Beliefs and Adherence in Hypertension and Cardiovascular Protection

10

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10.1 Non-adherence: The Silent Thief

10.1.1 Sizing the Challenge of Non-adherence

The availability of medicines for cardiovascular protection has the ability to add on years of life to individuals at risk of cardiovascular events—if everyone aged 55 or older, or had existing cardiovascular disease, took medications for cardiovascular protection, a third of the individuals would gain an average of 11 years of life, free from cardiovascular events or stroke [1]. The greatest challenge, however, lies in achieving adherence to these preventative treatments. Whilst the use of medicines for cardiovascular protection have the potential to reduce risk by over 80% [1], these health benefits cannot be gained if individuals do not take the treatment.

Adherence to treatment in long-term conditions where medication primarily serves as a preventative, rather symptomatic or curative, measure is notoriously difficult [2]. Medication used for hypertension and cardiovascular protection are no exceptions. Patients prescribed such treatments are frequently asymptomatic, and correspondingly the risk of early treatment discontinuation is high [3]. Prescriptions for newly prescribed medicines for hypertension or hyperlipidaemia have the highest rates of primary non-adherence—that is, the prescription is not even brought to the pharmacy to be filled—compared to other medication classes [4]. Rates in the literature suggest that nearly 1 in 3 new prescriptions for hypertension or hyperlipidaemia are never filled [4]. Even when medicines are started by patients, the likelihood of continuation in the long term is low. A study of 77,193 patients on antihypertensive treatment found that after 2 years of treatment, only 55% of

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patients remained on treatment [3]. This was further reinforced in a meta-analysis which included 20 studies investigating adherence to medicines used in cardiovascular prevention, such as aspirin, statins, and antihypertensives: after 24 months, adherence was estimated to average 57% [5], a percentage similarly echoed in a meta-analysis published in the following year [6].

These numbers are potentially deadly. For every preventative medication that is never started, missed, or stopped early, there is a corresponding increase in risk of adverse health outcomes. Patients who did not fill their discharge prescriptions within 120 days after a myocardial infarction had an 80% increased odds of death; those who filled part of their prescriptions had a 44% increased odds, compared to those who filled the majority of their prescriptions [7]. It is well documented in the literature that poor medication adherence is linked to poor health outcomes; likewise, good adherence is linked to good health outcomes [8]. Early discontinuation of antihypertensive treatment, for example, was associated with a 15% increased risk of acute myocardial infarction and a 28% increased risk of stroke [3]. Similarly, in a large population-based retrospective study of 31,306 patients, patients who had good or excellent adherence to antihypertensive treatment had almost half the risk of all-cause death, stroke, or acute myocardial infarction (hazard ratio 0.69 with good adherence and 0.53 with excellent adherence) compared to those with poor adherence [9]—a finding which has been replicated in a number of other studies for antihypertensives as well as other cardiovascular protection agents [6, 10, 11]. The consequences of non-adherence are therefore great—not only for the individual in terms of lost years of life and disability but also for health providers, payers, and society. Patients who have poor adherence to their antihypertensive therapy are at higher risk of developing cardiovascular disease such as coronary disease or chronic heart failure [12]. It is the silent thief of resources—cost reductions in the order of 10–18% are estimated between groups with high and low adherence [13]. Yet despite the vast amount of evidence highlighting the importance of adherence to preventative treatment in hypertension and cardiovascular disease, adherence remains suboptimal.

Non-adherence is one of the most important challenges facing healthcare today. Although effective preventative medications exist for cardiovascular protection, which have proven potential to save lives, non-adherence as a cause of ongoing morbidity and mortality has not been adequately addressed. If the prescription was appropriate, non-adherence represents a waste of resources and a significant missed opportunity for health gain. As stated in the World Health Organisation report on adherence, “the potential rewards for patients and societies of addressing adherence to long-term therapies are large” [2]. There is an urgent need to design more effective solutions to address non-adherence.

10.2 Interventions to Enhance Adherence in Cardiovascular Disease: Room for Improvement

10.2.1 Review of over 20 Years of Intervention Research

Over the last two decades, there have been an increasing number of interventions designed to address the issue of non-adherence in long-term conditions. The latest

Cochrane review published in 2014 included 182 published randomised controlled trials (RCTs) of adherence interventions—an increase of 109 RCTs since the previous review in 2007 [14]. This increasing trend in number of studies is likely to continue as the challenge of non-adherence remains. Of the RCTs included in the review, the majority (24%, $n = 44$) of the RCTs were in the hypertension, dyslipidaemia, and cardiovascular disease or risk, highlighting the increasing prevalence of these conditions. Of the included RCTs however, only 2 RCTs in hypertension were considered to have low risk of bias and were included in the analysis [15, 16]. Both of these RCTs involved multifaceted, complex interventions, which are likely to be difficult to replicate in a real-world clinical setting. In a landmark study by Haynes et al., the intervention included special pill containers, counselling, self-monitoring, reminders, feedback, and support groups administered biweekly by a programme coordinator. Despite this intensive intervention and the corresponding higher adherence achieved in the intervention group, no significant changes were seen in diastolic blood pressure after 6 months [15]. In the study by Morgardo et al., intervention patients received counselling from a hospital pharmacist at a specialised outpatient clinic, providing education, advising physicians, and verifying adherence through checking of blister packs and medication boxes. Both adherence and blood pressure control improved after 9 months [16]. Even when all studies are taken into account, the effects of these interventions on adherence are mixed and non-consistent.

