that have, in turn, been associated with decreased patient adherence (41).
- *Systems determine continuity of care* and patients demonstrate better adherence when they receive care from the same provider over time (42).
- *Systems direct information sharing* – the ability of clinics and pharmacies to share information regarding patients' behaviour towards prescription refills has the potential to improve adherence.
- *Systems determine the level of communication with patients* – ongoing communication efforts (e.g. telephone contacts) that keep the patient engaged in health care may be the simplest and most cost-effective strategy for improving adherence (43).

## C. Patient attributes

Patient characteristics have been the focus of numerous investigations of adherence. However, age, sex, education, occupation, income, marital status, race, religion, ethnic background, and urban versus rural living have not been definitely associated with adherence (26,44). Similarly, the search for the stable personality traits of a typical nonadherent patient has been futile – there is no one pattern of patient characteristics predictive of nonadherence (34,42). With the exception of extreme disturbances of functioning and motivation, personality variables have not emerged as significant predictors. Recent studies of patients with mental health problems have provided evidence that depression and anxiety are pre-

dictive of adherence to medical recommendations (45–48). Almost everyone has difficulty adhering to medical recommendations, especially when the advice entails self-administered care.

Illness-relevant cognitions, perceptions of disease factors, and beliefs about treatment have stronger relationships to adherence. In particular, factors such as perceived susceptibility to illness, perceived severity of illness, self-efficacy and perceived control over health behaviours appear to be correlates (26,49). For adherence to occur, symptoms must be sufficiently severe to arouse the need for adherence, be perceived as being resolvable and acute, and remedial action must effect a rapid and noticeable reduction in symptoms (50).

Knowledge about an illness is not a correlate of nonadherence, but specific knowledge about elements of a medication regimen is, although apparently only for short-term, acute illnesses (51). Some of the above variables, and several others, form the basis of various theories and models of behaviour change and we now turn our attention to these.

## 4. Models

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Leventhal and Cameron (52) provided a very useful overview of the history of adherence research. They outlined five general theoretical perspectives on adherence:

- biomedical perspective;
- behavioural perspective;
- communication perspective;
- cognitive perspective; and
- self-regulatory perspective.

The **biomedical model of health and illness** remains a dominant perspective in many health care settings and organizations. The biomedical approach to adherence assumes that patients are more-or-less passive followers of their doctor's orders, further to a diagnosis and prescribed therapy (52,53). Non-adherence is understood in terms of characteristics of the patient (personality traits, sociodemographic background), and patient factors are seen as the targets of efforts to improve adherence. This approach has helped to elucidate the relationships between disease and treatment characteristics on the one hand, and adherence on the other. Technological innovations (e.g. assessing levels of adherence using biochemical measures, developing new devices to administer medications) have had this as their impetus. However, other important factors, such as patients' views about their symptoms or their medications have been largely ignored.

**Behavioural (learning) theory** emphasizes the importance of positive and negative reinforcement as a mechanism for influencing behaviour, and this has immediate relevance for adherence.

- The most basic, but powerful, principle is that of antecedents and consequences and their influence on behaviour (i.e. operant learning) (54,55).
- Antecedents, or preceding events, are internal (thoughts) or external (environmental cues) circumstances that elicit a behaviour.
- Consequences, or expected consequences, that can be conceptualized as rewards or punishments, also influence behaviour.
- The probability of a patient, provider, or health care system initiating or continuing a behaviour partially depends on what happens before and after the behaviour occurs.

- From a theoretical standpoint it would be possible to “control” the behaviour of patients, providers and health care systems if one could control the events preceding and following a specific behaviour. From a practical standpoint, behavioural principles can be used to design interventions that have the potential to incrementally shape behaviour at each level of influence (i.e. patient, provider and system) to address adherence problems.

**Communication perspectives** that emerged in the 1970s encouraged health care providers to try to improve their skills in communicating with their patients. This led to emphasis being placed on the importance of developing rapport, educating patients, employing good communication skills and stressing the desirability of a more equal relationship between patient and health professional. Although this approach has been shown to influence satisfaction with medical care, convincing data about its positive effects on compliance are scarce (56). Adopting a warm and kind style of interaction with a patient is necessary, but is insufficient in itself to effect changes in the adherence behaviours of patients.

Various models emphasizing **cognitive variables** and processes have been applied to adherence behaviour (53). Examples of these include the **health belief model** (57), **social-cognitive theory** (58), the **theory of planned behaviour** (and its precursor, the theory of reasoned action) (59), and the **protection-motivation theory** (60). Although these approaches have directed attention to the ways in which patients conceptualize health threats and appraise factors that may be barriers to, or facilitate, adherence they do not always address behavioural coping skills well.

