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**Medication management training for mental health professionals–
A programme of research**

by

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Medication management training for mental health professionals– A programme of research

Abstract:

Aim

This research programme aimed to investigate issues relating to the management of patient non-adherence with antipsychotic medication. The findings from the patient-related studies and the systematic literature review informed the development of a medication management staff training programme; which was evaluated in terms of the effects on mental health professionals' understanding and clinical practice in Hong Kong.

Background

Medication management interventions which are designed to maximise the potential benefits of antipsychotic medication for severe mental illness have shown promise in improving symptoms, reducing relapse rates and addressing non-adherence. Subsequent medication management studies which involve training mental health professionals in similar psychosocial interventions have also demonstrated that improvements in mental health professionals' knowledge, attitudes and skills can result in improved patient outcomes; however, the studies have not been replicated outside western general psychiatry settings and therefore the effects of training mental health professionals in other clinical contexts have not been established.

Methods

This research programme consists of a series of five studies that utilised a variety of methodological approaches. Three cross-sectional surveys were used to identify and explore clinical problems central to medication management in order to refine the staff training programme; the first investigates the extent of, and associations with, antipsychotic medication non-adherence in prisons. Qualitative interview data from the prison study provides additional context to the requirements for medication management training interventions by exploring prisoners' experiences of taking antipsychotic medication. The second survey ascertains and explores the problem of non-adherence with antipsychotics in an Asian population, and the third provides an estimate of potential treatment-related physical health problems. A systematic literature review investigates studies which measure the effects of medication management training on clinicians' knowledge, attitudes and skills. Finally concept mapping and clinicians' narratives are used in a longitudinal case series

study in order to establish the transferability of medication management training to an Asian setting and evaluate the effects of training on clinicians' understanding and clinical practice.

Results

Patients' positive attitudes towards antipsychotic medication, particularly awareness of the need for treatment predicted higher levels of adherence, and concerns about the adverse effects of these medications are closely related to the environmental context of treatment. Concerns associated with antipsychotic side effects appear to be less prominent when patients are not working or in prison but they may influence adherence when demands on functioning change. The modified medication management training was effective in improving clinicians' understanding and was felt to be transferrable to an Asian setting, but patients' and families' traditional cultural beliefs about mental illness and concerns about the effects of western medication on physical health were found to be particular challenges when implementing adherence interventions. Patients with severe mental illness in Hong Kong are twice as likely compared to the general population to have developed metabolic syndrome, consequently medication management interventions could require greater focus on the identification and management of physical health problems; which may help to address patient and family concerns about long-term treatment. The staff training programme requires psychopharmacology teaching, provision of clinical supervision and side effects management content in order to improve clinicians' confidence when implementing medication management interventions.

Conclusions

Concerns about the adverse effects of treatment that influence adherence are environmentally bound. As influences on medication adherence are different in different settings, staff training programmes should place more emphasis on the local context in order to improve efficacy and the feasibility of implementation. The results suggest that in Hong Kong medication management interventions should have an increased focus on families and that treatment satisfaction could be a suitable target for interventions. The findings also present a question about whether previous medication management studies have given due consideration to predicting and managing concerns about the impact of side effects on functioning over the longer term and the potential effects of medication on patients' physical well-being. The outcomes of this programme also demonstrate that future medication management training studies need to use robust study designs in order to more certainly attribute clinicians' improvements to the training intervention and could consider measuring treatment satisfaction as a primary patient outcome measure.

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Medication management training for mental health professionals– A programme of research

1: Introduction

This programme of research investigates issues that are central to medication management for severe mental illness. The first study explores patient-related factors that are associated with antipsychotic treatment adherence in a population of UK based prisoners. Two subsequent surveys investigate antipsychotic treatment adherence and the extent of treatment-related physical health problems in a community sample of people with severe mental illness in Hong Kong. The results of a systematic review and the earlier studies are then used to inform the development of a medication management staff training programme, which is evaluated in terms of the impact on Hong Kong based community mental health professionals' understanding and clinical practice. The studies involve a combined total of 767 patients and 26 clinicians.

The following definitions of terminology apply throughout this commentary:

Medication management (clinical) interventions:

Any psychosocial therapeutic intervention designed to be used by mental health professionals with individual patients to help them manage their medication for severe and enduring mental illness.

Medication management training interventions:

Educational or training interventions provided to mental health professionals which aim to improve their ability to manage medication for severe and enduring mental illness.

Intervention target(s):

The focus of medication management interventions used by mental health professionals when working with individual patients.

1:1 The research programme rationale

A number of other researchers have tested the effectiveness of implementing medication management interventions for people with severe mental illness (SMI) into routine clinical practice

by providing medication management staff training programmes. The outcomes have been measured in terms of patients being treated and the impact of training on clinicians' knowledge, attitudes and skills in managing medications and associated non-adherence. The training trials have produced some positive results in general mental health settings in Australia, USA and the UK (i.e. Gray, et al., 2004; Harris et al., 2009; Byrne et al., 2010; Byrne and Deane, 2011), but the studies have not been replicated outside these environments and therefore the effects of training mental health staff in other clinical settings have not been established.

In order to investigate whether similar targets for medication management interventions exist across different clinical settings, this programme of research focuses on two clinical areas in which there is a lack of evidence about influences on adherence and the effects of treatment for SMI on physical health. The clinical environments that were investigated were UK prisons and a Community Psychiatric Nursing Service in Hong Kong. Being able to understand these issues would provide evidence that is required to refine the content of staff medication management training programmes in order that clinical medication management interventions could become more sophisticated in accordance with the clinical context.

This reflective commentary critically analyses each study and aims to demonstrate the process of adapting a medication management staff training intervention based on both new evidence and piloting of the use of the approaches in clinical practice.

1:2 Aims and objectives:

Aims:

- This research programme aimed to investigate issues relating to the management of patient non-adherence with antipsychotic medication. The findings from the patient-related studies and the systematic literature review informed the development of a medication management staff training programme; which was evaluated in terms of the effects on mental health professionals' understanding and clinical practice in Hong Kong.

Specific research questions of each published study in relation to the research programme aims:

- What is the extent of and associations with, medication non-adherence in prisons? (Prison adherence survey; Gray et al. 2008)
- What do prisoners' narratives further tell us about adherence and medication management? (Prisoners' experiences study; Mills et al.,2011)
- How common is antipsychotic medication non-adherence in an Asian population and are targets for interventions different in this context? (Hong Kong adherence survey– Bressington et al.,2012a)
- What are the effects of medication management training on staff outcomes? (A systematic review of the literature; Bressington et al.,2013a)
- How transferrable is medication management training to an Asian population and what further modifications to training are required? (Hong Kong training study; Bressington et al., 2012b)
- What is the extent of treatment related metabolic disorders and other physical health problems in Hong Kong and how relevant are these issues in managing medication over the longer term? (Hong Kong physical health study– Bressington et al., 2013b)

2: The research context

2:1 What is medication management for severe mental illness and why is it important?

Medication management

There are a number of different definitions of medication and medicines management which vary in relation to professional paradigms. The focus of “medicines management” is on the mechanisms that underpin the whole system of prescribing, dispensing, storing, ordering and administering medication in order to minimise errors and improve patient safety (Rich, 2004). “Medication management” however, has more emphasis on working collaboratively with patients in order to maximise their potential response to treatment (Harris et al., 2009a). As mental health clinicians are expected to build effective ongoing therapeutic relationships with patients that they work with, they are well-placed to help maximise the potential benefits of medication (Usher and Arthur, 1997) and therefore this programme focuses on medication management interventions for individuals rather than system-related issues. These views are supported by the UK’s Nursing and Midwifery Council’s standards for general medication management (NMC, 2007) which broadly suggest that mental health clinicians who manage patients medication should assess and evaluate four areas of medication outcomes: symptoms, safety, side effects and satisfaction (Gray et al., 2009a).

Managing medication for people with severe mental illness (SMI) is an extremely important role for mental health clinicians as patients are often required to take antipsychotics for long periods. Helping patients to manage their medication may help to improve treatment efficacy, reduce relapse rates, provide the foundations for recovery-focussed psychosocial interventions and reduce the financial costs of treatment (Haynes et al. 2008; Harris et al., 2009a). Clearly, if medications are not taken it is certain that they will not work to help patients recover. Therefore there are specific issues relating to SMI and its treatment that require consideration when constructing medication management interventions for this client group.

Severe mental illness

Perhaps the most widely accepted definition of SMI is that patients need to be diagnosed with a non-organic psychosis, which has required treatment for at least two years and which has caused disruption to the person’s day-to-day functioning (Ruggeri et al.,2000). The most common diagnoses

that fall within this classification are schizophrenia, bipolar spectrum disorders and schizoaffective disorder.

Estimates of the prevalence of SMI vary across the world and are complicated by differing definitions of the range of conditions that fall within this group of disorders (Ruggeri et al., 2000). The most widely studied prevalence rates are those of schizophrenia; with average estimates of world-wide lifetime prevalence being in the region of 4 per 1,000 people (Bhugra, 2005), whilst the annual period prevalence rates for psychosis in the UK have been reported as being between 2 and 9 per 1000 people (Wiles et al., 2006).

Treatment for severe mental illness

The UK's National Institute for Health and Care Excellence produce guidelines for the treatment of SMI such as schizophrenia (NICE, 2009), recommending that treatment should consist of a package of care that includes both psychosocial and pharmacological approaches. The pharmacological treatments are the main focus of this research programme and they are an essential component as they provide symptom stability so that psychosocial interventions can be used to further patients' recovery. Detailed expert consensus guidelines published by the British Association of Psychopharmacology (Barnes et al., 2011) explore a wider range of evidence relating to the medical treatment of schizophrenia; the authors conclude that antipsychotic medications are core treatments throughout all stages of psychosis and should be taken consistently in order to realise the potential benefits.