As these examples demonstrate, many adherence interventions are complex. There is a lack of high-quality evidence to support the use of one particular intervention over another as results vary from one study to the next—whilst education may be effective in one population, this is ineffective in another. Despite the increasing number of intervention studies, the conclusion from these systematic reviews remains unchanged across 20 years of research. Interventions to improve adherence have limited effectiveness, and even if studies do show effect, the interventions are complex and difficult to sustain in real-life practice. Even the best interventions have limited and short-lived effects. Details on the actual content and delivery of the interventions are commonly not described in sufficient detail to replicate in practice. Systematic reviews may also not be able to capture changes in behaviour in an individual over the duration of the study. Although large numbers of studies are included in systematic reviews, the use of inter-group comparisons in RCTs may not capture intra-individual changes in behaviour. These changes may provide essential clues as to how the patient interacts with the intervention, and what factors determine its effectiveness. Unfortunately, few studies capture these details of individual behaviour change and few describe interventions in sufficient detail for us to identify the factors that were important for the behaviour change, or for replication. There is a need for a different approach to adherence—one that enables us to gain in-depth understanding of the barriers and facilitators of adherence to allow the design of effective interventions in a sustainable manner. Few interventions are tailored to address the specific reason for non-adherence that are unique to the individual [17, 18].

Although many different types of adherence interventions have been trialled in hypertension and cardiovascular protection, the techniques used and outcomes seen vary widely between studies, even amongst studies using the same general

intervention technique. Interventions which have been trialled include education; motivational interviewing; adherence problem solving; targeting adherence barriers; medication packaging; reminders; instructions; social support; self-monitoring; care integration; and adherence feedback [19]. Yet despite the vast number of interventions trialled, no single approach has been identified which effectively addresses non-adherence consistently—in fact, some studies which incorporate adherence changing techniques (such as problem-solving strategies) appear to report smaller effect sizes than studies which do not use these techniques [19].

Although no evidence supports any particular intervention type over another, interventions which appear to be more effective tend to be ones which involve multiple intervention components; or target patients recruited specifically due to adherence problems; or involved intervention delivery over a sustained period [19, 20]. These provide some clues as to what an effective intervention might look like. We can gain further information from studies which explore relationships between particular patient characteristics and adherence; although these studies per se give minimal information on how to develop an effective intervention, the findings can help identify groups at high risk of poor adherence and thus allow targeting of adherence interventions. For example, a systematic review and meta-analysis of adherence interventions in hypertension found that effect sizes were larger for interventions amongst female, older and moderate- or high-income participants [19]. These findings can have implications when prioritising interventions in limited resource settings. However, when considering the design of effective interventions, one must look beyond the population and focus on the individual. Interventions that may have demonstrated effectiveness in one population may not be effective for a particular individual. There is a need for an individualised, tailored approach if effective interventions are to be designed.

10.3 Understanding Non-adherence as a Variable Behaviour

10.3.1 Adherence as a Behaviour, Not a Characteristic

Adherence has traditionally been viewed as a characteristic unique to an individual—a person was thought of as either adherent or non-adherent. Yet the possible reason why previous interventions have failed to demonstrate effectiveness may lie in the approach taken to address non-adherence. Past research has focused predominantly on attempting to explain adherence using quantifiable determinants such as patient, regimen, or illness characteristics [21]. However, as discussed previously, these determinants have limited value when attempting to explain adherence. The ‘non-adherent patient’ is a myth as most of us can be non-adherent at least some of the time [17]. The relationships observed between particular characteristics, such as sex or income, and adherence, are neither clear nor consistent. For example, a study of 2325 patients on antihypertensives found an association between younger age and poorer adherence [22], yet a similar study found that those who were older were less likely to adhere to treatment [23]. The same contradicting associations have been reported with other demographic characteristics such as income and sex.

Indeed, focusing on sociodemographic factors will not provide a solution to non-adherence; non-adherence is a feature of the way the individual interacts with their treatment rather than any particular characteristic of the patient themselves. Non-adherence is therefore best viewed as a variable behaviour rather than a trait characteristic as adherence behaviour varies not only between individuals, but even within the same individual over time. Non-adherence does not arise from irrational behaviour—more often than not, the individual goes through a cognitive process and their consequent behaviour or actions towards the treatment comes from a combination of their own personal experiences with treatment, their perceptions of health and medication in general, and the attitudes they develop about their condition and treatment [17].