**Self-regulation perspectives** attempt to integrate environmental variables and the cognitive responses of individuals to health threats into the self-regulatory model (61,62). The essence of the model pertains to the central importance of the cognitive conceptualization of a patient (or a patient-to-be (63) of a health threat or an illness. Illness representations (the ideas patients have about the diseases they suffer) and coping are seen as mediating between the health threat and the action taken. Recent empirical studies seem to lend support to the importance of illness cognitions in predicting adherence (64–66). Patients create personal representations of health threats and models of the illness and its treatment, and it is these that guide their decision-making and behaviour. Thus, adherence requires an appropriate model and the belief that one can manage one’s own environment and behaviour, specific coping skills, and a belief that the issue requires one’s attention and the modification of one’s behaviour.

Although these theories and models provide a conceptual framework for organizing thoughts about adherence and other health behaviours, each has its advantages and disadvantages and no single approach may be readily translated into a comprehensive understanding of, and intervention for, adherence. More recent approaches that are more specific to health behaviours and the demands of following recommended health practices may provide more helpful frameworks.

Meichenbaum and Turk (42) suggested that four interdependent factors operate on adherence behaviour and that a deficit in any one contributes to risk of nonadherence.

- knowledge and skills: about the health problem and self-regulation behaviours required, their mechanisms of action, and the importance of adherence;
- beliefs: perceived severity and susceptibility (relevance), self-efficacy, outcome expectations, and response costs;
- motivation: value and reinforcement, internal attribution of success (positive outcomes are reinforcing, negative results seen not as failure, but rather as an indication to reflect on and modify behaviour);
- action: stimulated by relevant cues, driven by information recall, evaluation and selection of behavioural options and available resources.

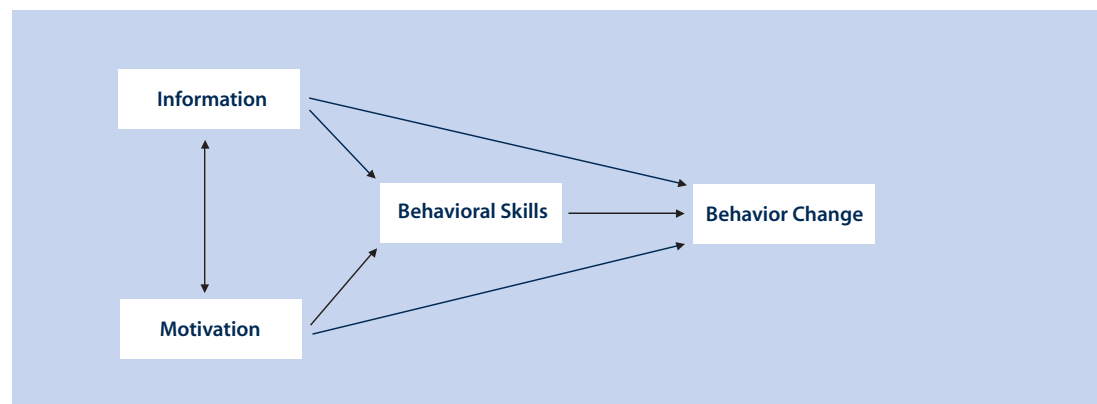
The recently developed **information–motivation–behavioural skills model (IMB model)** (67,68), borrowed elements from earlier work to construct a conceptually based, generalizable, and simple model to guide thinking about complex health behaviours. The IMB constructs, and how they pertain to patient adherence, are outlined below.

- Information is the basic knowledge about a medical condition that might include how the disease develops, its expected course and effective strategies for its management.
- Motivation encompasses personal attitudes towards the adherence behaviour, perceived social support for such behaviour, and the patients' subjective norm or perception of how others with this medical condition might behave.
- Behavioural skills include ensuring that the patient has the specific behavioural tools or strategies necessary to perform the adherence behaviour such as enlisting social support and other self-regulation strategies.

Note that information, motivation and behavioural skills must directly pertain to the desired behavioural outcome; they have to be specific.

Interventions based on this model have been effective in influencing behavioural change across a variety of clinical applications (67–69). In both prospective and correlational studies, the information, motivation and behavioural skills constructs have accounted for an average of 33% of the variance in behaviour change (68).

