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Treatment adherence

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Abstract

Angela has been spending a fair bit of time with Sam in recent months. She is a 29-year-old single mother with one child. She studies part-time at the local university and has managed to maintain acceptable grades. She has bipolar disorder that has been well managed with medication, in different combinations at different points in her illness. However, over the last month she has intermittently missed doses and is consequently becoming unwell. It is puzzling that she is missing doses because she is very attached to her child and last time she stopped medication her daughter was placed in care. The following information was obtained from her in order to undertake a functional analysis. Financially, Angela was managing well on her supporting parent benefit and the maintenance paid by the father of her child. However, her former partner was sent to jail 3 months ago and the maintenance money he was sending her dried up. As a consequence, she started falling behind in some bills about 8 weeks ago. She has told you that this worries her. On top of this, her daughter started experiencing stomach aches last week and is cranky most of the time. Angela has said that she thinks that her daughter may be lactose intolerant and believes that her local GP did not take her concerns about her daughter's distress seriously enough when she took her to see him 10 days ago. Since becoming involved with Sam, Angela has struggled to keep a routine for her and her daughter and she says she forgets her medication from time to time. Sometimes Angela loses interest in sex and she thinks that her medication might reduce her libido. Angela has never received much help from her family because they don't agree with her diagnosis. Her father says that she is just an attention getter and that she puts it on. He says that is why she cut herself when she was a teenager. Her father states that if she just stopped 'boozing' she wouldn't be so down and need the medication. Angela disagrees, stating that she has been drinking to help her sleep for years and is drinking no more or less now. Nonetheless, Angela has tried to cut down on her alcohol use over the last month and this has interfered with her sleep.

Keywords

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Disciplines

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Enhancing Adherence to Medications

Mitchell K. Byrne

'Keep a watch also on the faults of the patients, which often make them lie about the taking of things prescribed' – Hippocrates of Cos, circa 400BC

Chapter Overview

Medication is an essential tool in the clinician's armamentarium yet it is estimated that 50% of patients with a chronic health condition fail to adhere to prescribed treatments. This chapter outlines what we mean by adherence and the implications of nonadherence in chronic health conditions. Difficulties in measuring adherence are discussed, followed by a brief review of theoretical models used to explain nonadherence. The chapter concludes with a discussion of the major practical issues that affect patient adherence and strategies for clinical intervention.

Defining Adherence

Adherence to treatment has been defined as 'the extent to which patients follow the instructions they are given for prescribed treatments' (Haynes, et al., 2005, p 2). Within this definition it is possible to recognise four types of adherence behaviour: Adoption, Consistency, Amount, and Cessation (Martin, Bowen, Dunbar-Jacob, & Peri, 2000). Adoption reflects the number of prescriptions filled for the patient. Consistency relates to how reliably the patient takes their medication on a day-to-day basis over a specified period of time and picks up on fluctuations in medication taking behaviour. Amount refers to medication taken over a cumulative period. 'Amount' of adherence can reflect great variations in behaviour in that the patient may accumulate a near normal dose of medication, while varying widely (both over and under dose) on a daily basis. Finally, cessation of medication or 'dropout' can reflect permanently or temporarily stopping medication taking.

Adherence and nonadherence are not seen as polar phenomenon. Rather, adherence exists on a continuum from completely adherent, through levels of partial adherence, to not taking medication at all (Aslani & du Pasquier, 2002). In addition, both the *form* and *intentionality* of nonadherence may vary. For example, exceeding recommended doses or consuming medications in a single dose rather than spread across the day may be seen as nonadherence. Further, patients may vary on the degree of intentionality with respect to nonadherence, with some patients *intending* to take their medication as prescribed but failing to do so (due, for example, to forgetting) and others *intending* (consciously deciding) not to take their medication as prescribed (Aslani & du Pasquier, 2002).

Nonadherence in Chronic Illness

Within conventional medicine, the use of pharmacotherapy remains an essential feature of clinical practice. However, medications are only effective if they are appropriately used by patients. High rates of nonadherence have been observed in

conditions as diverse as glaucoma (Kowing, Messer, Slagle & Wasik, 2010), hypertension (Pladevall et al., 2010) and asthma (Park et al., 2010) and is as much a problem for children and adolescents as it is for adults (Dean, Walters and Hall, 2010). Across chronic medical conditions, nonadherence to prescribed medicines accounts for a significant proportion of treatment failure (Balkrishnan, 2005) and is associated with increased emergency department visits and hospitalisations (Sokol et al., 2005; Patel & Zed, 2002). Poor adherence is found in preventative medicine as well as acute and chronic health care regimens (Dunbar-Jacob, 1993) and remains a key predictor of relapse in major mental health disorders (Ascher-Svanum et al., 2006). Generally, adherence rates for prescribed medicines average 50% (Cutler & Everett, 2010; WHO, 2003) and may cost as much as US\$300 billion annually (Balkrishnan & Jayawant, 2007).

Difficulties with adherence are pronounced in older patients who are more likely to experience chronic health problems, with between 70% and 80% of persons over the age of 65 taking at least one prescription medicine (Kaufman, Kelly, Rosenberg, Anderson & Mitchell, 2002). Older patients often have additional impediments to their adherence, such as physical and cognitive changes, which necessitate individually designed or tailored treatment programs (Ruppar, Conn & Russell, 2008). The success of efforts to promote self management of chronic health conditions needs to also consider to whom the patient attributes responsibility for their health care, which may not always be 'the self' (Audulv, Asplund & Norbergh, 2010).

Measuring Adherence

The measurement of adherence, particularly in clinical, ecologically valid studies, remains a major challenge in adherence research. It is generally agreed that there is no recognised 'best method' for assessing adherence (Byerly et al., 2007). Estimates of adherence by prescribing physicians have been found to be inaccurate (Roth & Caron, 1978) as have pill counts (Morisky, Green & Levine, 1989). Physiological measures often reflect only recent medication taking behaviour (Urquhart, 1994). The most advanced method of medication monitoring to date – the Medication Events Monitoring System ([MEMS®], Apex Corporation, Fremont, CA) – involves an electronic record of each occasion the top of a medicine container is opened. However, this does not provide information about whether the medication is actually taken (Svarstad, Chewning, Sleath & Claesson, 1999).

The measurement of adherence can be broadly ascribed to two categories of activity: objective measures of medication-taking, such as pill counts and electronic monitoring; and subjective measures of medication use, such as clinician ratings or patient questionnaire (Sajatovic, Velligan, Weiden, Valenstein & Ogedegbe, 2010). Adherence may also be predicted by patient attitudes and beliefs as they relate to treatment (Byrne, Deane & Caputi, 2008) or from their level of insight into their need for treatment (Byrne & Deane, *in press*). While there appears to be no superior method to gain an exact measurement of medication adherence, self-report measures, particularly questionnaires, are the most efficient and cost effective method of

assessing medication adherence (Thompson Kulkarni & Sergejew, 2000). Given that one of the goals of adherence measurement is to identify opportunities for the enhancement of adherence behaviour, self report measures which include attitude and belief dimensions, such as the Beliefs about Medicines Questionnaire (BMQ – Horne, Weinman, & Hankins, 1999), may be particularly useful (Sajatovic et al., 2010).