There is a vast amount of evidence that the symptoms of people with SMI can respond positively to antipsychotic medications and therefore these are widely used to help patients manage their conditions (Leucht et al., 2012). There are many antipsychotic medications available and each class of drug is associated with its own benefit and risk profile. The original antipsychotics were first used widely in the 1950s and are commonly referred to as first generation or typical antipsychotics. They are effective in managing the positive symptoms of psychosis, but are associated with some distressing side effects such as movement disorders and sexual dysfunction (Miyamoto et al., 2012). More recently a range of newer antipsychotics have been developed; these second and third generation (or atypical) antipsychotics are equally effective in treating positive symptoms, but are far less likely to cause movement disorders due their pharmacodynamics (Davis et al., 2003). Despite the reduced likelihood of movement disorders some of the atypical antipsychotics have been shown

to be associated with sedation and physical health problems which include weight gain and other metabolic disorders (Saddichha et al., 2007).

2:2 Which elements of medication management should clinicians address?

A model of antipsychotic medication management in SMI proposed by Usher and Arthur (1997) highlights that approaches need to maximise the desired treatment effects, minimise the undesired effects, facilitate patient advocacy and adopt a patient empowerment stance. They suggest that because the process is often complex and ongoing, the relationship between clinician and patient is crucial. Harris et al., (2009a) concur that a collaborative relationship is key and outline the areas of medication management for mental health that require greatest consideration, including: empowering patients through choice, assessing and managing response to treatment, promoting patient safety and working to address both intentional and unintentional adherence problems. Adherence issues are central to medication management interventions; however it is important to note that patients should be supported in a decision to stop taking medication where a conscious and informed choice is being made (NICE, 2009a).

2:3 How common is non-adherence with treatment for severe mental illness and how is this best addressed in medication management training?

Treatment adherence is defined as the extent to which a person's behaviour coincides with healthcare professional's recommendations; such as taking medication as prescribed (Dunbar-Jacob and Mortimer-Stephens, 2001). Non-adherence with treatment for all long-term conditions (physical or mental health) is extremely common; the average rates are estimated to be around 50% (Haynes et al., 2008). The reported rates of non-adherence with antipsychotic medication vary in accordance with the clinical setting and the method of measurement, but it is generally accepted that around 50% of patients are likely to not take their medication as prescribed and the problem of non-adherence persists despite the widespread prescribing of atypical antipsychotics which were initially thought to be better tolerated than the typical antipsychotics (Dolder et al., 2003). Dichotomising adherence also complicates estimates of prevalence as adherence behaviours are unlikely to be static in that they can change on a regular basis (Valenstein et al., 2006).

The clinical consequences of non-adherence in SMI are extremely negative; patients that do not take their antipsychotic medications are much more likely to relapse, attempt suicide, be admitted to hospital and exhibit aggressive behaviours (Byerly et al., 2005). Even in patients newly diagnosed with psychosis the likelihood of relapse in non-adherent patients is 10 times that of adherent patients (Morken et al., 2008). Studies have also demonstrated that non-adherence in SMI is associated with a three-fold increase in financial treatment costs (Almond et al., 2004).

Influences on adherence

Influences on adherence are well-documented in western general psychiatry settings; these factors are potential targets for clinical intervention and have been useful in informing the construction of evidence-based interventions that aim to improve adherence with treatment. The influences on adherence have been broadly classified into six areas: illness-related factors, treatment-related factors, clinician-related factors, patient-related factors, environmental factors and cultural factors (Gray et al., 2008). Despite these areas all being important potential influences on medication adherence, the specific influences have been shown to vary in accordance with the treatment setting and diagnosis (WHO, 2003). Qualitative research has provided an additional insight into patients' experiences of taking antipsychotics; a study conducted in four European countries showed that patients with a diagnosis of SMI report that side effect self-management, the efficacy of medication, insight and professional/carer support were the four most important factors that influenced their adherence to antipsychotic medication (Kikkert et al., 2006).

A theoretical model that is widely referenced and which aims to explain treatment non-adherence and target adherence interventions is the necessity-concerns framework, which is based on an extended self-regulatory model (Horne and Weinman, 1999). The model was initially proposed for long term physical health conditions and has more recently been applied to a range of long term mental health problems, including depression (Aikens et al., 2005; Brown et al., 2005) and bipolar affective disorder (Clatworthy et al., 2007; 2009). The model considers that patients' levels of adherence are determined by their perceptions of how the necessity of treatment balances with their concerns about medication, and therefore provides some direction in terms of potential areas for clinical interventions. For example, Clatworthy et al., (2009) demonstrated that patients with a diagnosis of bipolar affective disorder were most likely to be accepting of treatment if they perceived high necessity for and low concerns about medication. The authors suggest that the model is a useful platform on which to contextualise adherence, but due to the cross sectional

nature of their research the conclusions are limited to the “here and now”. However, an earlier prospective cohort study conducted over six months (Hunot et al., 2007) reinforces the link between treatment concerns and adherence to antidepressants, and also shows that patient preference about the choice of antidepressant prescribed is a strong predictor of good adherence. The findings from this longitudinal study therefore also suggest that there needs to be a strong collaborative working arrangement in place between clinician and patient in order for treatment concerns and preferences to be explored over time. This clinical ethos underpins many of the studies which have been conducted in order to improve adherence with treatment in people with mental health problems and is reflected in associated clinical guidelines (NICE, 2009a).

Adherence intervention efficacy studies

A number of studies have investigated the efficacy of patient-focused adherence interventions in SMI (i.e. Kemp et al., 1998; O’Donnell et al., 2003; Gray et al., 2006; Staring et al., 2010) and the principles underpinning these approaches have more recently been supported by The National Institute for Clinical Excellence in the UK (NICE, 2009a) which published clinical guidance on the need to use a patient-centred approach which encourages clinicians to facilitate patients’ informed choice about adherence.

Interventions to improve adherence are often determined by the intentional or unintentional nature of non-adherence. Unintentional non-adherence can relate to misunderstandings about treatment or forgetting to take medication; these issues are probably best addressed using practical approaches that reduce the complexity of drug regimens or aim to directly change medication taking behaviour by using problem solving techniques (Barkhof et al., 2012), or from a pharmacological perspective using long acting injections to minimise inconvenience and the frequency of administration (Patel et al., 2009).

Addressing intentional non-adherence requires a more complex approach; the most influential study to demonstrate the efficacy of psychosocial interventions in improving intentional non-adherence in SMI was conducted by Kemp et al., (1998). The study used a randomised controlled trial design to test “Compliance Therapy” involving 74 patients; the results showed that in comparison with the control group, patients who received compliance therapy had improved insight into their illness, more positive attitudes towards treatment, reduced numbers of readmissions, and better treatment adherence at 18 months follow-up. “Compliance therapy” combines motivational interviewing and

cognitive-behavioural interventions and consists of three phases which engage patients in collaborative discussions about their beliefs and attitudes towards treatment while avoiding confrontation and coercion.

Subsequent to the Kemp et al study, according to a systematic review (Barkhof et al., 2012) there have been at least 10 studies published that investigate the effects of similar interventions in an SMI population which have produced some equivocal findings. The first replication of this study (O'Donnell et al., 2003) compared compliance therapy with non-specific counselling, and concluded that compliance therapy was no more effective than the control intervention in improving patients' adherence with treatment. There have been some criticisms of this trial (i.e. David, 2010; Gray et al., 2010) that mostly relate to concerns about fidelity to the manualised treatment and lack of statistical power. The primary outcome measure was a clinician rating of adherence, which also presents questions about the accuracy of measurement. The relevance of adherence as a primary outcome is also potentially clinically and ethically dubious; if patients are more adherent with treatment that is not effective for them how meaningful is this? This issue is well illustrated by a more recent randomised-controlled trial of "Treatment Adherence Therapy" (Staring et al., 2010) which targeted likely causes of non-adherence in each individual patient and found that although there were improvements in adherence, symptoms did not improve.

In terms of efficacy some "Adherence Therapy" controlled trials (based on compliance therapy approaches) demonstrate positive outcomes for patients in terms of reduced symptoms (i.e. Maneeskorn et al., 2007; Schulz et al., 2013). Whilst others have reported mixed results; Anderson et al., (2010) concluded in a small exploratory trial that adherence therapy did not have significant effects on symptoms or adherence, but patients engaged actively in treatment. Similarly, Byerly et al., (2005a) conducted a trial of adherence therapy in outpatients with schizophrenia and report that although adherence improved post-intervention the improvements were not maintained at follow-up. The largest randomised controlled trial to date of adherence therapy conducted by Gray et al. (2006) compared the intervention to an active control (health education) and concluded that adherence therapy was no more effective than the control intervention in improving quality of life. The potential reasons for the mixed findings are numerous (David, 2010; Gray et al., 2010); measuring adherence is notoriously unreliable, some studies had active control interventions whilst others compared to treatment as usual, levels of adherence were often relatively high at baseline and the intervention was delivered in varying clinical settings with patients at different stages of recovery.

The existing evidence therefore indicates that within research settings patient-focussed adherence interventions have the potential to improve patient outcomes. However, a more recent review of interventions to improve adherence with treatment in SMI (Barkhof et al., 2012) suggests that the ongoing and potentially continuous management of adherence may be best carried out by clinicians involved in patients' day-to-day clinical care which appears to reinforce the need for medication management staff training in order to equip the workforce to implement interventions within everyday clinical practice.