The best insights we can gain into adherence behaviour is to understand an individual's perceptions about their illness and treatment. Indeed, patients' understanding of the causes and effects of hypertension and beliefs about side effects were some of the most commonly reported reasons for stopping treatment for hypertension [24]. Patients who believe they are personally able to control the illness without treatment are almost half as likely to adhere to adhere to treatment [24, 25]. These findings are similar with medicines prescribed for cardiovascular disease [26]. Together these studies illustrate the importance of understanding adherence as a behaviour—a person's beliefs about the illness and treatment are more likely to influence adherence rather than demographic characteristics. Future interventions in adherence need to focus on changing behaviour and using behaviour change techniques [27]. New strategies need to build on this concept of adherence as a health behaviour to enable effective interventions to be developed. After decades of research, it is clear there is no one type of patient who is 'non-adherent', nor a 'one size fits all' intervention. There is a need to develop more effective ways of tailoring support to meet the needs of individuals if we are to improve adherence in a sustainable fashion.

10.3.2 The Motivation-Ability Paradigm for Explaining Adherence Behaviour

In order to tackle non-adherence, it is important to understand why non-adherence occurs from an individual patient perspective. First, non-adherence may be intentional (e.g. when we decide not to take the treatment or to take it in a way which differs from the recommendations) and/or unintentional (e.g. when we want to follow the recommendations but lack the capability or opportunity to do so). The easiest way to think of this is to consider adherence behaviour as two-pronged—patients do not adhere because either they **do not want to**, or they **are not able to**. How non-adherence arises therefore relates to two components which drive the behaviour respectively—*motivation* and *ability* [17]. This ability in turn is affected by the individual's *environment*—both internal factors (e.g. physical capability to take the medication) and external factors (e.g. aspects of our environment affecting access to the treatment, such as not having easy access to a pharmacy) [17, 28].

This forms the basis of the Perceptions and Practicalities Approach (PAPA) to explaining and improving adherence [17], which has been applied in the NICE Medicines Adherence Guidelines [18].

10.3.3 A Perceptions and Practicalities Approach to Designing Patient-Centred Interventions

Using PAPA for adherence support derives from an understanding of the types of reasons why people do not take their medicines (Fig. 10.1). First, adherence to treatment is a result of two factors: motivation and ability, as described above. PAPA therefore stipulates that adherence interventions should address these two components: *motivation* to adhere by addressing perceptual barriers (e.g. beliefs about the illness and treatment) and *ability* to adhere by minimising practical barriers (e.g. ability to remember to take the medicine, or afford medication supply) [18]. Adherence support should be tailored to the individual's need by using a 'menu-based' approach. This is where specific intervention components are selected to address the individual's unique perceptual and/or practical barriers.

Figure 10.1 shows the PAPA approach to adherence—it depicts the key influences of adherence behaviour as the two middles circles, which represent perceptual and practical barriers to adherence. These two factors can overlap. For example, motivation may help the individual overcome limitations in ability which might in turn influence motivation to take the treatment. The model is therefore a Venn diagram, rather than two discrete circles (Fig. 10.1). Influencing these two factors is the social and environmental context affecting the interaction of the patient with their medication [17]. The importance of these external factors (e.g. social and environmental factors, or triggers to act such as reminders) is also described in other behaviour change models, such as in the Fogg Behaviour Model which identifies external triggers as an impetus for action [29], and Michie et al.'s COM-B conceptual framework for determinants of behaviour [30], which describes capability, opportunity and motivation as components which act together to affect behaviour.

Adherence is therefore best understood as a complex behaviour with multiple determinants—both internal and external (see Fig. 10.2 for a summary). These

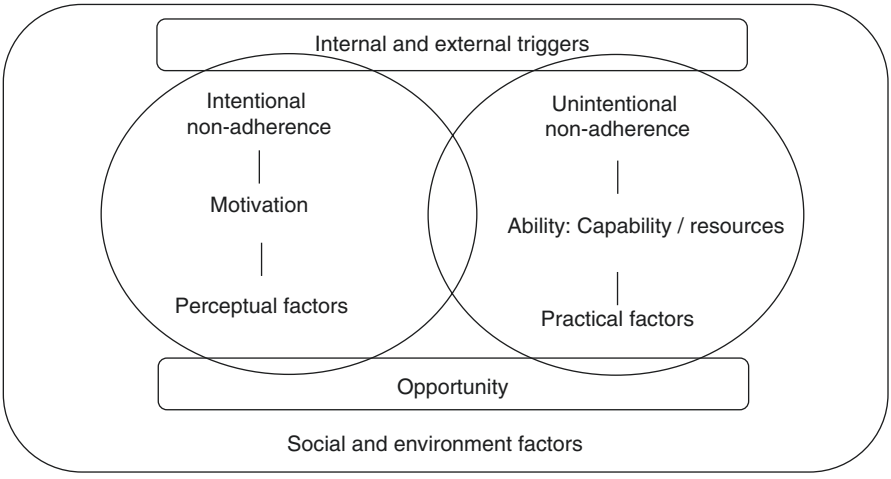

Fig. 10.1 Figure depicting PAPA: how motivation and ability overlap with other factors to influence adherence