In addition to measures which identify current adherence behaviour, several recent measures have emerged which seek to predict which patients are likely to experience difficulties with adherence to treatment. For example, the ASK-20 Adherence Barrier Survey (Hahn et al., 2008; Matza et al., 2008) has proven useful in identifying barriers to adherence across a range of chronic health conditions, including asthma, depression, diabetes and congestive heart failure. Similarly, McHorney (2009) has developed the Adherence Estimator, a three-item screening instrument which enables healthcare providers to identify the propensity to adhere to medication among patients with chronic illness. Finally, Byrne and his colleagues have developed a behavioural rating scale which can be used to predict inpatient engagement with medications among psychiatric patients (Byrne, Deane, Willis, Hawkins & Quinn, 2009).

Ultimately, the choice of the measure of adherence should be based not only on its psychometric properties, but also on its utility with respect to the researcher or clinicians goals (Farmer, 1999). In general, it is best that measures of adherence employ a continuous scale so that variations in levels of adherence can be assessed (Balkrishnan & Jayawant, 2007). Given that self-report as a single measure of adherence has unacceptably low sensitivity (Stewart, 1987), when using self report measures it is preferable to combine them with other sources of data or related domains such as clinician reports or patient attitudes (Svarstad et al., 1999). This might include not only multiple patient based measures, but also the ratings of clinicians, which have been shown to broadly concur with patient ratings (Kampman Lehtinen, & Lassila, 2001).

Explaining Nonadherence

The causes of nonadherence are multifaceted, but most explanatory models of adherence behaviour focus on the individual patient (Dunbar-Jacob, 1993). It has been observed that there is no consequence of nonadherence that is severe enough to ensure that all patients will adhere to treatment (Cramer & Rosenheck, 1998). Patient behaviour sometimes defies logic and common sense, however Health Psychology has provided a range of models of which can be used explain adherence behaviour. Among these, three specific models, collectively referred to as ‘Social Cognition Models’, seem pre-eminent: The Health Beliefs Model (HBM: Strecher, Champion, & Rosenstock, 1997); the Theory of Planned Behaviour (Ajzen & Fishbein, 2005); and the Self Regulation Model (SRM – Leventhal, Leventhal & Contrada, 1998).

Health Beliefs Model (HBM)

The HBM proposes that adherence is the result of an individual's cost-benefit analysis of adherence behaviour. Further, the HBM suggests that four beliefs contribute to a person's adherence behaviour: what benefits they see arising from adherence ('benefits', such as reduced symptoms); what barriers they anticipate to adherence ('costs', for example, side effects); perceived vulnerability to the illness ('susceptibility', such as the extent to which they believe that they might relapse); and perceived severity of the outcome ('severity', i.e. how bad they appraise an illness incident would be). Higher adherence is expected when the person sees themselves as more susceptible to illness, the more severe they appraise the consequences of the illness, the greater the expected treatment benefits and the lower the assessed barriers to adherence (relative to benefit). These beliefs are influenced by other variables such as the individual's personality, the opinion of others and their previous experiences.

Theory of Planned Behaviour (TpB)

The fundamental premise of the TpB is that an individual's behaviour may be predicted by their intentions. The intention to perform a behaviour is a function of the person's attitude toward the behaviour (expected value), his/her subjective norm in relation to the behaviour, and the individual's perceived ability to perform the behaviour, termed 'behavioural control'. While the TpB assumes that an individual's intention to behave in a given fashion is directly related to their beliefs about engaging in the behaviour, there is no assumption that *beliefs* are accurate; they may be biased or irrational. Once beliefs have been formed, behaviour specific attitudes are developed in relation to the specific behaviour, appraisals of social norms about the behaviour and perceptions regarding control or ability to perform the behaviour. Intentions to engage in the behaviour are seen to follow on from these attitudes in a consistent manner.

Self Regulation Model

According to the SRM, patients' responses to illness are a function of their evaluation of the illness based on their own knowledge and perceptions. Central to the process of responding is the recognition that *illness* (the experience of being unwell) is different to *disease* (a condition involving diagnosed pathology). Illness is a subjective experience that may or may not be associated with physical pathology (disease). When faced with a health threat (being told that one has an illness), the individual must construct a personal representation of the illness. Illness representations consist of the patient's own 'common sense' beliefs about their illness. This 'cognitive' level of illness representation is paralleled by the generation and processing of concomitant emotional responses.

In seeking to understand nonadherence (and therefore intervene to enhance adherence), Social Cognition Models have identified a range of variables that relate to the individual. These variables, and the implications for intervention, are detailed in Table 1.

Table 1: Variables Affecting Adherence Derived from Social Cognition Models*

Variable	Implication	Model
Perceived Benefit	Psycho education, motivational strategies, strategies to enhance ‘insight’ (eg. Cognitive therapy)	HBM
Perceived Costs	Motivational strategies, problem solving skills	HBM
Perceived Vulnerability	Strategies to enhance insight, psycho education	HBM
Perceived Severity	Psycho education, motivational strategies	HBM
Beliefs & Attitudes	Psycho education, strategies to enhance ‘insight’ or challenge irrational beliefs (such as cognitive therapy)	TpB
Normative appraisal of others beliefs	Enhancement of alignment with pro-adherence others (therapeutic alliance with clinician), involvement of carers, de-stigmatising mental ill-health (normalising strategies),	TpB
Behavioural control/self-efficacy	Problem solving strategies, motivational strategies, behavioural strategies (such as ‘behavioural tailoring’)	TpB
Recognition and Representation of illness	Psycho education, strategies to enhance ‘insight’, motivational strategies	SRM

* The interventions listed under “Implications” are described below.

Causes of Nonadherence

Patient factors alone do not fully explain why an individual does or does not adhere to treatment. Generally, four categories are used to capture the variables contributing to treatment adherence. These include factors associated with the treatment (such as complexity); factors associated with the clinician (such as skill); factors associated with the patient (such as insight); and factors associated with the relationship between clinician and therapist (McDonald, Garg & Haynes, 2002). These variables usually overlap (Meichenbaum & Turk, 1987), but their influences will be reviewed separately.

Treatment Factors

Treatment factors incorporate a broad range of variables from characteristics of the treatment setting through to the clarity of the prescriber’s instructions (Meichenbaum & Turk, 1987). More than 35 years ago, Kasl (1975) asserted that knowledge of the treatment regime can, in and of itself, provide information about the likelihood of adherence. For example, the more complex the medication regimen, the more likely it is that the patient will not adhere. Polypharmacy has been cited as an issue in adherence across chronic health conditions (DiMatteo, 2004). Simplifying medication regimens has proven effective in enhancing adherence in a range of chronic health

disorders, such as glaucoma (Robin, Novack, Covert, Crocket & Marcic, 2007) and AIDS (Battaglioli-DeNero, 2007). It has been suggested that increasing from as few as one to two doses per day is enough to affect adherence (MacKean & Elkington, 1983).