2:4 What are the potential benefits of medication management staff training for patient outcomes?

Staff training has the potential to improve patients' outcomes because research has demonstrated that there is a relationship between clinician knowledge and attitudes relating to medication management and ability to address non-adherence issues in SMI (Byrne et al., 2005; Byrne and Deane, 2011). A more recent study also supports the need for staff training; the relationship between staff knowledge/skills and difficulties managing medication non-adherence for bipolar affective disorder was reported by Tacchi et al., (2012) who showed that clinicians' baseline knowledge about medication and adherence in BPAD was poor and that the clinical approaches being used in an attempt to manage nonadherence were unlikely to be effective.

The previous medication management staff training trials have all demonstrated consistently positive patient outcomes and seem an appropriate and effective way to maximise the potential of medications and reduce non-adherence. The studies show that training community-based mental health care professionals resulted in improvements in symptoms of their patients, increased levels of adherence and improved patient engagement (Gray et al., 2004; Byrne and Deane, 2011; Harris et al., 2009). However; the study designs, contents, duration and effectiveness of the medication management staff training interventions vary across the different studies.

Gray et al., (2004) conducted a cluster randomised controlled trial in the UK which involved 60 community mental health professionals (CMHPs) and measured the effects of staff training on patients' psychopathology and other clinical outcomes over a six month period. The nurses were randomised based on geographical clusters to receive 80 hours of medication management training or to continue to provide treatment as usual. The results show that patients being treated by CMHPs who had received the training had significantly reduced levels of symptoms compared the treatment as usual group (change in PANSS total scores: medication management -16.62, treatment as usual

1.17; difference -17.79; 95% CI -24.12 to -11.45; $P < 0.001$). The improvement in psychopathology is clinically significant as 6 of the patients in the medication management group achieved at least a 30% reduction in symptoms compared to none in the treatment as usual group.

In addition to psychopathology, patients in the medication management group also showed a significant improvement in attitudes towards treatment and adherence with medication in comparison to treatment as usual. The training involved teaching “Compliance Therapy” interventions (as described by Kemp et al., 1996), training in the use of standardised measures to assess side effects/treatment attitudes and basic psychopharmacology education. The results suggest that the positive results seen in Kemp et al’s (1998) “Compliance Therapy” trial can be replicated in routine clinical practice by providing the workforce with medication management training.

Harris et al., (2009) also conducted a cluster randomised controlled trial in the UK. Their study involved randomising 28 pairs of CMHPs to either medication management training or treatment as usual. Similarly to the Gray et al (2004) study the training lasted for 10 days, however the researchers also provided monthly individual clinical supervision over the 9 month duration of the study. The contents of the training programme resembled those of Gray et al (2004); however there was some variation in the outcome measures and the clinical interventions had greater focus on reviewing the effectiveness of prescribed medications. The study also placed greater emphasis on the relationships between service users and CMHPs by assessing service users’ perception of therapeutic involvement using the Californian Psychopharmacology Alliance Scale (CALPAS) (Gaston and Marmar, 1993). The results of this study show significant improvements in psychopathology and the CALPAS scores for the patients being treated by CMHPs who had received training when compared to the control group.

Similarly, Byrne and Deane (2011) conducted a “medication alliance” 3 day staff training programme in Australia. The patients being treated by 46 CMHPs that received the educational intervention were followed over a period of 12 months and the patient outcomes measured included medication adherence, attitudes towards treatment, psychopathology and insight. The researchers suggest that the training programme resulted in significant improvements in levels of patients’ adherence and psychopathology, but as this is an uncontrolled study caution needs to be applied when interpreting the findings. Despite the study limitations, the results are promising and indicate that a shorter

medication management training programme can result in improved patient outcomes in a similar fashion to the longer training programmes.

The findings from all the previous medication management training studies therefore highlight that improving the knowledge and skills of CMHPs can result in better patient outcomes; however, due to the studies all being carried out in similar cultural and clinical settings it is uncertain as to how transferrable the training intervention is to other populations.

2:5 Why may medication management training interventions require adaptation to suit the local clinical context?

Researchers have demonstrated that when evidenced-based interventions are delivered to new populations they may require adaptation in terms of content, focus and method of delivery (i.e. Castro et al., 2004; Bell et al., 2007). A recent study also reinforces the need to alter medication management interventions to suit new cultural settings; Williams et al., (2012) conducted a series of mixed-methods studies and highlight the importance of including family members in interventions designed to improve adherence to HIV medications in China. It is therefore possible that the requirement to adapt adherence and related medication management interventions provides one potential explanation for the mixed results of efficacy studies conducted in new populations. The need to fine-tune adherence interventions for new populations is also supported by a literature review; Zygmunt et al., 2002 concluded that interventions targeted specifically to problems of non-adherence were more likely to be effective than broadly focussed interventions.

Transcultural psychiatry research has also demonstrated that the cultural and ethnic context and interpretation of mental health problems and their treatment vary dramatically across different cultures (Tseng, 2006) and this provides additional rationale for establishing the feasibility of adherence interventions in different cultures. A randomised-controlled trial of adherence therapy in Thailand (Maneesekorn et al., 2007) is the only study conducted in an Asian setting and is encouraging in terms of potential transferability of the intervention to a new cultural group. The intervention resulted in the largest effect size of all the previous studies and this clearly demonstrates that the intervention can be effective outside western settings. However, the wider scale implementation into routine practice via staff training has not been investigated and therefore clinicians' perceptions about the acceptability and relevance of the approach are currently unknown.

When expecting clinicians to implement interventions within routine practice it is vital to ascertain their views about the acceptability of interventions. This is clearly demonstrated by a recent randomised-controlled trial which investigated the efficacy of “Joint Crisis Plans” to reduce compulsory treatment for people with psychosis (Thornicroft et al., 2013). The researchers conclude that the intervention was not successful as there were no improvements in compulsory admission rates in comparison with treatment as usual. However, they also report that the clinicians who delivered the intervention had little faith in the approach; they did not maintain fidelity to the specified treatment model and less than half of the interventions were delivered in discrete clinical sessions as recommended by the study protocol. This raises important questions about the need for clinicians to “buy-in” to an intervention in order for it to be effectively and faithfully implemented in clinical practice (Thornicroft et al., 2013).

2:6 *The sequence, process and coherence of studies included in this research programme*

Appendix 1 is a concept map that details the sequence, process and relationship between the studies included in this research programme. The series of studies demonstrate my ongoing professional development as an autonomous researcher to the extent where I led three of the five included studies.

The first study commenced in the summer of 2006 and involved a survey by questionnaire and concurrent interviews of a sample of prisoners prescribed antipsychotic medication in three UK prisons. The quantitative and qualitative aspects of the study were reported in two separate papers (Gray et al. 2008; Mills et al., 2011). The study was funded by the Prison Health Research Network and my involvement started after funding had been granted. I was involved in the final design of the study in terms of considering which quantitative measures would be utilised and in finalising the semi-structured interview questionnaire. As a more junior member of the research team I worked under supervision from the chief investigator and assumed responsibility for the research in one of the clinical settings. In addition to this; I conducted the literature review, obtained research governance approval for one site, recruited participants at one site, collected the majority of quantitative data, conducted participant interviews, input all quantitative data, jointly analysed data, interpreted data analysis, was lead for writing of the quantitative paper and the corresponding author. The results from this study indicate that the clinical variables associated with antipsychotic medication adherence in prisons differed to those observed in UK community based samples of patients with severe mental illness; particularly in relation to the impact of adverse effects of medication on levels of adherence. These observed differences suggest that the specific clinical

environment is closely related to adherence and highlight the need for further research in similarly under-researched populations. Table 1 (appendix 2) synthesises the quantitative and qualitative findings in order to make recommendations for interventions to improve antipsychotic medication adherence in prisons.

The second study is a large survey of community-based patients with severe mental illness in Hong Kong (Bressington et al., 2012a) which started in January 2007; this study aimed to identify influences on medication adherence in this previously unexplored clinical population by using a similar research design to the first study and also adopted a similar data analysis strategy. The study explored issues relating to antipsychotic medication adherence and was led by a colleague in Hong Kong; I provided advice on the research design, helped with data input/cleaning, jointly analysed data, interpreted data analysis, wrote the final paper and was corresponding author. The results of this study suggest that levels of non-adherence are significant enough to warrant clinical attention in terms of medication management. Similarly to the findings from the quantitative prison study in this research programme, positive treatment attitudes were found to be significantly associated with adherence; this reinforces the view that interventions to improve adherence need to explore and improve patients' attitudes towards their medication.

Given that antipsychotic nonadherence was established as a significant clinical problem in Hong Kong, the next stage of this research programme was to identify and explore studies which reported the effects of staff medication management training on improving mental health professionals' ability to manage this issue. A systematic review of the literature (Bressington et al., 2013a) commenced in the summer of 2010, it was conducted in order to clarify which medication management training interventions had been most effective; so that both the contents and research design of the planned subsequent staff training study were based on the best available evidence. I designed the review, conducted the literature search, jointly assessed the quality of the included studies, conducted data analysis, interpreted findings of the review/analysis, wrote the paper and was corresponding author. Table 2 (appendix 3) outlines the main results from this review and the previous studies which were used to help inform the content and the research design of the subsequent medication management training programme.