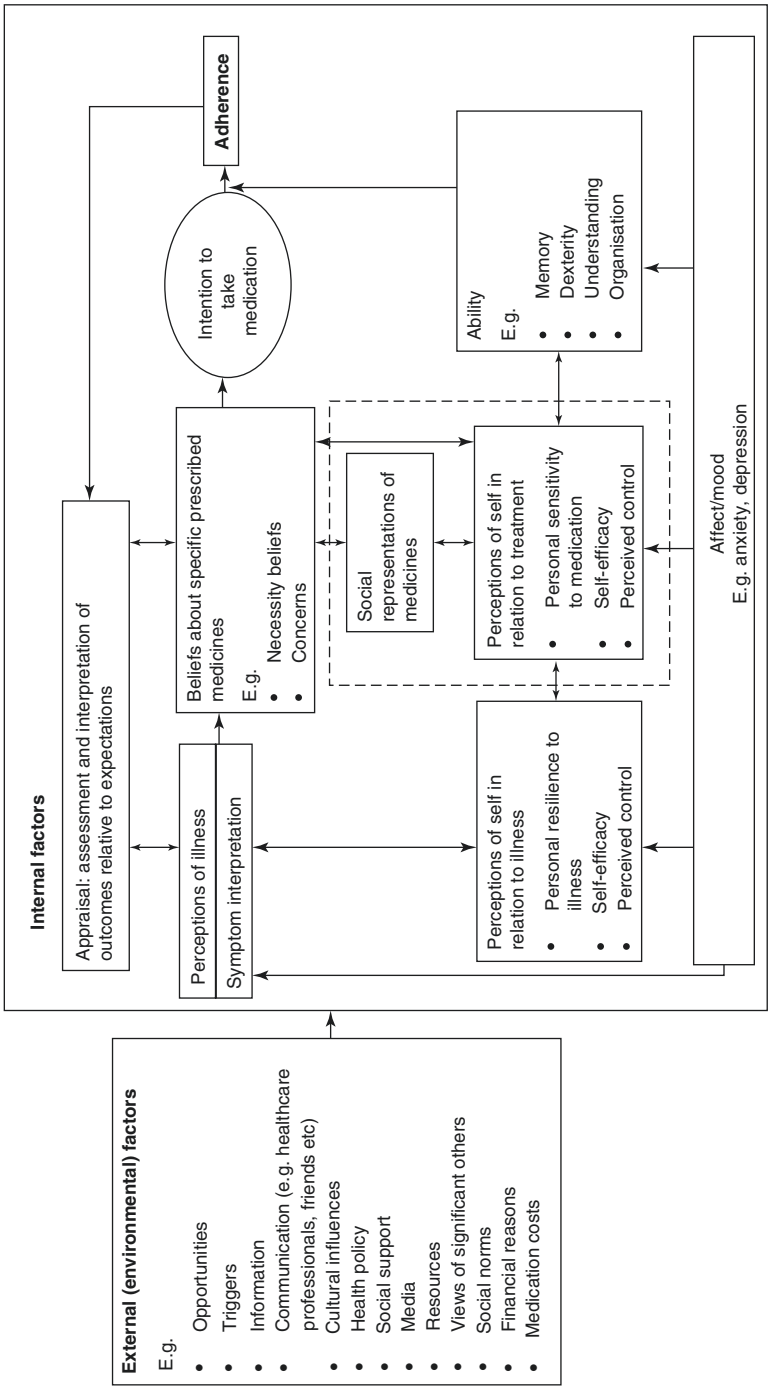

Fig. 10.2 Conceptual map of determinants of adherence (reproduced from Horne et al., 2005 [17])

factors form part of a complex interplay of determinants influencing behaviour. The 'internal' factors influencing motivation and ability may be moderated by 'external' variables, such as the quality of the patient-provider relationship [31], and also be wider societal contexts such as funding and financial coverage of treatment [24]. The external factors can include whether the individual has the opportunity to adhere to treatment; as well as external triggers to act such as text message reminders to prompt behaviour [32].

When considering how to design adherence interventions, these adherence determinants can be used to help target interventions. Motivation and ability can be considered separately based on what factor or factors are driving the behaviour. For example, interventions to improve a patient's *ability* to adhere (such as improving access to treatment) will fail if the patient does not *want* to take the medication (such as when the patient decides they do not need medication). Understanding what drives a patient's decision to take, or not take, a treatment is key to addressing non-adherence. The following sections explore these two drivers of non-adherence—perceptions and practicalities—in greater detail.

10.3.3.1 Perceptions: Understanding How Beliefs About Necessity and Concerns About Medication Influence Decisions about Treatment

When a person starts a new medication, they will begin to form their own beliefs and attitudes towards the treatment based on their initial and subsequent evaluation of the medication. This thinking process is captured by the Necessity-Concerns Framework [33]. The framework suggests that the motivation to start and persist with treatment is influenced by the way the individual judges their personal *need* for the treatment relative to their *concerns* about potential adverse effects. Analysis of 514 patients on antihypertensives found those who believed in the necessity of the treatment had triple the odds of adhering than those who did not [25]. Similarly, adherence is also affected by concerns about adverse effects—a phenomenon which may account for the differences in adherence rates with different antihypertensive classes [34, 35]. Diuretics, for example, are commonly associated with poorer adherence rates compared to newer agents such as angiotensin II receptor antagonists, which may have a better perceived side effect profiles [35]. Other studies that investigated patients with a range of other conditions have consistently found similar results—that poor adherence is related to doubts about personal need for medication and concerns about potential side effects [36].