There is also substantial research on the influence of side effects on adherence. Side effects are generally considered an issue across chronic health conditions (e.g. heart failure – Wu, Moser, Lennie & Burkhart, 2008; blood pressure – Elliott, 2008; and cancer – Faiman, 2007) and have received considerable attention in the management of severe mental illness (Hamer & Haddad, 2007). While it is generally accepted that negative side effects can reduce patient adherence and should be managed by the clinician (Weinmann, Janssen & Gaebel, 2005), clinicians often over estimate the extent to which side effects influence individual adherence decisions. Side effects are a relatively uncommon reason reported by patients for nonadherence (Cooper et al., 2007) and are not a consistent predictor of adherence in research studies (Lacro et al., 2002).

Other ‘treatment’ related issues that influence adherence include accessibility, which refers to how easy it is to get the medications. Issues such as difficulty travelling to the pharmacy or doctor and not having sufficient funds to purchase the medications are examples of accessibility barriers to adherence. Finally, a commonly reported finding in chronic illness is that when patients are asymptomatic, they waiver in their adherence to treatment. This is often explained in terms of the difficulty relating treatment to illness when no symptoms are apparent or where symptoms are not ego-dystonic. Cardiovascular disease is a good example of chronic illnesses where symptoms may not be detected by patients and where nonadherence to medications is a major challenge (Munger, Van Tassell & LaFleur, 2007).

Patient Factors

There is a substantial literature on patient related factors associated with adherence. This is in part due to the tendency of health researchers to focus on patient-centred reasons for nonadherence (Dunbar-Jacob, 1993), and because the models of health related behaviour, such as those reviewed above, focus on aspects of the individual. A consistent finding in the literature is an association between poor medication adherence and co-morbid substance abuse (Janssen et al., 2006). This is particularly a problem in severe mental health disorders, where up to 50% of patients diagnosed with schizophrenia meet criteria for a co-morbid diagnosis of substance abuse disorder (Hunt, Bergen & Bashir, 2002).

Another patient related factor associated with poor adherence has been lack of insight into illness (McEvoy, 1998). Insight is a term associated with various meanings, both medical and non-medical. However, most definitions relate to an individual’s ‘understanding’ of a given situation. While much of the research into insight has focussed on mental health (Amador et al., 1994), lack of insight into the need to

maintain treatment in order to maintain health is not confined to patients with psychotic illnesses. For example, Shaw (2005) observes that glaucoma patients often need to be convinced that there is something wrong with them before they will adhere to preventative treatments.

Poor insight has been associated with reduced help seeking behaviour, dangerousness to self and others, reduced treatment adherence and a generally poorer prognosis (Yen, Yeh, Chen, & Chung, 2002). Most frequently, it is the patient's absence of an understanding that there is a need for treatment that predicts nonadherence in chronic illness (Buckley, Wirshing, Bhushan, Pierre, & Wirshing, 2007). Insight problems are likely to influence attitudes to treatment and the interplay of attitude and insight is important given the association between attitudes toward medication and medication adherence.

Attitude to Medication

Attitude to health behaviours have been central in Social Cognition Models (see above) and thus are salient patient factors in relation to adherence behaviour. Patients' cognitions (beliefs and attitudes) can have a profound affect on treatment outcomes – directly through placebo (expectation that a substance or treatment will help when in fact it is inert) and nocebo (expectation that a substance or treatment will cause harm when in fact it is inert) effects and indirectly through their influence on patient behaviour (Horne, 2006). Clinicians should not assume that they share similar beliefs about medications with their patients (Ramström, Afandi, Elofsson, & Petersson, 2006). Patients hold complex beliefs about medicines and their failure to take medications may be the result of 'misguided' beliefs (Grunfeld, Hunter, Sikka & Mittal, 2005).

Cognitive Skills

Cognitive skills refer to a range of memory and executive functions that allow humans to undertake complex behaviours. This includes planning a sequence of tasks, overcoming unanticipated obstacles and remembering to do things. Cognitive functioning can be affected by dementia, intellectual disability, substance misuse or the aspects of mental disorders, such as concentration and memory in depression or schizophrenia, (Neufeld, 2007). Cognitive skills deficits enhance the likelihood of nonadherence to treatment (Wallace, Dyer & Penrod, 2006) and such deficits have been attributed to nonadherence in a range of samples and disorders (for example, older adults – Mackin & Arean, 2007; chronic heart failure patients – Callegari et al., 2002; and patients with HIV – Waldrop-Valverde et al., 2006).

Motivation

A frequently cited factor in health behaviour change is the importance of 'patient motivation' (Rollnick, Mason, & Butler, 2000) with motivation being found to be directly related to treatment adherence (Brondolo & Mas, 2001). Motivation has often mistakenly been seen as a trait or characterological feature of a person. However, it is

generally accepted that motivation is more accurately construed as a state or situational disposition, affected by interpersonal processes and amenable to change (Miller & Rollnick, 2002). The improvement of motivation, through specific motivational enhancement techniques such as Motivational Interviewing, has contributed to enhanced treatment adherence in a range of studies (Bisonó, Manuel & Forchimes, 2006), supporting the contention that motivation is an influential factor in treatment adherence.

Clinician Factors

While patient adherence to prescribed treatments may be influenced by clinician interventions (Petrilla, Benner, Battleman, Tierce & Hazard, 2005), not all clinicians actively try to enhance patient adherence using research driven methodologies (Ramström et al., 2006; Weinmann et al., 2005; Faris & Schopflocher, 1999; Stern et al., 1999). Given that medication remains an essential component of treatment of chronic health disorders, it could be asserted that effective implementation of 'adherence therapies' would be a core activity of health clinicians. Why this is not so may be due to a multitude of clinician-based factors, including the clinician's own competencies, attitudes and resources (Byrne, Deane & Coombs, 2005). For example, positive, or at least non-stigmatising attitudes towards patients are essential for the development of effective clinician-patient relationships (Buchanan, Rohr, Stevak, & Sai, 2007). However, there is no guarantee that clinicians in training hold appropriate attitudes toward patients, nor that they develop them as a consequence of their training relationships (Buchanan et al., 2007). If the clinician's attitudes to medication are negative, it is likely that their ability to work effectively with patients to facilitate medication adherence would be compromised.

Clinicians' beliefs about their own adequacy have also been shown to influence intended engagement in specific professional behaviours. For example, mental health clinicians engagement in adherence interventions (Byrne et al, 2008), pharmacists delivery of medication advice and support (Farris & Schopflocher, 1999), paediatric providers (paediatricians and nurse-practitioners) screening of risky adolescent behaviours (Ozer et al., 2004), and the response by health care providers to domestic violence victims (Gadomski, Wolff, Trip, Lewis, & Short, 2001) are diverse examples where efficacy beliefs either increased or decreased the given behaviour.