The fourth study included in this research programme (Bressington et al., 2012b) is longitudinal case series study that investigates the effects of the modified medication management staff training programme on community mental health practitioners' understanding and clinical practice in Hong Kong. The study was designed based on the findings from the earlier studies included in this research programme and started in 2011. In terms of my involvement I was the project lead, designed the

study, wrote the proposal, completed all ethical approval documentation, obtained funding, delivered the training, collected concept mapping data, jointly analysed data and was corresponding author. It was decided to conduct a longitudinal case series, employ a mixed-methods approach towards data collection and collect data at baseline, immediately post training and at 9 months follow-up. The primary method of data collection chosen was concept mapping because previous research findings (Bressington et al., 2011) suggested that it was a useful method to use to measure changes in understanding over time and also was effective to encourage self-prompted reflective dialogue within qualitative interviews. The study also used the Knowledge about Medication Management Multiple Choice Questionnaire (KMMCQ; Gray et al., 2004) to measure changes in clinicians' knowledge immediately post training in order to be able to compare the results with previously published studies.

In line with the recommendations in table 2 (appendix 3) the training programme was delivered for a total of five days; the initial three days teaching were followed by a period of three days clinical practice before the remainder of the teaching content was delivered. The period of clinical practice was built in so that CMHP's clinical work could be explored through clinical supervision in the classroom. We included content relating to psychopharmacology/side effect management due to the associations identified between side effects and non-adherence in our Hong Kong adherence survey. The compliance therapy interventions used in previously published studies were at the core of the clinical approaches that were taught to address non-adherence and the main elements of manualised adherence therapy (Gray et al., 2006) were used in an attempt to improve clinician fidelity to the treatment protocol; although more emphasis was placed on predicting how the adverse effects of treatment may become more concerning if demands on occupational and social functioning change over the longer term. In line with the results from the Hong Kong adherence survey, CMHPs were encouraged to explore patients' views about their awareness of the need for treatment so that the primary and secondary benefits of medication may be reinforced.

The final study in this research programme (Bressington et al., 2013b) is a cross-sectional study which aimed to estimate the prevalence of metabolic syndrome in community-based patients with severe mental illness in Hong Kong and to identify the relationships between metabolic syndrome and treatment, sociodemographic and lifestyle factors. The study commenced in February 2012, the rationale for conducting it stemmed from the results from the Hong Kong survey which demonstrated that adherence was associated with antipsychotics reported to cause metabolic problems and also from the staff medication management training study in which mental health

professionals identified family concerns about physical health as being a barrier to adherence. This was an important issue to explore as given the absolute lack of evidence about the extent of metabolic disorders in the Hong Kong SMI population, clinicians in this setting would have difficulty in providing evidence-based accurate information to concerned patients and carers in relation to this issue. I was the project lead, designed the study, obtained research funding, jointly input data, jointly analysed data, interpreted data analysis, wrote the paper and was corresponding author.

The range of studies included in this research programme evolved over time; the process of conducting the studies was a learning process where lines of scientific enquiry and research designs were influenced by the experiences and results of the previous studies. Therefore the series of studies clearly informed each other, but in an ideal world they would have been planned from the outset of the programme. With the benefit of hindsight it would have been more effective and less time consuming to have engaged the Hong Kong based mental health professionals in focus groups prior to designing and delivering the training; this approach may have helped to establish their views about their training needs in order that potential barriers to implementation and required modifications to content could have been identified earlier.

3: Critical appraisal of included studies

3:1 *General methodological issues*

Quantitative research design of included studies

The quantitative studies included in this research programme are primarily observational cross sectional surveys which were used to establish the extent of clinical problems being investigated and identify associated independent variables which may be potential targets for medication management interventions. The conclusions drawn from the results obtained from cross sectional surveys are limited in that it is not possible to demonstrate causality between the dependent and independent variables. The data that is gathered only provides a snap-shot of the prevalence of the dependent variable and other variables that are associated (Hennekens et al., 1987). In addition to the limitations on demonstrating causality, cross sectional studies are heavily dependent on the recruitment strategy which will influence the generalisability of the results (Barker, 2013).

Measuring non-adherence with treatment

The measurement of non-adherence is a challenging issue for researchers, particularly as the most nonadherent patients are the least likely to agree to participate in studies; potentially resulting in an

over-estimation of adherence rates (Gray et al., 2006; David, 2010). Methods of measuring non-adherence can be classified as being objective or subjective in nature, currently there is no agreed gold-standard of measurement, and in fact measurement issues have been cited as being the “Achilles Heel” of all adherence research (Kikkert et al., 2008).

Objective measurements include electronic recording of when pill boxes are opened, blood tests to ascertain medication levels, medication possession ratios and other pill counting methods (Sajatovic et al., 2010). All of these methods have potential limitations, particularly where non-adherence may be covert; for example a record of a pill box being opened or a count of remaining tablets does not guarantee that the medication was actually taken. One of the most accurate approaches towards objectively measuring adherence (and which may also detect covert non-adherence) is a blood serum concentration level to dose ratio (Sajatovic et al., 2010); where higher levels of the ratio indicate adherence. However this approach also has limitations in terms of patient acceptability, this method was recently utilised as an outcome measure in an adherence therapy randomised controlled trial (Shultz et al., 2013) and patients were found to be reluctant to attend for blood tests; in fact only 58% of the 161 patients that were randomised for sampling agreed to have their blood taken.

Clinicians’ subjective impressions about patients’ levels of adherence have also been shown to be potentially inaccurate, particularly when ratings are compared to direct observational methods such as medication electronic monitoring systems (Byerly et al., 2007). For example, a study by Byerly et al., (2005) reported that clinicians felt 100% of patients were adherent when actually 48% were non-adherent as measured by the electronic medication monitoring device.

Patients’ subjective reports of adherence levels are similarly problematic and also tend to overestimate adherence. Even standardised subjective rating scales that are still widely used in adherence research have been shown to have limited accuracy; Kikkert et al., (2008) demonstrated that three standardised questionnaires used concurrently in the same patient group (Medication Adherence Questionnaire: Morisky et al., 1986; Compliance Rating Scale: Kemp & David, 1996; Drug Attitude Inventory: Hogan et al., 1983) failed to agree on levels of non-adherence. The evidence therefore suggests that researchers need to be mindful of the limitations of accuracy that relate to adherence measures, appreciate that adherence is likely to be overestimated based on subjective reports and where possible combine approaches.

Concept mapping as a research method

Concept mapping is an approach that is used to graphically represent understanding and the process of learning; it is based within constructivist epistemology (Kandiko and Kinchin, 2012) and is concerned with the ways in which individuals organise and order knowledge based on their experiences (von Glasersfeld, 1984). Concept maps are similar to “mind maps” and involve students creating a pictorial representation of how concepts relating to their understanding of a particular topic are related to each other by using explanatory linking statements (Rice et al., 1998). Recently, series of individual concept maps have been used to track the changes (or lack of changes) in a person’s understanding over time in order that experiential and other learning triggers can be identified and explored (Kinchin et al., 2010; Miller et al., 2009).

The decision to use concept mapping to explore the process of learning was driven by a review of the literature and previous research experience. The evidence base at the time of designing the training study suggested that traditional methods of assessing learning (i.e. multiple choice questionnaires) were too superficial as they are reliant on comparing students to pre-set academic standards, rather than being able to explore how new knowledge is integrated into existing understanding and how this is actually applied to clinical practice. An example of this finding was reported by Hay et al., (2008) who concluded that psychiatry students’ traditional academic achievements did not correspond with the complexity of understanding reflected within their concept maps, and also that concept mapping in conjunction with qualitative interviews may elicit detailed personal narratives about both the process and outcomes of learning. This view is also supported by Miller et al., (2009) who demonstrated that study participants’ reflective narratives that were prompted by looking at changes in map series were useful in explaining and expanding the researchers’ understanding of the process and results of learning.

In a previous study Bressington et al., (2011) demonstrated the benefits of using concept maps to prompt discussion within interviews and explore how understanding changes as a result of education and the application of interventions within clinical settings. Subsequently other researchers have suggested that using concept maps and mind maps within qualitative interviews is a useful strategy to encourage participant recall and prompt dialogue; Wheeldon (2011) showed that research participants who constructed mind maps were more able to remember, organise and frame reflections upon their past experiences. Similarly, in a recently published study by Kandiko & Kinchin (2012) PhD students completed concept maps and used these within one-to-one interviews with their supervisors; the results demonstrated that combining the interview and map data helped to reveal the unique nature and process of learning within supervision.

3:2 Study 1: What is the extent of and associations with medication non-adherence in prisons? And what do prisoners' narratives further tell us about medication management in this setting?

(Gray et al., 2008; Mills et al., 2011).

The critical appraisal of this study is guided by a critical appraisal survey checklist developed by Crombie (1996) adapted for the Oxford Centre for Evidence Medicine and published by a British Medical Journal evidence based health series (example questions are in appendix 4). The appraisal of the qualitative element of this study is based on the Critical Appraisal Skills Programme Qualitative Research Checklist (CASP, 2013a); (please see appendix 5 for examples of questions).

This study addresses a clearly focused clinical issue as the objectives were to explore the relationships between medication adherence and a variety of other clinical/treatment/demographic variables in prisoners taking antipsychotic medications. The study also intended to examine prisoners' subjective experiences of medication in order to provide a contextualised understanding of adherence within a prison setting.

The research design seems appropriate for answering the clinical questions as this study utilised a mixed methods design where quantitative and qualitative data were collected concurrently. A cross sectional survey design was chosen in order to gather data relating to the standardised numerical questionnaires, whilst qualitative interviews were conducted in order to obtain narratives about prisoner's experiences of taking antipsychotic medication.