Treatment Necessity Beliefs

Beliefs about the importance and necessity of medicines can have a significant impact on adherence. Qualitative studies show that many people hold prototypic beliefs about medicines, and their capacity to produce harm as well as benefit, and beliefs about the appropriateness of doctors' prescribing of medication [33]. These beliefs exist even before a person takes the medication. When a person is first presented with a new diagnosis, or health 'threat', the first thing they will try to do is to

make sense of the situation, based on the thoughts they had about condition even before they were diagnosed. These thoughts will then influence how information is interpreted by patients, what their experiences are, and how they act as a result of this information [17, 37]. A qualitative synthesis of studies into the lay perspectives of hypertension found that many people believe hypertension is caused by stress, and as such regular treatment is not needed if the stress abates or they are able to reduce their stress [24, 38].

Likewise, it is intuitive that medicines should only be taken when we are feeling ill. After all, for many patients, the 'no symptoms, no medication' concept will be much more familiar than needing to take medication when they do not perceive themselves to be unwell. This is illustrated in the difference in adherence rates seen between medications prescribed for primary versus secondary prevention. Adherence to medicines for cardiovascular protection averages 50% when used in primary prevention; this increases to an average of 66% in secondary prevention [5]. This difference can be explained by how the individual makes sense of the need to take regular medication—it makes 'sense' for an individual to be on treatment after having a cardiac event, but perhaps less so for prevention. Adherence for secondary prevention purposes would thus be expected to be higher as the individual is able to make sense of the need for treatment [5].

Patients who believe in the necessity of treatment have a much higher chance of adhering to treatment compared to those patients who did not perceive treatment as necessary [25]. This appears to be particularly problematic for cardiovascular medication as many perceive a limited necessity for medicines, and believe there is a clear link between the condition and lifestyle choices [26, 39] compared to other health conditions such as diabetes and thus do not see regular treatment as necessary. These beliefs make patients particularly resistant to having additional medications for cardiovascular medication, and fuel the belief that health professionals tend to overprescribe medicines [26].

Perceived necessity of treatment is however not related to beliefs about treatment efficacy. Although views about medication efficacy are likely to contribute to perceived need, the two are not synonymous. For example, perceived necessity can be influenced by illness beliefs—a patient might believe that a treatment is effective but may not perceive a personal *need* for the treatment. For example, a patient may believe antihypertensives are effective for reducing blood pressure, but may not think their blood pressure needs treating with a medication, such as when they believe it is related to stress [24]. In this case, the patient does not think they need any pharmaceutical treatment, regardless of its perceived efficacy. Conversely, a patient might perceive a strong need for a treatment even though they believe it is only moderately effective—for example, if it is the only treatment that is available or acceptable to the patient. A study of beliefs about hypertension in different culture groups found that although all respondents understood the importance of controlling hypertension, those of West Indian decent had lower adherence rates to antihypertensives as they preferred treatment with herbal remedies rather than prescribed medicines [38].

Treatment Concerns

In terms of perceived concerns, there is much overlap in the type of concerns that patients report about medicines, regardless of the medication type. Many patients receiving regular medication who have not experienced adverse effects worry about possible problems in the future—a view that may be related to beliefs that regular medication use can lead to dependence or accumulation within the body and corresponding long-term effects [33]. For example, a common concern people have about antihypertensive medication relates to side effects and fear of addiction [24]. These attitudes are linked to wider concerns about scientific medicine in general, a lack of trust in doctors and an increasing interest in alternative or complementary healthcare [33, 38]. People also seem to vary in their perceptions of personal sensitivity to medicines [40], with some being more concerned than others about their response to medication.

The way that people perceive medication in general can influence how people evaluate *specific* medication prescribed for a particular condition [33]. These beliefs can affect a person's initial expectations of the outcome of taking a medication as well as how any subsequent events are interpreted—for example, whether symptoms experienced are attributed to the illness or the medication [41]. These beliefs may even influence clinical outcome directly via the 'placebo/nocebo' effects of active drugs—terms describing the phenomenon of having beneficial or harmful effects occur when people have positive or negative expectations about the medication, respectively [42]. Beliefs can also be *specific* for a particular medication—such as when adherence to certain antihypertensive medications are higher for particular classes [35].

Concerns also relate to the meaning that being on regular medication has for the individual and their sense of self or identity. Taking a daily treatment may be an unwelcome reminder of their illness which may have a negative impact on how they view themselves or perceive how they are seen by others. A study into beliefs about hypertension in 19 African American males showed that having hypertension was viewed by some as being "weak" or "not macho" and that it is seen as a "basically a Black disease"—ideas which can add to negativity and stigma [43]. In these circumstances, non-adherence might be seen as an implicit strategy to minimise the impact on their sense of self [43]. These necessity beliefs and concerns can influence adherence separately and in combination, and the effects may be through explicit and implicit processes. For example, in some situations, non-adherence could be part of a deliberate strategy to minimise harm by taking less medication. Alternatively, it might simply reflect the fact that patients who do not perceive their medication to be important are more likely to forget to take it. The impact of perceptions of treatment on adherence may also influenced by beliefs about adherence behaviour itself, such as whether or not strict adherence to medication is needed to achieve the desired outcome. This is seen when patients decide to take 'drug holidays', where they believe they can go without medication for a certain period of time [43].