Brawley and Culos-Reed (2000) observe that self-efficacy beliefs are not traits of the individual but are sets of beliefs about specific areas of functioning. Self-efficacy does not relate to a quantum of skills but rather utility of possessed skills in a given situation. Self-efficacy can be enhanced through mastery experiences, but in the absence of adequate knowledge and skills training experiences, self-efficacy for a given behaviour can be expected to be low, reducing the likelihood of the clinician engaging in the desired behaviour. Thus, attention to the needs of the clinician may be as important as the focus on the patient when seeking to improve engagement in treatment.

Relationship Factors

Collaborative therapeutic relationships are essential in enhancing adherence (Sajatovic et al., 2005) and there is broad acceptance that the nature of the therapeutic relationship between the treating clinician and the patient has an important impact upon the outcomes of treatment (Ackerman & Hilsenroth, 2003; Horvath & Bedi, 2002) and may even serve as a predictor of treatment outcome (Howgego, Yellowlees, Owen, Meldrum, & Dark, 2003). The therapeutic relationship between clinician and patient has been referred to as the '*therapeutic alliance*'. Both the behaviour of the clinician in session (Binder & Strupp, 1997) and the clinician's attitudes and expectations influence the development and maintenance of the therapeutic alliance (Brossart, Willson, Patton, Kivlighan, & Multon, 1998). This perspective emphasises the importance of non-specific features of therapy (i.e. those unrelated to technique) as well as the need to facilitate clinician behaviours that promote the alliance and clinician attitudes that sustain it.

Skilled use of specific activities within the therapy session may enhance the likelihood of developing a strong therapeutic alliance. For example, significant correlations have been found between poor alliance and the clinician's failure to structure the session (such as through the use of an agenda), address patient resistance (for example by using techniques derived from motivational interviewing), adopting an inflexible stance (lacking a collaborative framework for intervention) and using destructive interventions (based on coercion) (Eaton, Abeles & Gutfreund, 1993). Clinicians' attributes and behaviours that *positively* affect the alliance, include the ability to convey to the patient an adequate level of competence (with demonstrable self-confidence), to be responsive and empathic, and to be flexible (Ackerman & Hilsenroth, 2003). Furthermore, clinicians' behaviours such as exploration, reflection and attending to the patient's past experiences also supported the establishment of the alliance. Overall, collaborative clinician activities are usually associated with the deepening of the therapeutic alliance (Ackerman & Hilsenroth, 2003)

Strategies for the Enhancement of Adherence

The range of adherence interventions that have been reported in the literature fall broadly into three classes or approaches: psycho educational approaches; behavioural strategies; and cognitive-behavioural interventions.

Psycho-educational Approaches

There is good reason to believe that enhanced patient knowledge about medications can play an important role in adherence, especially where the patient holds negative beliefs about treatment (Fernandez, Evans, Griffiths & Mostacchi, 2006). Knowledge can enhance insight, the patient's appreciation of the relationship between symptoms and illness, treatment and recovery and thus improve motivation to adhere to treatment.

The most successful psycho educational interventions are those that target both behavioural and attitudinal change. This has been demonstrated by the failure of numerous studies to effect significant changes in adherence or clinical functioning using psycho-education alone (for example Mundt, Clarke, Burroughs, Brennan, & Griest, 2001). One domain that has recognised the importance of behavioural and attitudinal variables in the success of psycho educational strategies is that of 'health literacy'. Health literacy refers to the extent to which individuals have the capacity to obtain, process, and understand health information and services such that they are able to make appropriate health decisions (Rawson et al., 2009). Lower rates health literacy are associated with generally poorer health status, lower use of preventative and screening health services, increased hospitalisation, lower adherence to treatment and reduced self-management of chronic illness (DeWalt, Berkman, Sheridan, Lohr & Pignone, 2004). According to Jorm and colleagues (1997), mental health literacy comprises six facets:

1. Recognition of disorder
2. Knowledge and beliefs about causes
3. Knowledge and beliefs about self help
4. Knowledge and beliefs about professional help
5. Attitudes that facilitate recognition and help-seeking, and
6. Knowledge of how to seek information

Clearly in this model, attitudinal variables play an important role in a psycho-educational model. Furthermore, both recognition of disorder and knowledge and beliefs about causes seem associated with insight, for which perhaps additional (cognitive behavioural) interventions may be necessary in order to maximise the benefits of psycho-educational strategies.

Behavioural Interventions

Treatment complexity has long been identified as a source of patient nonadherence (Haynes, 1976). It is well known that patients with problems in 'executive function', principally due to deficits in the frontal structures, particularly the pre-frontal cortex, experience difficulties with attention, memory, abstraction and planning (Falloon, Barbieri, Boggian & Lamonaca, 2007). Executive function deficits may be apparent in patients who are elderly, intellectually disabled, or who have chronic and severe mental health problems (such as depression and psychotic disorders). Given that different patients will have different levels of cognitive functioning (and therefore capacity to tolerate complex treatment regimes), a range of behavioural strategies have emerged to assist patients to overcome their 'functional' barriers to adherence. Unlike psycho-educational interventions, behavioural interventions are often tailored specifically to the needs of the individual patient, thus increasing treatment specificity.

One of the core strategies in behavioural self-management is the use of problem solving techniques (Chang & D’Zurilla, 1996). Problem solving training has proven useful and effective for both the treatment and prevention of a wide variety of clinical problems (Falloon et al., 2007). Problem solving interventions aim to change both the individual’s ‘problem orientation’ as well as the individual’s skills at solving problems. Problem orientation refers to the extent to which the individual perceives everyday life problems as ‘solvable’ and how capable they feel at initiating problem solving strategies (self-efficacy). A particular strength of a problem solving approach is that it is amenable to the use of worksheets and templates, enabling the individual to experience self-efficacy and empowerment in the implementation of problem solving strategies.

Across chronic health conditions, problem solving strategies hold additional benefits relevant to the enhancement of adherence, such as improving readiness to recognise problems (motivation), the normalisation of the experience of “problems” in life and the development of skills in attributing causes of problems accurately (Chang, Downey, & Salata, 2004). The process of problem solving also enhances the perception of problems as challenges as opposed to catastrophes or situations to avoid and offers the patient an opportunity to improve self-efficacy.