The recruitment process is one of the main limitations of this study; this project used a convenience sampling strategy rather than random selection, which is likely to have resulted in selection bias (Riedel-Heller et al., 2000). Therefore the sample may not be representative of the SMI prison population and this may have also led to an overestimation of adherence rates. In order to ascertain the representativeness of the sample it would have been worthwhile to compare the demographic and clinical data of participants with similar data from the greater prison population. The response rate of 79% may also have affected the representativeness of the sample because it is likely that the most inherently adherent prisoners agreed to take part in the study. The sample size was not based on pre-study considerations of statistical power and it is therefore possible that this oversight resulted in an under-powered sample which may have affected the statistical significance of the identified associations between variables (Delucchi, 2004).

The quantitative measures that were used in the study were chosen based on their reported strengths in terms of their validity and reliability; however, the problematic nature of clinicians'

assessment of adherence which is previously discussed in this narrative is relevant to this study and this approach may have resulted in a further overestimation of adherence rates.

Although perhaps not ideal; the quantitative and qualitative data were discussed in separate papers due to the large amounts of data that required reporting and the health journal restrictions on word counts, however a report to the NHS R and D (Gray et al., 2007) and a related discussion paper written by the research team and published in "Mental Health Practice" (Bressington et al., 2008) combine the results from the data in order to provide a contextual understanding of the relationships between variables identified within the quantitative survey (Bryman, 2006).

The process of analysing the qualitative data is well described and clearly shows how the stages of thematic analysis were used to identify categories and themes from the interview data. But, the credibility of the findings are not well discussed in the qualitative paper, it would have been more transparent for reflexivity issues to have been outlined as the researchers' beliefs, values, perspectives and professional experience may have influenced the identification and interpretation of the themes that emerged from the data (Cresswell and Miller, 2000). A further potential limitation of the qualitative element of the study was that it was not practically possible to obtain respondent verification of the themes that were identified and this may have also negatively impacted on the credibility of the findings (Burnard et al., 2008).

3:3 Study 2: How common is antipsychotic medication non-adherence in an Asian population and are targets for interventions different in this context?

(Bressington et al., 2012a)

The critical appraisal of this study is also guided by a survey critical appraisal checklist developed by Crombie (1996) and adapted for the Oxford Centre for Evidence Medicine (please see appendix 4). This study had a clear and clinically relevant focus because it aimed to determine the prevalence of non-adherence with antipsychotic medication in patients being treated by the community psychiatric nursing (CPN) service in Hong Kong. It also aimed to explore the relationships between adherence and beliefs/attitudes towards medication, and identify sociodemographic and clinical variables associated with adherence.

The study involved a large number of patients (584 in total) and had a very high response rate (97%); which may have strengthened the representativeness of the sample, but one of the main study limitations relates to the convenience sampling strategy which could have introduced selection bias (Riedel-Heller et al., 2000). Given that levels of non-adherence with treatment were self-reported,

and that data were collected by nurses directly involved in providing clinical care it is additionally likely that the patients reported an overly positive picture of their medication taking behaviour. These issues could have resulted in underestimating the prevalence of non-adherence in this population.

The study adopts a similar design to that of the prison survey and also used some of the standardised assessments that were found to be useful in explaining adherence in prisons, but these may not have the degree of specificity required for the very different cultural and clinical setting. The measures were chosen based on their reported psychometric properties and availability of translated versions. Although they had been translated into Chinese and back-translated into English to check for language accuracy this process does not guarantee reliability in a Chinese population (Giesinger, 1994). The analysis strategy which involved dichotomising patients as either adherent (scoring ≥ 3) or nonadherent (scoring ≤ 2) is also arguably another limitation of this study as partial and fluctuating adherence may be more commonly observed in clinical practice (Masand et al., 2009). Therefore it may have been more clinically relevant to utilise the total adherence score as the dependent variable rather than polarising the sample into adherent or nonadherent patients.

Despite using similar approaches to the prison survey, the study was only able to account for 13% of the variance in nonadherence (as opposed to 52% of variance in the prison study); suggesting that some important additional independent variables have been overlooked. On reflection the decision not to measure treatment satisfaction (using the SWAM; Rofail et al., 2005) which was highly significant in explaining adherence in the prison study, may have resulted in the poor explanatory power of the final regression model.

This study only considers quantitative data, because at the time of designing the study the main aim was to recruit a large number of patients to try and improve the representativeness of the sample. Conducting, transcribing and analysing qualitative interviews in conjunction with the quantitative measures with all patients would be rather impractical and too resource intensive, but a small sample of patients could have been selected for interview. This lack of qualitative data is a further potential study limitation; overall the results from this large quantitative survey provide useful information about potential targets for adherence interventions, but if qualitative data relating to patients' experiences of taking medication had been collected, the findings may have been able to more accurately contextualise the observed associations between the variables (Cresswell and Plano Clark, 2010).

In summary, this study provides useful information about the problem of nonadherence with antipsychotics in Hong Kong, but the results show that the application of a research methodology which is effective in a western setting is not directly transferrable to a Hong Kong context, and therefore further studies are needed to more certainly establish what influences medication taking behaviours in Asian populations

3:4 Study 3: What are the effects of medication management training on staff outcomes? (A systematic review of the literature)

(Bressington et al., 2013a)

The critical appraisal of this systematic review is based on a Systematic Review Checklist (CASP, 2013; appendix 6). The purpose of this study was to identify, and explore the effects of medication management staff training studies which aimed to empower mental health clinicians to address non-adherence with treatment in people with SMI. The review addressed a clearly focussed question as the population, intervention and study outcomes are well defined. The review aimed to include a broad range of study designs in order to answer the review question; however, due to a limited amount of studies being identified from the search only uncontrolled quantitative studies were included in the review. The inclusion of studies only written in English may have resulted in important studies that were written in other languages being overlooked and also presents a question about the generalisability of the findings beyond English speaking countries (Moher et al., 1999). The process of searching the databases is well-described and relatively thorough which should have ensured that all of the important and relevant published studies were included in the review. But, on reflection it would have been beneficial and more comprehensive to have also searched for unpublished studies via clinical trial registration databases.

Arguably, due to the lack of comparison groups in the included studies it may have been more appropriate to conduct a narrative review rather than calculate effects sizes for comparison purposes; particularly as the educational and clinical relevance of the individual effect sizes is unclear due to the heterogeneity of outcome measures used (Blettner et al., 1999). However, as the high degree of observed heterogeneity in terms of outcome measures, study populations, length of the training interventions and study designs complicates the direct comparison of results, the decision to not combine results by meta-analysis seems appropriate.

Some of the strengths of this review include the transparency of the discussion relating to the review limitations, the methodological qualities of the included studies are appropriately assessed

using a recognised checklist and the design and the reporting of the study generally adhered to PRISMA guidelines (Moher et al., 2009).

3:5 Study 4: How transferrable is medication management training to an Asian population and what further modifications to training are required?

(Bressington et al. 2012b)

This study is appraised in accordance with the Critical Appraisal Skills Programme Qualitative Research Checklist (CASP, 2013a; appendix 5). The aims of this study were clearly stated as the specific objectives were to explore changes in Community Mental Health Practitioners' (CMHP's) understanding as a result of medication management training and gain insight into CMHPs' experiences of using the evidence-based medication management approaches in Hong Kong. The qualitative study design is an appropriate method to employ in order to meet these aims due to the focus on the experiences of practitioners that had received the medication management training intervention. The purposive recruitment strategy is suitable for the population being investigated. Although reflexivity issues were considered throughout the research process, the selection of the clinicians that were chosen for interview was based the research teams interpretations of the structure and contents of the concept maps, and this may have resulted in some meaningful additional clinician narratives being excluded.

Although not reported in the published paper, qualitative and quantitative data were collected concurrently. The quantitative data (which consisted of the KMMCQ pre and post training scores) showed a significant improvement in clinicians' knowledge about medication management immediately post training ($t= 5.085$; $p<0.001$; 95% CI 7.97, 3.40); however due to the word limitations of the journal in which the paper was published and the journal reviewer's comments about maintaining a qualitative focus in the manuscript these results were not reported. Therefore, on reflection the inability to report the quantitative data may have reduced the overall quality of the study because it detracts from the completeness of the study and precludes the in-depth contextual understanding that can be conveyed by studies that utilise a mixed-methods study design (Cresswell and Plano Clark, 2010). Another limitation of this study relates to the difficulties in generalising the findings beyond the study population due to the interpretative nature of the approach.

The process of thematic analysis is sufficiently rigorous and some of the other strengths of this study relate to the credibility of the findings; which were strengthened by the processes of peer review of the thematic analysis and respondents' validation of the results (Tong et al., 2007). The effective use

of concept maps to prompt narratives and visualise changes in understanding over time is also demonstrated by this study, and as previously discussed in this reflective commentary the decision to use this relatively novel approach towards qualitative data collection was based upon previous research experience and evidence reported by other researchers.

3:6 Study 5: What is the extent of treatment related metabolic disorders and other physical health problems in Hong Kong?

(Bressington et al., 2013b).

The critical appraisal of this study is guided by a survey appraisal checklist developed by Crombie (1996) and adapted for the Oxford Centre for Evidence Medicine (appendix 4). This descriptive study has clearly defined aims: to estimate the prevalence of metabolic syndrome in community dwelling patients with SMI in Hong Kong; and to identify the relationships between metabolic syndrome and sociodemographic, treatment and lifestyle variables in the study population. The aim of the study is clinically relevant due to the lack of evidence about the prevalence of metabolic syndrome in this population and the cross sectional design is appropriate to answer the study question.