**Figure 1** Information-motivation-behavioural skills model



The IMB model demonstrates that information is a prerequisite for changing behaviour, but in itself is insufficient to achieve this change (70). Motivation and behavioural skills are critical determinants and are independent of behaviour change (67,68). Information and motivation work largely through behavioural skills to affect behaviour; however, when the behavioural skills are familiar or uncomplicated, information and motivation can have direct effects on behaviour (see diagram). In this case, a patient might fill a prescription (a simple, familiar behaviour) based on information given by the provider. The relationship between the information and motivation constructs is weak. In practical terms, a highly motivated person may have little information, or a highly informed person may have low motivation. However, in the IMB model, the presence of both information and motivation increase the likelihood of adherence.

The **stages-of-change model** (SOC – also referred to as the transtheoretical model) identifies five stages through which individuals progress as they change behaviours, and stage-matched strategies that predict progress to each subsequent stage of change (71,72). The stages of change are: precontemplation (not considering changing behaviour in the next 6 months), contemplation (considering changing behaviour in the next 6 months), preparation (planning to change behaviour during the next 30 days), action (currently changing behaviour) and maintenance (successful behaviour change for at least 6 months). Stages of change describe an individual's motivational readiness to change.

The SOC model is useful for understanding and predicting intentional behaviour change. Most patients at one time or another make unintentional errors in taking their medication because of forgetfulness or misunderstanding of instructions. However, *intentional* non-adherence is a significant problem, particularly among patients with conditions requiring long-term therapy such as asthma, hypertension and diabetes.

Stage of change is an indicator of an individual's motivation to change, and is a powerful predictor of behaviour (73–75), but variables that explain behavioural change are needed to develop actionable, effective strategies to help people change. The SOC model has proven useful in this regard because it utilizes key psychological constructs to characterize individuals at different levels of readiness for change. Some of these constructs are: decisional balance, temptation to relapse, and processes or strategies for change (76). These constructs are briefly summarized below.

**Decisional balance.** Decisional balance consists of the pros and cons of behaviour change. Longitudinal research has established a characteristic relationship between stage of change and the pros and cons (77,78). The pros of healthy behaviour are low in the early stages of change and increase as stage of change increases. Conversely, the cons of the healthy behaviour are high in the early stages of change and decrease as stage of change increases. The positive aspects of changing behaviour begin to outweigh the negative aspects of change late in the contemplation stage or early in the preparation stage. Scales measuring pros and cons are particularly useful when intervening with individuals in early stages of change (precontemplation, contemplation and preparation) because decisional balance is an excellent indicator of an individual's readiness to move out of the precontemplation stage (74,78,79).

**Temptation to relapse.** The degree of temptation associated with situations that present a challenge for maintaining behavioural change is a concept based upon the coping models of relapse and maintenance. Situational temptation to engage in unhealthy behaviour is often viewed as an important companion construct to measures of confidence or self-efficacy. Confidence and temptation function inversely across stages of change (80), and temptation predicts relapse better (81). Scores on temptation are generally highest in the precontemplation stage, decreasing linearly from the precontemplation to maintenance stages (81).

**Strategies for change.** The SOC model identifies specific strategies or processes of change that are associated with successful movement from one stage to the next. The strategies for change outlined in the SOC theory are based upon components of several theoretical models in behavioural science. Each of the strategies for change is categorized as either experiential or behavioural in nature (82). Experiential strategies reflect cognitive, evaluative and affective planning for change whereas behavioural strategies reflect observable change strategies such as using reminders or rewards (73).

Specific strategies for change are useful for intervening with individuals in particular stages of change; individuals who are thinking about change need different strategies from those who are actively involved in change.

Tailored interventions provide individualized information based upon a specific theoretical framework, demographic characteristics or a combination of variables. There is evidence that tailored communications are more effective for influencing health behaviours than non-tailored materials (83), and comparisons of stage-tailored versus non-tailored interventions have shown that tailoring resulted in increased efficacy in influencing health behaviours (84).



A recent review found that interventions to improve adherence to medication were more effective when they included multiple components such as more convenient care, information, counselling, reminders, self-monitoring, reinforcement or family therapy (43). SOC tailoring may be a useful strategy for implementing complex, multi-component interventions in a cost-effective manner. Identification of stage of change can help determine the most relevant intervention components for each person, thus eliminating the need to deliver all intervention components to all patients. The availability of valid measures to assess stage of change provides a foundation for the development of stage-matched interventions for the promotion of adherence to medication. Stage-tailored communication has been shown to be an effective method for changing health behaviour, but has yet to be applied to the problem of nonadherence with medication.

## 5. Interventions

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The “state-of-the-art” adherence interventions target the patient, the provider, and the health care system. Several programmes have demonstrated good results using multilevel team approaches (85–87). Adequate evidence exists to support the utility of innovative, modified health care system teams in addressing the problem (25,88).