Cognitive Behavioural Interventions

Many aspects of Cognitive Behavioural Therapies (CBT) have been incorporated into adherence interventions. Cognitive therapy (Beck, 1964; Beck, 1995) is based on the precept that all psychological disorders involve the generation of dysfunctional or distorted thoughts and it is these thoughts which influence mood and behaviour. Cognitive-behavioural interventions to improve adherence aim to get patients actively involved in their treatment and seek to work with patients to investigate the range of factors that might influence medication-taking behaviour (Gray, Wykes & Gournay, 2002). Given the apparent benefits of CBT, cognitive and behavioural approaches have formed the basis of most contemporary adherence programs such as Compliance Therapy (Kemp et al, 1996; 1998), Medication Management (Gray, Wykes, Edmonds, Leese, & Gournay, 2004) and more recently, Medication Alliance (Byrne, Deane, Lambert & Coombs, 2004; Byrne & Deane, *in press*).

Motivational Interviewing (MI – Miller & Rollnick, 2002), which has been incorporated into most CBT based interventions, is a directive counselling style that is patient-centred and collaborative. The core strategy in MI is to assist the patient to understand their reasons for and against a change in behaviour and to make decisions about change that are intrinsically motivated. It is patient-centred as the focus is the concerns and perspectives of the patient, rather than the clinician. While the ‘therapy’ may be directive, the term ‘interviewing’ is used to capture the process of listening and strategic questioning rather than ‘teaching’ the patient.

MI emphasises a partnership relationship between the clinician and the patient and seeks to elicit behaviour change within the patient by assisting them to explore and resolve ambivalence. Furthermore, MI stresses the importance of supporting the patient to generate arguments for change rather than reliance upon the clinician to generate such information. Essentially, MI draws upon the idea that if a person can talk themselves out of change, they may also talk themselves into change.

The process of MI involves the identification of the patient's goals and values and an awareness in the patient of the discrepancies between current behaviour, (such as nonadherence) and personally relevant goals. From this awareness, the patient, rather than the clinician, generates reasons for behaviour change (Burke, Arkowitz, & Menchola, 2003). Ultimately, the patient's readiness for change is thought to stem from two main factors: the importance of change from the patient's perspective and the patient's confidence in their ability to engage in the change process. MI emphasises that the clinician must assess both importance and confidence and target intervention to improve both. Confidence relates directly to the patient's self-efficacy and is a good predictor of treatment outcome (Burke et al., 2003).

Summary and Conclusions

The enhancement of adherence to treatment should be a core activity for all health and allied health professionals. There are many interventions which aim to enhance patient adherence and which intervention to choose should be determined from the individual adherence *behaviours* of the patient. Detailed assessment of the factors which predict non-adherence, with recognition of the motivational contingencies influencing the patient's behaviours, is the best strategy to use in order to determine how to support improved adherence. This can, however, be time consuming and there are brief strategies that the clinician can use which will enhance adherence among a significant proportion of patients outlined as 'quick tips' in the following:

Quick Tips

- Provide education about the illness and *how* treatment can assist: encourage the patient to ask questions;
- Listen to the patient's fears and beliefs about treatment and correct false beliefs or irrational fears;
- Check that the patient understands what has been said about the illness and treatment by asking *them* to explain *their* understanding of the situation;
- Make sure all your recommendations are simple, personalised and built into the patient's daily rituals. *WRITE DOWN IN SIMPLIFIED TERMS WHAT YOU WANT THE PATIENT TO DO, WHEN, WHERE AND HOW OFTEN – IF POSSIBLE, SHOW THE PATIENT WHAT YOU WANT;*
- Keep the treatment as simple as possible;

- Use as little jargon as possible & as much reflective listening to the patient as you can: *be a team*;
- Send reminders & follow up notes (including appointment reminders), for example, text messages on mobile phones;
- Communicate with other members of the health team what your treatment plan is so that the patient receives a consistent message;
- Reward any improvement in adherence, not just complete “*compliance*”

References

Ackerman, S. J., & Hilsenroth, M. J. (2001). A review of therapist characteristics and techniques negatively impacting the therapeutic alliance. *Psychotherapy, 38*(2), 171-185

Ajzen, I., & Fishbein, M. (2005). The influence of attitudes on behaviour. In D. Albarracín, B. T. Johnson, & M. P. Zanna (Eds.) *The Handbook of Attitudes* (pp. 173-221) Mahwah, New Jersey: Lawrence Erlbaum Associates

Amador, X. F., Flaum, M., Andreasen, N. C., Strauss, D. H., Yale, S. A., Clark, S. C., & Gorman, J. M. (1994). Awareness of illness in schizophrenia and schizoaffective mood disorders. *Archives of General Psychiatry, 51*, 826-836

Ascher-Svanum, H., Zhu, B., Faries, D. E., Lacro, J. P., & Dolder, C. R. (2007). A prospective study of risk factors for nonadherence with antipsychotic medication in the treatment of schizophrenia. *Journal of Clinical Psychiatry, 67*(7), 1114-1123

Aslani, P., & du Pasquier, S. (2002). Compliance, adherence or concordance? *Australian Pharmacist, 12*(3), 170-174

Audulv, A., Asplund, K., & Norbergh, K. (2010). Who's in charge? The role of responsibility attribution in self-management among people with chronic illness. *Patient Education and Counseling, 81*, 94-100

Balkrishnan, R. (2005). The importance of medication adherence in improving chronic-disease related outcomes: What we know and what we need to further know. *Medical Care, 43*(6), 517-520

Balkrishnan, R. & Jayawant, S. S. (2007). Medication adherence research in populations: Measurement issues and other challenges. *Clinical Therapeutics, 29*(6), 1180-1183

Battaglioli-DeNero, A.M. (2007) Strategies for improving patient adherence to therapy and long-term patient outcomes. *Journal of the Association of Nurses in AIDS Care, 18*(1 Suppl): S17-22

Beck, A. T. (1964). Thinking and depression II: Theory and therapy. *Archives of general Psychiatry*, 10(6), 561-571

Beck, J. S. (1995). *Cognitive Therapy: Basics and Beyond*. New York: Guilford Press.

Binder, J. L., & Strupp, H. H. (1997). "Negative process": A recently discovered and underestimated facet of therapeutic process and outcome in the individual psychotherapy of adults. *Clinical Psychology Science and Practice*, 4, 121-139

Bisonó, A. M., Manuel, J. K., & Forcehimes, A. A. (2006). Promoting treatment adherence through Motivational Interviewing. In: W. T. O'Donohue and E. R. Levensky (Eds). *Promoting Treatment Adherence: A Practical Handbook for Health Care Providers*. Thousand Oaks, California: Sage.