Despite this study's important and unique contribution towards the evidence base, the results need to be viewed in light of the numerous study weaknesses. One of the main limitations relates to the consecutive recruitment strategy which was not randomised; it involved CMHPs recruiting and collecting data from the first 5 patients that they were routinely scheduled to visit, and is therefore likely to have introduced an increased risk of selection bias (Kendall, 2003). A randomised recruitment strategy may have helped to minimise this risk.

The HIP (White et al., 2009) physical health screening tool is the primary measure used for data collection. CMHPs used this form to assess areas of physical health risk and to collate/record biometric data (blood test results etc.) from recent outpatient records. It is likely that obtaining blood test results from outpatient records has resulted in a biased sample, as patients who had been invited to attend for such tests may have been asked to do so because of clinicians' concerns about their physical health, and therefore are more likely to have developed metabolic syndrome than those who had not been invited. Looking back, it would have reduced the potential of bias if we had obtained blood samples as part of the study, however there were a number of reasons why we decided against this when designing the study: this approach would have resulted in increased financial costs; we wanted to reduce the assessment burden for both CMHPs and patients; and we aimed to explore the feasibility of CMHPs taking a brokerage approach towards physical health risk assessment by using the HIP within routine clinical practice which would usually involve key-workers interrogating existing medical records.

As the CMHPs collected data this may have resulted in patients self-reporting an overly positive picture of their lifestyle and this could account for the lack of associations identified between metabolic syndrome and some health behaviours. The sample size is also relatively small for an epidemiological study and as it was not guided by a power calculation this may account for the lack of statistically significant associations identified between the dependent and independent variables (Delucchi, 2004). Some of the strengths of this study include the rigorous data analysis strategy, the results are presented in terms of odds ratios/relative risks with confidence intervals and the significance of the findings are discussed in terms of clinical relevance.

In summary, the studies included in this research programme have some methodological weaknesses. These often relate to the recruitment strategies utilised, the selection of specific quantitative measures, the approaches used to estimate levels of antipsychotic medication adherence and the potential lack of statistical power due to the low numbers of participants. These study limitations are frequently the result of pragmatic decisions that are necessitated from conducting the research in real-world settings with very limited financial resources. Despite these imperfections, the results make an important contribution towards the understanding of how mental health professionals can help patients to manage their prescribed antipsychotic medication.

4: Contribution towards knowledge and the need for further research in this area

The published papers included in this research programme have been referenced by other researchers 22 times at the time of writing this narrative. If the findings can be used to help devise medication management staff training programmes which result in improved levels of patient adherence with antipsychotics it would be a significant clinical development, which may help to improve the efficacy of treatment and hence the cost effectiveness of mental health services.

4:1 What do the research programme's findings tell us about recommendations for practice and education?

The findings from this research programme contribute towards developing a better understanding of influences on adherence with treatment which are potential targets for intervention. The results also indicate that the cultural and clinical context of treatment is an important consideration when developing medication management training interventions for new populations.

The prison studies show that treatment satisfaction is related to adherence and counter-intuitively the side effect of weight gain was positively associated with adherence. More side effects were also reported by prisoners than in general psychiatric settings and despite the absence of legal powers to enforce treatment under the Mental Health Act (1983) levels of adherence were better. Prisoners also stated that in the past side effects had resulted in their stopping their treatment and that they were presently passively accepting of treatment. Therefore, in prisons it is important that clinicians appreciate that the adverse effects of treatment are less likely to contribute towards negative attitudes about medication whilst patients are incarcerated and more clinical emphasis needs to be placed on exploring how prisoners will feel about taking medication when demands on their functioning change.

The Hong Kong adherence survey identified that the factors associated with increased adherence were: fewer side effects, being prescribed clozapine, lower levels of symptoms and being in receipt of state benefits. The results may relate to concerns about the impact of side effects on occupational functioning or service users' experiences of stigma about mental illness in the workplace. This suggests that interventions should focus on reducing concerns about the adverse effects of treatment, particularly when people are working. Focussing medication management interventions purely on the "here and now" may result in clinicians failing to predict and prevent non-adherence over the longer term.

The results from both the adherence cross-sectional studies also demonstrate that clinical efforts to improve adherence should aim to explore patients' awareness of the need for treatment and require less focus on enhancing insight into the illness itself. The studies show that improved adherence is associated with fewer symptoms and the belief that "my antipsychotic medication makes me feel better"; suggesting that improving patients' satisfaction about the efficacy of treatment is a suitable target for medication management interventions.

A systematic review of the literature demonstrated that medication management staff training programmes designed to enhance patient adherence with treatment were likely to be effective in improving clinician's outcomes immediately post-training. However, the study showed that there was a lack of evidence in terms of transferability of the training to different clinical populations and also identified a lack of robustly designed longitudinal studies that measure the durability of improvements and explore clinicians' experiences of delivering the interventions in clinical practice. The results also suggest that a shorter duration of training may be effective in terms of improving

mental health professionals' ability to manage nonadherence and therefore a reduction in training time may improve cost-effectiveness.

The medication management training study shows that the refined medication management training programme had a positive effect on clinicians' understanding and clinical practice. Practitioners felt that the programme was mainly transferrable to an Asian population, but required some modifications; particularly in relation to the influences of family members and cultural beliefs on adherence with treatment. The study demonstrates that the training requires psychopharmacology and side effects management content in order to improve clinicians' confidence when having treatment-related discussions with patients, carers or colleagues. The pragmatic approach that is adopted due to perceived implementation barriers suggests that clinical supervision and additional resources may also be required to improve fidelity to the treatment model.

As metabolic disorder was found to be highly prevalent in Hong Kong, physical health inequalities for people with SMI in this setting are similar to those observed in western countries. The lack of association between metabolic syndrome and antipsychotic medications most widely felt to cause metabolic disorders may suggest that lifestyle factors are more important in terms of aetiology and raises a question about how much focus medication management interventions should have in this regard. The findings may indicate that physical health promotion strategies require greater attention as part of general mental health clinical practice rather than being a specific focus of medication management. However; the Hong Kong concept mapping study demonstrates that patients' and families' worries about the effects of medication on physical health are a barrier to adherence and therefore enhanced physical health screening may address these concerns and provide some reassurance about physical safety. Due to previously published evidence that atypical antipsychotics are associated with metabolic disorders, the physical health monitoring policy in the clinical setting recommends that only patients receiving this group of drugs require annual screening. However, as our results show that typical antipsychotics were associated with metabolic syndrome this suggests a change in local policy is required and that screening should be extended to all people taking antipsychotics irrespective of the drug type or group prescribed.

The results from the series of studies included in this research programme can be synthesised into recommendations for the future development of medication management staff training packages designed to assist practitioners in managing patients' non-adherence with antipsychotic medication. These recommendations can be categorised into the following three areas:

- ***Core elements of medication management training*** - Approaches designed to manage antipsychotic non-adherence should aim to work in partnership with patients to facilitate informed choice, focus on maintaining therapeutic engagement and avoid criticism/coercion. Assessing and maintaining satisfaction with antipsychotics is key to enhancing adherence and medication should be regularly reviewed to ensure efficacy. Clinicians should focus on improving patients' attitudes towards treatment by enhancing perceptions about the personal relevance of treatment and by considering the relationship between the environmental contexts of treatment and distress associated with antipsychotic side effects. Antipsychotic medication management training packages may be most effective if they have built in clinical supervision, provide education on psychopharmacology/side effects management and place greater emphasis on the longer term influences on treatment satisfaction.
- ***Hong Kong specific required modifications for medication management training:*** Professionals require specific teaching to build their skills and confidence when having conversations with patients/families about traditional cultural beliefs relating to mental illness and antipsychotic treatment. Medication management interventions in Hong Kong should incorporate regular enhanced physical health screening in order to enhance safety and satisfaction with treatment over the long term.
- ***Considerations for adaptation of medication management training to other settings:*** Potential barriers to the implementation of interventions should be considered prior to designing medication management training. Involving experienced practitioners in the design of training would afford them a sense of ownership of the clinical approaches and may highlight additional cultural considerations.

The findings from this research programme have also led to the development of a conceptual model for long-term antipsychotic medication management which will require testing in future studies (appendix 7). The model aims to provide a framework for enhancing long term adherence by improving satisfaction with treatment in three areas of medication outcomes (symptoms, side effects and physical safety). The overall aim is to manage fluctuating satisfaction across these three spheres of outcome within the environmental and therapeutic context of treatment. A recent systematic review of the literature (Barbosa et al., 2012) reports that satisfaction was found to be associated with increased levels of adherence and persistence. This reinforces the view that

components of treatment satisfaction may be useful targets for medication management interventions rather than a focus on adherence itself.

4:2 *What should be the next steps for research in this area?*

It is tempting to assume that targets for medication management interventions are universal; whilst some evidence was found to support this it is clear that non-adherence and concerns about treatment are environmentally bound. The results show that the application of a research methodology which is effective in explaining adherence in a western setting is not directly transferrable to different cultural contexts, and therefore further studies are needed to more certainly establish what influences medication taking behaviours in Asian populations. As adherence is unlikely to be static, longitudinal data would help to get a better picture of adherence behaviours over time.

The results show that patient and family concerns about physical health may be related to adherence, a finding which requires further exploration and presents a question about whether previous medication management studies have given due consideration to longer-term concerns about treatment and the potential effects of medication on patients' physical well-being. Satisfaction with treatment is closely related to adherence and given the problems associated with measuring adherence, future medication management studies could consider utilising satisfaction as an alternative primary outcome measure.