Common Sense Understanding of Illness and Treatment

Adherence in hypertension and cardiovascular is traditionally difficult to achieve. Whilst non-adherence is a problem that is common to all health conditions where regular preventative treatment needs to be taken, medicines prescribed for hypertension or cardiovascular protection pose unique challenges. Qualitative research into patient perceived barriers to adherence provides us with some clues as to why adherence in this group of conditions may be particularly difficult. Firstly, hypertension and cardiovascular disease are predominantly silent conditions—people tend to feel well most of the time and may have limited experience of co-morbidities or medication when they are first informed of hypertension or cardiovascular risk [44, 45]. Surveys of patients on antihypertensive agents have found that fear of adverse effects is a significant barrier to adherence, particularly amongst those who are young or in the early stages of treatment [24, 45]. Indeed, patients who were on multiple drug treatments, or have other co-morbidities such as diabetes or dyslipidaemia, were more likely to adhere to their antihypertensive treatments compared to their counterparts who did not have other treatments or cardiovascular co-morbidities [10]. Likewise, patients who have pre-existing hypertension, or a history of cardiac disease and are prescribed medication for secondary prevention, have higher adherence rates compared to patients who are newly prescribed treatment, or do not have a history of a cardiac event [5, 46].

Secondly, it is difficult for the patient to perceive any immediate benefits or differences from taking the medication. Although there is plenty of evidence highlighting the clinical benefits of medication taking for cardiovascular protection, it is difficult for the patient to detect these benefits on an individual subjective scale. Furthermore, there are no immediate physical consequences or symptoms that arise from missing doses—even if doses are missed for a prolonged period—thus further reinforcing the notion that the medication does very little for improving health [24]. Conversely, even though there are no perceivable benefits of treatment, the patient may suffer from adverse effects when they start the medication—an occurrence which is likely to further deter patients from taking their medication. There is a link between reported side effects and lowered treatment adherence—in a study of 175 patients on antihypertensive treatment, those individuals who reported a high number of side effects beyond the median value in the group had lower adherence; those who reported genitourinary side effects such as excessive urination or reduced sexual drive were least likely to adhere to treatment [47]. These quantitative findings are supported by qualitative research identifying side effects—in particular urinary frequency and impotence—as reasons for non-adherence [24].

Lastly, hypertension and cardiovascular disease tend to be perceived by people as self-manageable conditions, conditions which can be easily managed by the individual themselves, such as by reducing stress for example [24]. The role of medication is thus perceived to be of limited value, as many individuals link lifestyle factors with hypertension and cardiovascular disease, and thus believe that if their lifestyle improved, their need for these medicines would be reduced [26].

It can therefore be very difficult to convince a patient of their need for treatment and the potential benefits they can gain from taking treatment regularly. Indeed, there can be little impetus for patients to begin taking a new treatment for a condition from which they do not suffer any ill effects. Even if patients do begin to take the treatment, the likelihood of continuing this medication everyday lifelong is very low—a fact which is reflected in the high rates of discontinuation—persistence with medication drops within the first 6 months of starting antihypertensive or cardiovascular protection treatment, and continues to decline over time, with less than half of the individuals persisting after 2 years [3, 7, 44]. Studies report reductions in adherence to antihypertensives by 20-30% over a period of 1–3 years after starting medication [46, 48], with similar trends seen for other cardiovascular protection agents such as statins and aspirin [5, 7]. Given the increasingly prevalence of cardiovascular diseases, and the great potential of these preventative medicines to improve outcomes and extend life, there is a need to focus on improving adherence to these treatments and maximise the efficacy of treatments.

10.3.3.2 Practicalities: Enhancing Capability, Opportunity and Triggers to Adhere

The other key factor influencing adherence are practical barriers—factors that determine a patient's ability to adhere. Forgetting to take the medication is the most commonly cited practical barrier for non-adherence [39]. This may be due to the complexity of regimes associated with cardiovascular diseases as well as a lack of routine and erratic lifestyle. Regimens with a high dosing frequency, or high number of medication or complicated instructions for medication taking tend to be associated with poorer adherence [34, 35]. Reducing dosing frequency to once daily can improve the patient's ability to adhere by making the treatment less intrusive and more convenient [34, 49]. Simplifying the regimen by using fixed dose combination agents or reducing unnecessary polypharmacy can also facilitate adherence [10].

Reminder systems or medication organisers such as pill boxes may be useful though reported effects are typically modest [50]. Linking the medication taking to specific environmental cues may be more effective than a repeated reminder to help reinforce habits and routine [51]. For example, placing the medication near the toothbrush so that taking the medication becomes linked to an existing habit may be useful. This involves planning with the patient how and when they can take their medication. Turning a patient's intention to take medication (e.g. 'I will take my medicine') into a more specific plan (e.g. 'I will take my medicine immediately after I brush my teeth every morning') increases the likelihood of the behaviour being performed [51], though routines can be susceptible to changes in the environment such as going on holiday [52].