Brawley, L. R. & Culos-Reed, N. (2000). Studying adherence to therapeutic regimens: Overview, theories, recommendations. *Controlled Clinical Trials*, 21, 156S-163S

Brondolo, E., & Mas, F. (2001). Cognitive-behavioral strategies for improving medication adherence in patients with bipolar disorder. *Cognitive and Behavioral Practice*, 8, 137-147

Brossart, D. F., Willson, V. L., Patton, M. J., Kivlighan, D. M., & Multon, K. D. (1998). A time series model of the working alliance: A key process in short-term psychoanalytic counselling. *Psychotherapy*, 35(2), 197-205

Buckley, P. F., Wirshing, D. A., Bhushan, P., Pierre, J. M., & Wirshing, W. C. (2007). Lack of insight in schizophrenia: Impact on treatment adherence. *CNS Drugs*, 21(2), 129-141

Buchanan, D., Rohr, L., Stevak, L., & Sai, T. (2007). Documenting attitude changes towards homeless people: Comparing two standardised surveys. *Medical Education*, 41, 346-34

Burke, B. L., Arkowitz, H., & Menchola, M. (2003). The efficacy of motivational interviewing: A meta-analysis of controlled clinical trials. *Journal of Consulting and Clinical Psychology*, 71(5), 843-861

Byerly, M. J., Thompson, A., Carmody, T., Bugno, R., Erwin, T., Kashner, M., & Rush, A.J. (2007). Validity of electronically monitored medication adherence and conventional adherence measures in schizophrenia. *Psychiatric Services*, 58(6), 844-847

Byrne, M.K. & Deane, F.P. (*in press*). Enhancing patient adherence: Outcomes of Medication Alliance training on therapeutic alliance, insight, adherence and

psychopathology with mental health patients. *International Journal of Mental Health Nursing*

Byrne, M.K., Deane, F.P., & Caputi, P. (2008). Mental health clinicians' beliefs about medicines, attitudes and expectations of improved medication adherence in patients. *Evaluation and the Health Professions*, 31(4): 390-403

Byrne, M. K., Deane, F. P., & Coombs, T. (2005). Nurse's beliefs and knowledge about medications are associated with their difficulties when using patient adherence strategies. *Journal of Mental Health*, 14, 513-521

Byrne, M.K., Deane, F.D., Lambert, G., & Coombs, T. (2004). Enhancing medication adherence: Clinician outcomes from the 'Medication Alliance' training program. *Australian & New Zealand Journal of Psychiatry*, 36: 246-253

Byrne, M.K., Deane, F.P., Willis, A., Hawkins, B., & Quinn, R. (2009). Preliminary Reliability of an Observer Rating Scale for Assessing Medication Adherence on Psychiatric Wards. *Journal of Evaluation in Clinical Practice*, 15, 246-251

Callegari, S., Majani, G., Giardini, A., Pierobon, A., Opasich, C., Cobelli, F., & Tavazzi, L. (2002). Relationship between cognitive impairment and clinical status in chronic heart failure patients. *Monaldi Archives for Chest Disease*, 58(1), 19-25

Chang, E. C., Downey, C. A., & Salata, J. L. (2004). Social problem solving and positive psychological functioning: Looking at the positive side of problem solving. In: E. C. Chang, T. J. D'Zurilla and L. J. Sanna, (Eds). *Social Problem Solving: Theory, Research, and Training*. (pp. 99-116). Washington, DC: American Psychological Association.

Chang, E. C., & D'Zurilla, T. J. (1996) Relations between problem orientation & optimism, pessimism, and trait affectivity: A construct validation study. *Behavior Research and Therapy* 34(2), 185-194

Cooper, C., Bebbington, P., King, M., Brugha, T., Meltzer, H., Bhugra, D., & Jenkins, R. (2007). Why people do not take their psychotropic drugs as prescribed: Results of the 2000 National Psychiatric Morbidity Survey. *Acta Psychiatrica Scandinavica*, 116(1), 47-53

Cramer, J. A., & Rosenheck, M. D. (1998). Compliance with medication regimes for mental and physical disorders. *Psychiatric Services*, 49(2), 196-201

Cutler, D.M. & Everett, W. (2010). Thinking outside the pillbox – Medication adherence as a priority for health care reform. *The New England Journal of Medicine*, 362(17), 1553-1555

- Dean, A.J., Walters, J., & Hall, A. (2010). A systematic review of interventions to enhance medication adherence in children and adolescents with chronic illness. *Archives of Disease in Childhood, 95*(9), 717-723
- DeWalt, D.A., Berkman, N.D., Sheridan, S., Lohr, K.N., & Pignone, M.P. (2004). Literacy and health outcomes: A systematic review of the literature. *Journal of General Internal Medicine, 19*(12), 1228-1239
- DiMatteo, M. R. (2004). Variations in patients' adherence to medical recommendations: A quantitative review of 50 years of research. *Medical Care, 42*, 200-209
- Dunbar-Jacob, J. (1993). Contributions to patient adherence: Is it time to share the blame? *Health Psychology, 12*(9), 91-92
- Eaton, T. T., Abeles, N., & Gutfreund, M. J. (1993). Negative indicators, therapeutic alliance, and therapy outcome. *Psychotherapy Research, 3*(2), 115-123
- Elliott, W. J. (2008). What factors contribute to inadequate control of elevated blood pressure? *Journal of Clinical Hypertension, 10*(1 Suppl 1), 20-26
- Faiman, B. (2007). Clinical updates and nursing considerations for patients with multiple myeloma. *Clinical Journal of Oncology Nursing, 11*(6), 831-840
- Falloon, I. R. H., Barbieri, L., Boggian, I., & Lamonaca, D. (2007). Problem solving for schizophrenia: Rationale and review. *Journal of Mental Health, 16*(5), 553-568
- Farris, K. B., & Schopflocher, D. P. (1999). Between intention and behavior: an application of community pharmacists' assessment of pharmaceutical care. *Social Science & Medicine, 49*(1), 55-66
- Farmer, K. C. (1999). Methods for measuring and monitoring medication regimen adherence in clinical trials and clinical practice. *Clinical Therapeutics, 21*(6), 1074-1090
- Fernandez, R. S., Evans, V., Griffiths, R. D., & Mostacchi, M. S. (2006). Educational interventions for mental health consumers receiving psychotropic medication: A review of the evidence. *International Journal of Mental Health Nursing, 15*, 70-80
- Gadomski, A. M., Wolff, D., Tripp, M., Lewis, C., & Short, L. M. (2001). Changes in health care providers' knowledge, attitudes, beliefs, and behaviors regarding domestic violence, following a multifaceted intervention. *Academic Medicine, 76*(10), 1045-52
- Gray, R., Wykes, T., Edmonds, M., Leese, M., & Gournay, K. (2004). Effect of a medication management training package for nurses on clinical outcomes for patients

with schizophrenia: Cluster randomised controlled trial. *British Journal of Psychiatry*, 185(2), 157-162

Gray, R., Wykes, T., & Gournay, K. (2002). From compliance to concordance: A review of the literature on interventions to enhance compliance with antipsychotic medication. *Journal of Psychiatric Mental Health Nursing*, 9(3), 277-284

Grunfeld, E.A., Hunter, M.S., Sikka, P., & Mittal S. (2005). Adherence beliefs among breast cancer patients taking tamoxifen. *Patient Education and Counselling*, 59: 97-102