The next stage for research in this area is to measure the efficacy of enhanced medication management training for an Asian population. The focus of individual patient interventions will be based on the "Medication Management Target Model" (appendix 7) and the additional teaching content will include strategies for engaging and working with families in addition to enhanced physical health management approaches. In order to establish the effects of the enhanced medication management training on patient outcomes, a cluster randomised controlled trial design will be utilised. As previous medication management staff training trials have not used active control interventions I plan to compare "enhanced medication management training" to a control training intervention based on current best practice (standard medication management training) by randomising clinicians in clusters based on the geographical location of their clinical base. A mixed-methods approach towards data collection will be utilised where concept mapping and clinicians'

narratives are used to gain a deeper understanding of learning and implementation issues, in conjunction with quantitative data relating to patients' clinical outcomes.

5 *Conclusions*

Concerns about the adverse effects of treatment that influence adherence are environmentally bound. As influences on medication adherence are different in different settings, staff training programmes should place more emphasis on the local context in order to improve efficacy and the feasibility of implementation. The outcomes indicate that the modified medication management training programme is likely to result in an improvement in mental health professionals' ability to manage antipsychotic nonadherence in Hong Kong. However, the results also show that in this setting medication management interventions should have an increased focus on families and treatment satisfaction could be a suitable target for interventions. The findings also present a question about whether previous medication management studies have given due consideration to predicting and managing concerns about the impact of side effects on functioning over the longer term and the potential effects of medication on patients' physical well-being. The outcomes of this programme also demonstrate that future medication management training studies need to use robust study designs in order to more certainly attribute clinicians' improvements to the training intervention and could consider measuring treatment satisfaction as a primary patient outcome measure.

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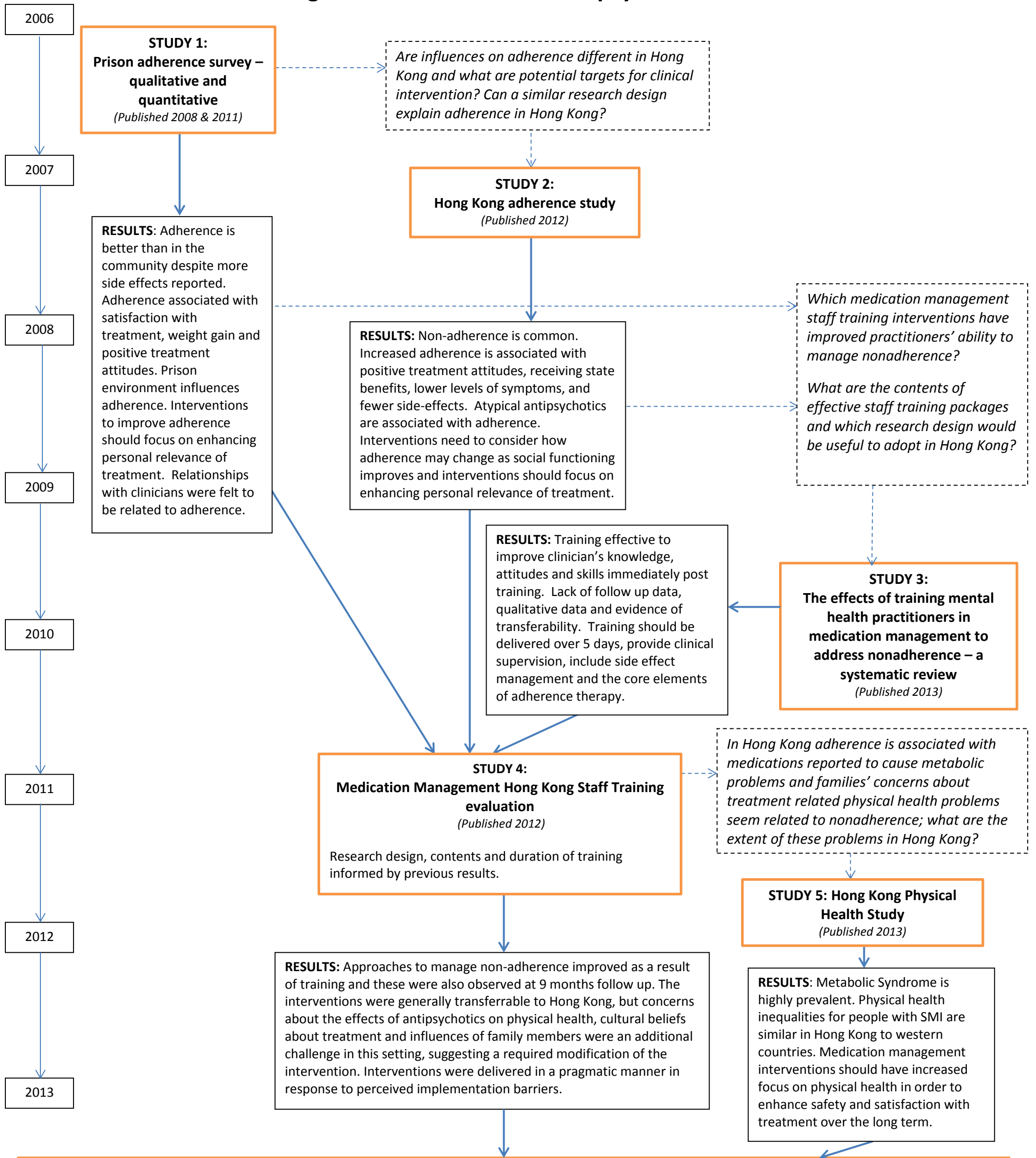
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Research concept map – development and evaluation of a staff training package to manage nonadherence with antipsychotic medication



Medication Management final training recommendations

Core elements of training: Interventions to manage antipsychotic non-adherence should aim to work in partnership with patients to facilitate informed choice, focus on maintaining therapeutic engagement and avoid criticism/coercion. Assessing and maintaining satisfaction with antipsychotics is key. Clinicians should focus on improving patients' attitudes towards treatment by enhancing perceptions about personal relevance of treatment and by considering the relationship between the environmental contexts of treatment and distress associated with antipsychotic side effects. Antipsychotic medication management training packages may be most effective if they have built in clinical supervision, provide education on psychopharmacology/side effects management and place greater emphasis on the longer term influences on treatment satisfaction.

Hong Kong specific required modifications: Professionals require specific teaching to build skills/confidence when having conversations with patients/families about traditional cultural beliefs about mental illness and antipsychotic treatment. Medication management interventions in Hong Kong should incorporate regular enhanced physical health screening in order to enhance safety and satisfaction with treatment over the long term.

Considerations for adaptation to other settings: Contextual potential barriers to the implementation of interventions should be considered prior to designing medication management training. Involving experienced practitioners in the design of training would afford them a sense of ownership of the clinical approaches and may highlight additional cultural considerations.

Appendix 2 - Table 1: Summary of findings and clinical implications (from Bressington et al.,2008)

Topic	Findings	Suggested interventions	Potential clinical benefits
Exchanging information about treatment	2/3rds of prisoners felt they were not given enough information	To provide clear, understandable and accurate information about medication (potential benefits and adverse effects)	To minimise potential mistrust in services. To aid in maintaining collaborative therapeutic relationships
Service provision	Prison routine helpful, but inflexibility in routine a potential practical barrier to adherence. Prisoners who had medication dispensed on a daily basis were more adherent	The taking of medication should be embedded into the daily routine. The dispensing of medication should not be at the same time as other activities (i.e. meal times).	To reduce the likelihood of forgetting to take medication and to minimise practical barriers.
Motivation to take medication	Prisoners motivated to take treatment were more adherent	Assess motivation in terms of: Importance of treatment, Confidence to take treatment and Satisfaction with treatment.	To explore motivation so that reasons for feeling unmotivated can be identified and addressed
Recognising benefits of treatment	The idea that: “my antipsychotic medication makes me feel better” was identified as a strong predictor of adherence.	Explore the direct and indirect benefits of treatment and ambivalence about taking medication. Help the prisoners to consider how medication may help them to achieve goals.	To help prisoners recognise the benefits of treatment and explore the natural uncertainty about taking long term medication.
Side effects from medication (SE's)	A higher incidence of SE's was identified than in community populations, the influence of individual SE's may differ in prison populations from the general population.	The impact of side effects may be environmentally bound. SE's should be assessed and addressed as required. Explore the current distress associated with SE's and help the prisoner to consider how these SE's may impact on functioning upon release from prison.	To reduce distress associated with SE's that is likely to negatively influence adherence. To collaboratively promote adherence when released from prison.
Assessing adherence	Prisoners were passively accepting of medication, however reported previous episodes of non-adherence	Assess adherence regularly and explore past and present reasons for non-adherence. For professionals to recognise that adherence is subject to change over time.	To maintain concordance in the relationship. To obtain an accurate picture of the prisoners participation and minimise non-adherence upon release.
Therapeutic relationships	Majority of prisoners felt listened to by professionals. Lack of time during appointments and difficulty accessing talking treatments were identified as areas for improvement.	To maintain therapeutic collaborative relationships with prisoners. Where possible; to increase the amount of time spent with prisoners in appointments and increase the provision of psychological input.	To incorporate psychological approaches into treatment packages so that residual symptoms may be managed and so that engagement is maintained.