Strategies to improve adherence by changing formulation or dosing are however only effective if perceptual barriers to adherence have been addressed [17]. Involving patients in treatment decisions is therefore important to achieve ongoing

adherence [53]. To achieve adherence, the clinician must therefore aim to elicit the patient's perspective about treatment—including their beliefs and concerns—and ensure that decisions about treatment are informed by fact rather than misperceptions [54]. Offering a medication choice can be an effective method of involving the patient in prescribing decisions—even as simple as involving the patient in choice of dosage form may be a helpful way of helping the patient feel cared for and involved [43]. Medication cost and access to health services and medication may be other factors to consider when addressing practical barriers to adherence [39, 49].

10.4 Assessing Non-adherence

Measuring non-adherence is a complex issue. Whilst the easiest and most accessible method of assessing adherence is simply to ask the patient, it comes with the caveat that the reported adherence is likely to be much higher than what the true adherence might be [55]. For example, a meta-analysis found that average adherence to medicines used for cardiovascular protection was estimated to be 90% in studies which used self-reported measures of adherence, whereas studies using prescription refills to measure adherence reported average adherence to be 57% [5]. This phenomenon has been described extensively in the literature (Self report bias) and can be explained by 'social desirability bias'—where the patient wishes to 'please' the health provider by exhibiting themselves in a more positive light when reporting their treatment adherence.

The use of more accurate objective measures however, such as using high performance liquid chromatography-tandem mass spectrometry-based analysis of urine/serum or electronic adherence monitoring, have their own shortcomings. Urine analysis may be viewed as intrusive or inconvenient by the patient and electronic adherence monitoring—where each dose taken is monitored electronically using a special monitored vial—is expensive and may be ill-perceived by patients as 'big-brother' monitoring [55].

There is therefore the need to encourage patients to actively and accurately discuss adherence with the clinician. The negativity surrounding medication non-adherence needs to be removed to encourage honest, non-judgemental communication between the patient and healthcare provider [18]. In clinical practice, 'detoxifying' non-adherence and allowing sufficient time in the consultation to discuss barriers to treatment are necessary first steps to improve the assessment of adherence [18, 53]. This may be facilitated by opening up discussions about adherence in a non-judgemental way and explaining the reasons for the discussion. It is helpful to focus the discussions on a specific time period such as "in the past week" and asking about specific medication-taking behaviours such as skipping or changing the dose, or stopping medication [18]. Patients should be encouraged to freely discuss their adherence behaviours and barriers in clinical practice such that the need for objective adherence measurement becomes less of an issue.

10.5 Using PAPA in Practice to Achieve Informed Adherence

10.5.1 A Stepped Approach to Improving Adherence and Tailoring Support to Individual Need

PAPA provides a pragmatic framework to adherence support. This approach can be used in any consultation about treatment. The first step to this is to aim for 'easy wins' by targeting the adherence barriers that can be addressed using minimal resources (Fig. 10.3). This can then be stepped up to address perceptual barriers, specifically targeting motivation, before finally delivering 'tailored PAPA' according to the individual's unique needs.

When delivering an intervention using the PAPA approach, consider these three components:

1. **Communicate necessity of treatment**. In hypertension and cardiovascular disease, many patients do not believe treatment is necessary as they do not feel ill or they think their condition can be managed by lifestyle changes rather than medication. Discuss with the patient what their understanding is of the condition and reason for medication. Explain the condition and how the medication will influence this, considering the aims of the treatment and what the patient themselves hope to achieve. Focus on how the patient may benefit from the treatment, considering the individual motivations the patient may have, which may not be directly related to the condition.
2. **Elicit and address any concerns raised about treatment**. Use open-ended questions to encourage patients to discuss and ask about their condition and treatment.

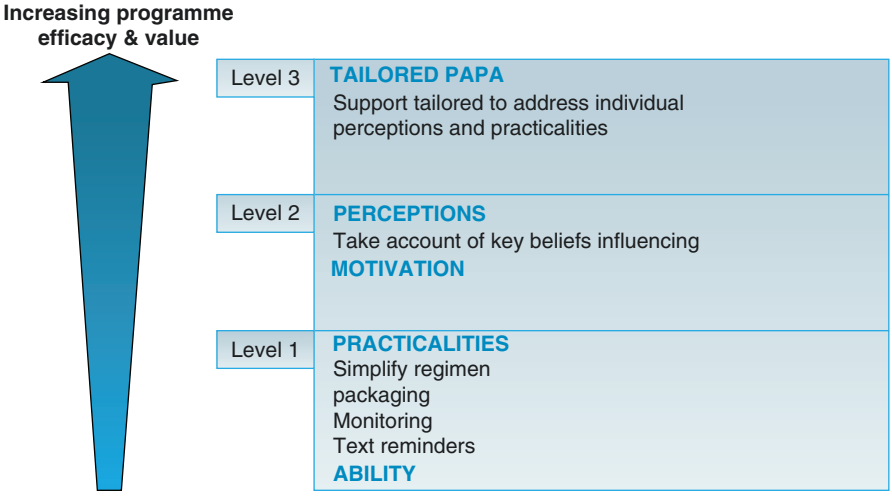

Fig. 10.3 A stepped approach of intervention development according to resource availability. (1) Home R. Project ongoing. (2) Alhalaiqa F, et al. *J Hum Hypertens*, 2012;26:117–26. (3) Farmer AJ, et al. *Diabet Med*. 2016;33:565–79 (Adapted from Horne R, Guide to adherence, Behavioural Pharmacy Programme 2016, UCL School of Pharmacy)

Find out what the patient knows, believes, and understands about their treatment before starting or changing a medicine. Often these concerns centre on side effects of frequent urination or sexual dysfunction, as well as fears of addiction [24]. Discuss and agree a plan of action to manage these concerns with the patient.