However, research on interventions to promote adherence has focused largely on modifying patient behaviour. According to several published reviews on adherence, no single intervention targeting patient behaviour is effective, and the most promising methods of improving adherence behaviour use a combination of the strategies listed below (89–91):

- patient education (92);
- behavioural skills (93,94);
- self-rewards (95);
- social support (96); and
- telephone follow-up (97).

Various combinations of these techniques have been shown to increase adherence and improve treatment outcomes. However, even the most efficacious patient-focused interventions have no substantial effects on adherence behaviour over the long term (43) and few randomized controlled trials targeting patient adherence behaviour have been reported (91).

### A. Patient interventions

The most effective adherence-enhancing interventions directed at patients aim to enhance self-regulation or self-management capabilities. Self-management programmes offered to patients with chronic diseases can improve health status and reduce health care utilization and costs. Some data suggest a cost-to-savings ratio of 1:10 (98). Such approaches are grounded in basic principles of learning (99,100). This is critical in the management of patients with chronic illness, as over the long term patients must rely on unassisted effort and self-regulation to maintain their behaviour. Several strategies appear to be effective, at least in the short term. These include:

- self-monitoring;
- goal-setting;
- stimulus control;
- behavioural rehearsal;
- corrective feedback;

- behavioural contracting;
- commitment enhancement;
- creating social support;
- reinforcement; and
- relapse prevention.

Since the early 1980s there has been sufficient evidence to support the use of these strategies. These are most effective when used as components of multi-modal programmes and implemented in an individualized tailored manner, including creating social support, reorganization of the service-delivery environment, increasing accessibility of services, and a collaborative treatment relationship.

A meta-analysis of 28 studies revealed that the key intervention components were providing reinforcement for patients' efforts to change, providing feedback on progress, tailoring education to patients' needs and circumstances, teaching skills and providing access to resources, and continuity of care (proactive) (101). An earlier review, Garrity & Garrity (102) identified four intervention themes associated with successful outcomes: active patient theme (promote self-care), social support theme (help in meeting illness-related demands), fear arousal theme (increase concern about the consequences of the disease), and patient instruction theme. The self-care (contingency contracting element) and social support themes were associated with the strongest effects on treatment outcome.

There has been little research on the most effective methods for improving adherence to recommended treatment in children. Education alone does not promote the desired patient outcomes and the format of the educational programme may be less important than the actual presentation and understanding of the information (103). However, when behavioural strategies were used in conjunction with patient education, adherence to recommended treatment improved by an average of 25% (104). Multi-component behavioural strategies that have been found to be successful in promoting adherence include self-monitoring, contingency contracting, reinforcing, tailoring and cueing. In addition, individual rather than group educational sessions can be better adapted to the specific needs of a child and his or her family, and are therefore anticipated to have a greater impact on outcomes (105). There is a need for research to identify and test developmentally-appropriate interventions to remedy the problem of paediatric nonadherence and improve health care outcomes for children.

The need for research to further our understanding of the differences in adherence behaviour at different stages of development has been only partially met. While some progress has been made in understanding and modifying adherence among paediatric populations there remains much to be learned. The research to date has suffered from a lack of methodological rigour and attention to theoretically-based investigations, particularly the utilization of developmentally-based theory to guide adherence interventions. Children are not small adults; children and adolescents have specific needs that differ from those of their adult counterparts. Advances in the area of adherence will be dependent upon:

- designing and testing tools for objectively measuring adherence that are non-intrusive (e.g. electronic monitoring), and that children and adolescents are willing and able to use;
- addressing psychosocial and family factors that modify adherence in children and adolescents;
- designing and testing age- and disease-specific quality-of-life scales for children and adolescents; and
- designing and testing educational and behavioural strategies appropriate for children and adolescents.

The desired outcome is for practitioners to tailor scientifically-based adherence interventions to the developmental stage of the patient. As interdisciplinary expertise is brought to bear on developing scientifically-based policy for addressing the developmental aspects of adherence and managing care, the gaps in the understanding of nonadherence should begin to close.

## B. Interventions directed to providers

Because providers have such a significant role in adherence, designing interventions to influence their behaviour seems a reasonable strategy. However, few investigations on this subject have been reported in the literature. Training providers in patient-centred methods of care may be effective, but the strongest effects of such training appear to be on patient satisfaction with treatment. Some recent studies suggest that adherence interventions based on behavioural principles can be successfully implemented by social workers and nurses (106, 107). Studies of physicians trained to use goal-setting, feedback and ongoing education reveal better patient outcomes, though such studies have seldom measured adherence as an outcome.