Hahn, S.r., Park, J., Skinner, E.P., Yu-Isenberg, K.S., Weaver, M.B., Crawford, B., & Flowers, P.W. (2008). Development of the ASK-20 Adherence Barrier Survey. *Current Medical Research and Opinion*, 24(7), 2127-2138

Hamer, S., & Haddad, P. M. (2007). Adverse effects of antipsychotics as outcome measures. *British Journal of Psychiatry*, 50(s), 64-70

Haynes, R.B. (1976). A critical review of the 'determinant' of patients' compliance with therapeutic regimens. In: Haynes R. B., and D. L. Sackett (Eds). *Compliance with Therapeutic Regimens*. Baltimore: John Hopkins University Press, pp. 27-39

Haynes, R. B., Yao, X., Degani, A., Kripalani, S., Garg, A., & McDonald, H. P. (2005). Interventions for enhancing medication adherence. *The Cochrane Database of Systematic Reviews*, 4: CD000011

Hogan, T. P., Awad, A. G., & Eastwood, R. (1983). A self-report scale predictive of drug compliance in schizophrenics: Reliability and discriminative validity. *Psychological Medicine*, 13, 177-183

Horne, R. (2006). Beliefs and adherence to treatment: The challenge for research and clinical practice. In: P. W. Halligan and M. Aylward (Eds.), *The Power of Beliefs: Psychosocial Influence on Illness, Disability and Medicine*, (pp. 115-136). Oxford, UK: Oxford University Press.

Horne, R., Weinman, J., & Hankins, M. (1999). The beliefs about Medicines Questionnaire: the development and evaluation of a new method for assessing the cognitive representation of medication. *Psychology and Health*, 14, 1-24

Horvath, A. O. & Bedi, R. P. (2002). The alliance. In: J. C. Norcross (Ed.), *Psychotherapy Relationships that Work: Therapist Contributions and Responsiveness to Patients*. (pp. 37-69). New York, US: Oxford University Press.

Howgego, I. M., Yellowlees, P., Owen, C., Meldrum, L., & Dark, F. (2003). The therapeutic alliance: The key to effective patient outcome? A descriptive review of the

evidence in community mental health case management. *Australian and New Zealand Journal of Psychiatry*, 37, 169-183

Hunt, G. E., Bergen, J., & Bashir, M. (2002). Medication compliance and comorbid substance abuse in schizophrenia: Impact on community survival 4 years after relapse. *Schizophrenia Research*, 54, 253-264

Janssen, B., Gaebel, W., Haerter, M., Komaharadi, F., Lindel, B., & Weinmann, S. (2006). Evaluation of factors influencing medication compliance in inpatient treatment of psychotic disorders. *Psychopharmacology*, 187, 229-236

Jorm, A. F., Korten, A. E., Jacomb, P. A., Christensen, H., Rodgers, B., & Pollitt, P. (1997). 'Mental health literacy': A survey of the public's ability to recognise mental disorders and their beliefs about the effectiveness of treatment. *Medical Journal of Australia*, 166, 182-186

Kampman, O., Lehtinen, K., & Lassila, V. (2001). The reliability of compliance assessments performed by doctors and patients during neuroleptic treatment: a comparison of compliance ratings. *Acta Psychiatrica Scandinavica*, 104, 299-304

Kasl, S. V. (1975). Issues in patient adherence to health care regimens. *Journal of Human Stress*, 1, 5-18

Kaufman, D.W., Kelly, J.P., Rosenberg, L., Anderson, T.E., & Mitchell, A.A. (2002). Recent patterns of medication use in the ambulatory adult population of the United States: The Slone survey. *Journal of the American Medical Association*, 287(3), 337-344

Kemp, R., Hayward, P., Applewhaite, G., Everitt, B., & David, A. (1996). Compliance therapy in psychotic patients: Randomised controlled trial. *British Medical Journal*, 312(7027), 345-349

Kemp, R., Kirov, G., Everitt, B., Hayward, P., & David, A. (1998). A randomised controlled trial of compliance therapy: 18-month follow-up. *British Journal of Psychiatry*, 172, 413-419

Kowing, D., Messer, D., Slagle, S., & Wasik, A. (2010). Programs to optimize adherence in glaucoma. *Optometry*, 81(7), 339-350

Lacro, J. P., Dunn, L. B., Dolder, C. R., Leckband, S. G., & Jeste, D. V. (2002). Prevalence of and risk factors for medication nonadherence in patients with schizophrenia: A comprehensive review of recent literature. *Journal of Clinical Psychiatry*, 63(10), 892-909

- Leventhal, H., Leventhal, E. A., & Contrada, R. J. (1998). Self-regulation, health and behaviour: a perceptual-cognitive approach. *Psychology and Health, 13*, 717-733
- MacKean, J. M. & Elkington, A. R. (1983). Compliance with treatment of patients with chronic open-angle glaucoma. *British Journal of Ophthalmology, 67*, 46-49
- Mackin, R. S. & Arean, P. A. (2007). Cognitive and psychiatric predictors of medical treatment adherence among older adults in primary care clinics. *International Journal of Geriatric Psychiatry, 22*(1), 55-60
- McDonald, H. P., Garg, A. X., & Haynes, R. B. (2002). Interventions to enhance patient adherence to medication prescriptions. *Journal of the American Medical Association, 288*, 2868-2879
- McEvoy, J. P. (1998). The relationship between insight in psychosis and compliance with medications. In: X. F. Amador and A. S. Anthony (Eds.) *Insight and Psychosis* (pp. 289-306). New York, New York: Oxford University Press.
- McHorney, C. (2009). The Adherence Estimator: A brief, proximal screener for patient propensity to adhere to prescription medications for chronic disease. *Current Medical Research and Opinion, 25*(1), 215-238
- Martin, K. A., Bowen, D. J., Dunbar-Jacob, J., & Perri, M. G. (2000). Who will adhere? Key issues in the study and prediction of adherence in randomized controlled trials. *Controlled Clinical Trials, 21*, 195S-199S
- Matza, L.S., Yu-Isenberg, K.S., Coyne, K.S., Park, J., Wakefield, J., Skinner, E.P., & Wolever, R.Q. (2008). Further testing of the reliability and validity of the ASK-20 adherence barrier questionnaire in a medical center outpatient population. *Current Medical Research and Opinion, 24*(11), 3197-3206
- Meichenbaum, D. & Turk, D.C. (1987). Treatment adherence: Terminology, incidence and conceptualisation. In: M. Meichenbaum and D. Turk D (Eds). *Facilitating Treatment Adherence*. (pp. 19-39). New York: Plenum Press.
- Miller, W. R. & Rollnick, S. (2002). *Motivational Interviewing: Preparing people for change*. (2nd ed.) NY/London: The Guilford Press.
- Morisky, D. E., Green, L. W., & Levine, D. M. (1989). Concurrent and predictive validity of a self-reported measure of medication adherence. *Medical Care, 24*, 67-73
- Mundt, J. C., Clarke, G. N., Burroughs, D., Brennman, D. O., & Griest, J. H. (2001). Effectiveness of antidepressant pharmacotherapy. The impact of medication compliance and patient education. *Depression and Anxiety, 13*(1), 1-10

Munger, M. A., Van Tassel, B. W., & LaFleur, J. (2007). Medication nonadherence: An unrecognized cardiovascular risk. *Medscape General Medicine*, 9(3), 58

Neufeld, R. W. (2007). *Advances in Clinical Cognitive Science: Formal Modeling of Process and Symptoms*. Washington DC: American Psychological Association.