Appendix 3 - Table 2: Systematic review findings

Topic	Findings	Implications for Medication Management training
Duration of training	Longer duration of training resulted in the largest effect sizes. But, the additional costs of training may not translate into meaningful educational differences; for example, Gray's 10 day study results in only a one point gain on a 16 item multiple choice questionnaire when compared to Byrne's 3 day programme.	Reduce training length to the minimum that allows for the required teaching content to be covered. 3 days is sufficient to deliver the adherence therapy approaches (as demonstrated by Byrne's studies) and an additional 2 days is required for psychopharmacology and side effects management.
Content	Training programmes which incorporated clinical supervision result in the largest effects sizes, particularly in relation to skills.	Build clinical supervision into the training in order that clinicians can reflect on their clinical work, have support in working with challenging patients and ground their practice within theoretical perspectives.
Content	Psychopharmacology and side effects assessment/management content is only included in Gray's 10 day programme. However, previous research demonstrates that a lack of psychopharmacology knowledge contributes towards clinicians' difficulties addressing non-adherence and concerns about side effects are likely to result in non-adherence.	Build psychopharmacology and side effects assessment/management content into a shorter programme. Interventions should aim to consider how patients' concerns about side effects may negatively influence adherence, particularly when demands on functioning change or when they are working.
Content	Adherence with treatment is an important focus of medication management interventions. All studies used the core elements of Kemp et al.'s "compliance therapy" approach to explore patients' beliefs and attitudes towards non-adherence in order to help patients recognise the benefits of treatment and address concerns about treatment.	Utilise core elements of compliance/ adherence therapy in order to address non-adherence issues.
Outcome measures	All studies included in the review used repeated quantitative measures to determine the knowledge and attitudinal related effects of training; these were typically multiple choice questionnaires. The measures used were different across each study and were not standardised, resulting in complications when directly comparing outcomes due to heterogeneity.	Use an outcome measure that has been tested and reported in earlier research. The content validity and test-retest reliability of the Knowledge about Medication Management Questionnaire (KAMMQ; Gray et al., 2004) had been established and as this measure also relates to psychopharmacology content this should be considered as a potential outcome measure where training will involve this content.
Follow-up period	Only one study (Byrne and Dean, 2011) reported durability of clinicians' improvements over a significant follow-up period. As knowledge and skills deteriorated over 6 and 12 months it is likely that the other studies overestimate the effects of training on clinicians outcomes.	Utilise a significant follow-up period to explore how understanding and clinical practice are affected by training over the longer term.
Qualitative data	There is a lack of qualitative data that may help gain a deeper awareness of how the training influences clinicians' understanding and clinical practice and gain insight into clinical implementation issues. Using only repeated quantitative measures of outcome may encourage rote recall of facts rather than meaningful learning	Use a longitudinal case study approach to measure how understanding changes over time and explore clinicians' experiences of using interventions in clinical practice. Consider concept mapping to measure changes in understanding and prompt discussion about how learning is applied to practice.

Appendix 4 – Survey Critical Appraisal Questions

(Adapted from Crombie (1996); The Pocket Guide to Critical Appraisal; the critical appraisal approach used by the Oxford Centre for Evidence Medicine, checklists of the Dutch Cochrane Centre, BMJ editor's checklists and the checklists of the EPPI Centre).

1. Did the study address a clearly focused question / issue?
2. Is the research method (study design) appropriate for answering the research question?
3. Is the method of selection of the subjects (employees, teams, divisions, organizations) clearly described?
4. Could the way the sample was obtained introduce (selection) bias?
5. Was the sample of subjects representative with regard to the population to which the findings will be referred?
6. Was the sample size based on pre-study considerations of statistical power?
7. Was a satisfactory response rate achieved?
8. Are the measurements (questionnaires) likely to be valid and reliable?
9. Was the statistical significance assessed?
10. Are confidence intervals given for the main results?
11. Could there be confounding factors that haven't been accounted for?
12. Can the results be applied to your organization?

Appendix 5: Qualitative Review Checklist Questions

(Adapted from: Critical Appraisal Skills Programme (CASP; 2013a). Qualitative Review Checklist)

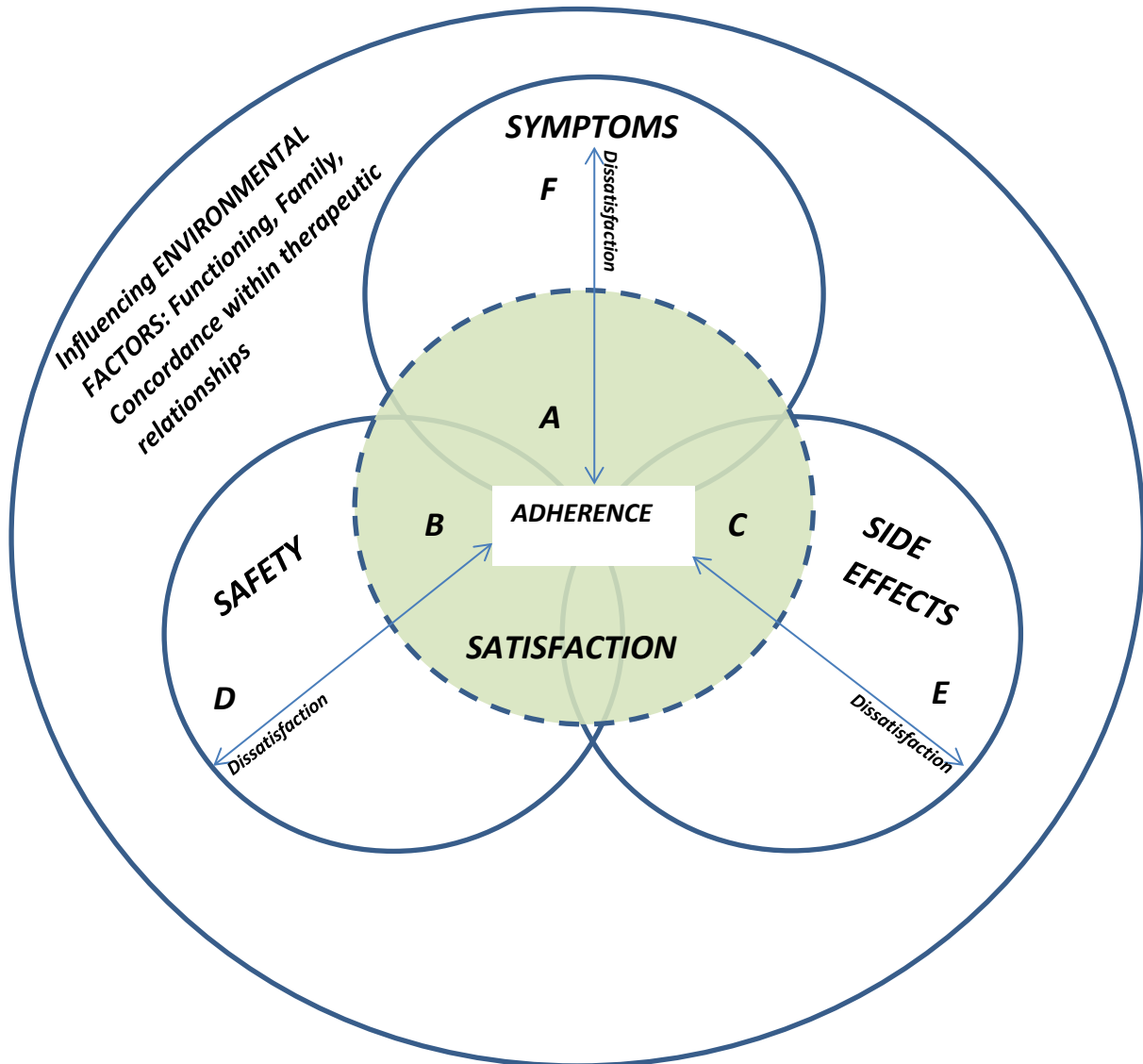
1. Was there a clear statement of aims of the research?
2. Is a Qualitative methodology appropriate to address the aims of the research?
3. Was the research design appropriate to address the aims of the research?
4. Was the recruitment strategy appropriate to the aims of the research?
5. Was the data collected in a way that addressed the research issue?
6. Has the relationship between researcher and participants been adequately considered?
7. Have ethical issues been taken into consideration?
8. Was the data analysis sufficiently rigorous?
9. Is there a clear statement of findings?
10. How valuable is the research?

Appendix 6: Systematic review checklist questions

(Adapted from: Critical Appraisal Skills Programme (CASP; 2013). Systematic Review Checklist)

1. Did the review ask a clearly-focused question?
2. Did the review include the right type of study?
3. Did the reviewers try to identify all relevant studies?
4. Did the reviewers assess the quality of the included studies?
5. If the results of the studies have been combined, was it reasonable to do so?
6. How are the results presented and what is the main result?
7. How precise are these results?
8. Can the results be applied to the local population?
9. Were all important outcomes considered?
10. Should policy or practice change as a result of the evidence contained in this review?

Medication Management Target Model – Maintaining antipsychotic adherence over the longer term



The overall aim is to manage fluctuating satisfaction across the three spheres of medication outcomes within the environmental context.

A: Maintain satisfaction with effects of medication on distressing symptoms - Target is to maximise the effects of treatment on problematic symptoms and maintain awareness of the need for treatment.

B: Maintain satisfaction with treatment safety – Target is to monitor physical health and manage emerging health problems.

C: Maintain satisfaction with medication side effects – Target is to assess/manage side effects, empower patients with side effect management strategies and predict how concerns about adverse effects may change in accordance with varying demands on functioning.

D, E, F: Dissatisfaction with any the three spheres of medication outcomes may result in nonadherence and treatment failure.