## C. Health system

Interventions in the health system are higher order interventions affecting health policy; organization and financing of care and quality of care programmes. One example is the creation and adoption of chronic care models of service delivery, which, at least in patients with diabetes and asthma, have been shown to result in better patient outcomes. However the extent to which these models are related to adherence is not yet clear.

## 6. Conclusions

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Nonadherence to treatment is a problem of increasing concern to all stakeholders in the health system. Since the early 1970s, the extent and consequences of poor adherence have been well documented in terms of impact on population health and health expenditure. Poor adherence limits the potential of efficacious treatments to improve patients' health and quality of life. This is a particular problem in the context of the chronic conditions that currently dominate the burden of illness in our society. Across health disciplines, providers experience considerable frustration over the high proportion of their patients who fail to follow treatment recommendations.

Adherence is a behavioural problem observed in patients, but with causes beyond the patient. It occurs in the context of treatment-related demands that the patient must attempt to cope with. These demands are characterized by the requirement to learn new behaviours, alter daily routines, tolerate discomforts and inconveniences, and persist in doing so while trying to function effectively in their various life-roles (108–110). While there is no behavioural magic bullet, there is substantial evidence identifying effective strategies for changing behaviour.

Practitioners (and other health enablers) often assume that the patient is, or should be, motivated by his or her illness to follow a treatment protocol. However, recent research in the behavioural sciences reveals this assumption to be erroneous. In fact, the patient population can be segmented according to level-of-readiness to follow health recommendations. The lack of concordance between patient readiness and practitioner behaviour means that treatments are frequently offered to patients who are not ready to follow them. This reflects an understandable bias towards treating the biomedical problem and an under-emphasis on addressing the behavioural requirements of the treatment protocol.

Prochaska (71) argued that people move through stages of increasing readiness to follow recommendations as they develop the motivation and skills required to change their behaviour. The SOC model provides a sensible and clear framework upon which to tailor treatment to patients' needs, and organize the delivery of the range of cognitive and behavioural interventions that are supported by the evidence

base. Miller and Rollnick (111) noted that motivation to adhere to treatment is influenced by the value that a person places on following the regimen (cost–benefit ratio) and their degree of confidence in being able to follow it. If either the perceived value of adhering, or confidence, is low the likelihood of adherence will also be low.

First-line interventions to optimize adherence can go beyond the provision of advice. Building on a patient’s intrinsic motivation by increasing the perceived importance of adherence, and strengthening confidence by intervening at the level of self-management skills are behavioural treatment targets that must be addressed concurrently with biomedical ones if overall effectiveness of treatment is to be improved. This approach offers a way of increasing the sophistication of the adherence interventions offered to patients. Pharmacists, case managers, health educators and others involved in patient care should be made familiar with these basic concepts. Non-physician providers have an important role to play and an opportunity to dramatically improve health by specifically targeting issues of patient adherence.

In every situation in which patients are required to administer their own treatment, nonadherence is likely. Consequently, the risk for nonadherence for all patients should be assessed as part of the treatment-planning process and their adherence should be monitored as part of treatment follow-up. The traditional approach has been to wait to identify those patients who demonstrate nonadherence and then try to “fix” the problem. The risk for nonadherence is ever present. Interventions based on non-adherence risk-stratification should be offered from the start, as opposed to using a stepped-care approach.

Poor adherence persists largely because it is a complex problem and is resistant to generic approaches to dealing with it. Adherence-promoting interventions are not consistently implemented in practice; practitioners report lack of time, lack of knowledge, lack of incentives and lack of feedback on performance as barriers. Clearly, non-adherence is not simply a “patient” problem. At the points of initial contact and follow-up, providers can have a significant impact by assessing risk and delivering interventions to optimize adherence. To make this way of practice a reality, practitioners must have access to specific training in adherence management, and the systems in which they work must design and support delivery systems that respect this objective. Health care providers can learn to assess the potential for nonadherence, and to detect it in their patients. They can then use this information to implement brief interventions to encourage and support progress towards adherence.

Interventions aimed at particular diseases need to target the most influential and core determinants among the various factors. Given available resources, these targets will invariably be the patient and provider, at least in the immediate term. Disease-specific protocols for patients can be tailored to their needs. Practitioner protocols can convey the key requirements for the creation of optimal treatment relationships and behaviour assessment and management skills. Beyond this, the system in which providers work must be organized in such a way as to enable a consistent and systematic focus on adherence. A major focus for future research should be the clarification of the best mode, or modes, of delivering adherence interventions. There are many points of contact with patients and times at which such interventions are required, and delivering them outside the traditional health system may enhance their overall effectiveness.

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