Ozer, E. M., Adams, S. H., Gardner, L. R., Mailloux, D. E., Wibbelsman, C. J., & Irwin, C. E. Jr. (2004) Provider self-efficacy and the screening of adolescents for risky health behaviors. *Journal of Adolescent Health*,35(2), 101-107

Park, J., Jackson, J., Skinner, E., Rangel, K., Saiers, J., & Cherney, B. (2010). Impact of an adherence intervention program on medication adherence barriers, asthma control, and productivity/daily activities in patients with asthma. *Journal of Asthma*, 47(10), 1072-1077

Patel, P. & Zed, P. J. (2002). Drug-related visits to emergency department: How big is the problem? *Pharmacotherapy*, 22, 915-923

Petrilla, A. A., Benner, J. S., Battleman, D. S., Tierce, J. C., & Hazard, E. H. (2005). Evidence-based interventions to improve patient compliance with antihypertensive and lipid-lowering medications. *International Journal of Clinical Practice*, 59(12), 1441-1451

Pladevall, M., Brotons, C., Gabriel, R., Arnau, A., Suarez, C., de la Figuera, M., et al., (2010). Multicenter cluster-randomized trial of a multifactorial intervention to improve antihypertensive medication adherence and blood pressure control among patients at high cardiovascular risk. *Circulation*, 122(12), 1183-1191

Ramström, H., Afandi, S., Elofsson, K., & Petersson, S. (2006). Differences in beliefs between patients and pharmaceutical specialists regarding medication. *Patient Education and Counseling*, 62(2), 244-249

Rawson, K.A., Gunstad, J., Hughes, J., Spitznagel, M.B., Potter, V., Waechter, D., & Rosneck, J. (2009). The METER: A brief, self-administered measure of health literacy. *Journal of General Internal Medicine*, 25(1), 67-71

Robin, A. L., Novack, G. D., Covert, D. W., Crockett, R. S., & Marcic, T. S. (2007). Adherence in glaucoma: Objective measurements of once-daily and adjunctive medication use. *American Journal of Ophthalmology*, 144(4), 533-540

Rollnick, S., Mason, P., & Butler, C. (2000). *Health Behavior Change: A Guide for Practitioners*. London: Churchill Livingstone.

Roth, H. P. & Caron, H. S. (1978). Accuracy of doctors' estimates and patients' statements on adherence to a drug regimen. *Clinical Pharmacological Therapy*, 23, 361-370

Ruppar, T.M., Conn, V.S., & Russell, C.L. (2008). Medication adherence interventions for older adults: Literature review. *Research and Theory for Nursing Practice: An international Journal*, 22(2), 114-147

Sajatovic, M., Davies, M., Bauer, M., McBride, L., Hays, R. A., Safavi, R., & Jenkins, J. (2005). Attitudes regarding the collaborative practice model and treatment adherence among individuals with bipolar disorder. *Comprehensive Psychiatry*, 46, 272-277

Sajatovic, M., Velligan, D.I., Weiden, P.J., Valenstein, M.A., & Ogedegbe, G. (2010). Measurement of psychiatric treatment adherence. *Journal of Psychosomatic Research*, 69, 591-599

Shaw, M. E. (2005). Increasing compliance with glaucoma therapy: "So, convince me I have something wrong with my eyes." *Insight: The Journal of the American Society of Ophthalmic Registered Nurses*, 30(3), 7-9

Sokol, M.C., Kimberly, M.S., McGuigan, A., Verbrugge, R.R., & Epstein, R.S. (2005). Impact of medication adherence on hospitalization risk and healthcare cost. *Medical Care*, 43(6), 521-530

Stern, S. L., Williams, T., Dixon, S. L., Clement, J.A., Butt, Z. A., Schwartzbaum, J. A., & Busch, K. (1999). Do health professional's attitudes interfere with the treatment of depression? *Depression and Anxiety*, 9(4), 151-155

Stewart, M. S. (1987). The validity of an interview to assess a patient's drug taking behaviour. *American Journal of Preventive Medicine*, 3, 95-100

Strecher, V. J., Champion, V. L., & Rosenstock, I. M. (1997). The health belief model and health behaviour. In: D. S. Gochman (Ed.), *Handbook of Health Behaviour Research 1: Personal and Social Determinants* (pp. 71-91). New York: Plenum

Svarstad, B. L., Chewning, B. A., Sleath, B. L., & Claesson, C. (1999). The brief medication questionnaire: A tool for screening patient adherence and barriers to adherence. *Patient Education and Counseling*, 37, 113-124

Thompson, K., Kulkarni, J., & Sergejew, A. A. (2000). Reliability and validity of a new medication adherence rating scales (MARS) for the psychoses. *Schizophrenia Research*, 42, 241-247

Urquhart, J. (1994). Role of patient compliance in clinical pharmacokinetics. A review of recent research. *Clinical Pharmacokinetics*, 27, 202-215

WHO (2003). [Adherence to Long-Term Therapies - Evidence for Action](#) (211 pages)
Retrieved March 15, 2011, from <http://who.int>

Waldrop-Valverde, D., Ownby, R.L., Wilkie, F. L., Mack, A., Kumar, M., & Metsch, L. (2006). Neurocognitive aspects of medication adherence in HIV-positive injecting drug users. *AIDS & Behavior, 10*(3), 287-297

Wallace, M. D., Dyer, E. J., & Penrod, B. (2006). Treatment adherence in developmental disabilities/cognitively impaired patients. In: W. T. O'Donohue & E. R. Levensky (Eds). *Promoting Treatment Adherence: A Practical Handbook for Health Care Providers*. (pp. 415-420). Thousand Oaks, California: Sage

Weinmann, S., Janssen, B., & Gaebel, W. (2005). Guideline adherence in medication management of psychotic disorders: An observational multi-site hospital study. *Acta Psychiatrica Scandinavica, 112*(1), 18-25

Wu, J. R., Moser, D. K., Lennie, T. A., & Burkhart, P. V. (2008). Medication adherence in patients who have heart failure: A review of the literature. *Nursing Clinics of North America, 43*(1), 133-153

Yen, C. F., Yeh, M. L., Chen, C. S., & Chung, H. H. (2002). Predictive value of insight for suicide, violence, hospitalization and social adjustment for outpatients with schizophrenia: A prospective study. *Comprehensive Psychiatry, 43*, 443-447