3. **Minimise any practical barriers to adherence**. It is helpful to discuss how the patient will fit the medication into their daily routine and remember to take the medication. Identify any barriers and agree a plan of action with the patient.

This approach ensures that both the perceptual barriers (necessity/concern beliefs) and practical barriers are addressed. Previous interventions have had limited effects partly because they have either not addressed all these factors or the intervention has not been individualised to the patient. Many have focussed on single causal factors whereas adherence is best seen as a complex health behaviour with multiple determinants both internal and external (see Fig. 10.2 for a summary). By using this approach, interventions can be tailored to the individual whilst achieving informed adherence.

10.5.2 Providing an Environment for Informed Adherence

Shared decision-marking with the patient and informed choice should be a key facet of clinical practice and adherence. For interventions to be effective, equitable, and efficient, one must facilitate informed choice [17]. Adherence is dependent on a collaborative relationship between the patient and healthcare provider [18]. Key to this is the need to facilitate an honest and open discussion. The discussion should aim to normalise non-adherence and allow patients to report non-adherence and express doubts and concerns. This allows assessment of adherence in a non-judgemental way. Effective communication is important. Factors such as mental state, health literacy, language barriers, or visual or hearing impairment may need to be considered to ensure effective communication.

A patient can be considered to have made an informed choice if they can demonstrate knowledge of relevant information about the treatment and then act according to their beliefs. This concept of informed choice has been extended to informed adherence [56], where evidence-based medicine is used to guide initial treatment recommendations. The recommendations should be presented to patients in a way that takes account of their individual beliefs and preferences, and any incompatibilities between their personal beliefs and the prevailing evidence should be resolved by non-judgemental discussion [37].

10.5.3 Practical Considerations in Intervention Design

When designing and implementing adherence interventions in practice, three dimensions of the intervention need to be optimised for success. This can be remembered as the “3 components to behaviour change” or “3CBC”—content, channel (delivery vehicle) and context.

10.5.3.1 Content

This is the basic substance of the intervention and how the specific barriers and enablers of adherence are addressed. Approaches should be tailored to address both the perceptual factors influencing motivation to initiate and persist with treatment, as well as facilitating the ability to adhere, for example, by addressing any capacity and resource limitations. The PAPA model described above is one method that can be used to ensure all aspects of adherence are addressed. As shown in Fig. 10.3 above, the content of the intervention may start with the simplest intervention (e.g. medication reminders) before progressing to more complex interventions (e.g. tailored advice for perceptual barriers) depending on the time and resources available.

10.5.3.2 Channel

Adherence support should occur, not just at the start of treatment, but also during treatment review as perceptions, abilities, and adherence can change. The increasing use of e-technology and mobile health (such as smart phone apps) offer the prospect of additional channels to compliment practitioner-delivered support [57]. A recent systematic review of the use of mobile technologies in chronic disease identified a total of 13 studies which evaluated mobile adherence tools for cardiovascular disease. Significant improvements in clinical outcomes were reported in 54% of the studies. These studies included use of short message service (SMS) enabled interactive monitoring so that the provider could set reminders for patients, collect data, and schedule visits for treatment adjustments. Others involved salt sensors and remote blood pressure monitoring [57]. However, despite the plethora of technology and digital solutions available, there is as yet, little evidence for their efficacy. Applying the principles outlined above to develop theory-based content might improve their effectiveness and utility.

10.5.3.3 Context

Context considers how appropriate prescribing and adherence support is facilitated by wider contextual factors, such as media representations of treatment and ease of access to treatment. With cardiovascular disease, there are often more than one prescriber involved in the follow-up and prescribing of treatment (e.g. cardiologists and general physicians) which adds to complexities for the patient for managing their treatment. Choudry et al. showed that the more pharmacies and prescribers that were involved in managing treatment, the poorer adherence was to cardiovascular medication [49]. Use of streamlined care and integration of services can help support adherence and facilitate the accessibility of medicines to patients.

Conclusions

Medication non-adherence remains a significant problem today despite decades of adherence intervention research. This non-adherence represents a missed opportunity for health gain, leading to increased risks of morbidity, mortality, and healthcare costs. There is a need for more effective interventions. Recent research recognises the importance of approaching adherence from the

individual's perspective and tailoring the intervention to the unique adherence barriers faced by the individual. For non-adherence to be addressed, future adherence interventions should be designed such that an individual's motivation and ability are taken into account. The use of a perception and practicalities approach to intervention design is one way that can help ensure that the perceptual and practical barriers of the individual are addressed in a tailored and pragmatic manner. By encouraging honest non-judgemental discussions and bringing adherence to the forefront of healthcare, we will be one step closer to tackling this issue of non-adherence. Only then can we fully realise the true benefits of the repertoire of available treatments.

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