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DIRECTORATE FOR EMPLOYMENT, LABOUR AND SOCIAL AFFAIRS
HEALTH COMMITTEE

FAST-TRACK DOCUMENT ON MORE RESPONSIBLE USE OF MEDICINES FOR CHRONIC CONDITIONS: DRIVERS, IMPACT AND POLICIES

The case of non-adherence to medicines for diabetes, hypertension and high blood cholesterol

21st Session of the Health Committee

To be held at the OECD Conference Centre at 2 rue André Pascal, 75016 Paris on Monday 26 June- Tuesday 27 June 2017

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1. NOTE BY THE SECRETARIAT

1. At the Health Committee in June 2016, delegates asked the Secretariat to review the international evidence on the magnitude of medication non-adherence, analyse its main drivers, and identify actions that health care stakeholders can take to address the avoidable costs currently incurred by health systems due to the suboptimal medicines use. Delegates asked the review to focus on hypertension, diabetes and hyperlipidaemia. This is due to the large populations of patients with these conditions using their medication suboptimally by not taking it at all, starting too late or discontinuing it prematurely. This means the beneficial effects of medicines are not fully realised, which is wasteful. Moreover, that suboptimal medication use leads to harmful health outcomes and results in additional physician visits, hospitalisation, and ultimately premature deaths.

2. Against this backdrop, this Fast Track paper examines the evidence underlying the importance of medication adherence, the magnitude of the issue, and the key drivers of medication non-adherence. This paper describes the OECD member countries approaches to medication non-adherence and reviews the evidence base on the effectiveness of different strategies and initiatives. The paper also seeks to offer insights on the extent to which, and ways in which, medication adherence could be effectively strengthened.

3. This paper was undertaken through a review of systematic reviews, meta-analyses, individual empirical journal articles, peer-reviewed reports, and grey literature predominantly published in the last seven years. Relevant references identified from material included in this review and forward citation tracking have been used to supplement the initial results of the review. In addition, countries were invited to complete a short questionnaire used to help inform understanding of policies and current practice across OECD Members. This questionnaire covered topics including monitoring of adherence, research on its prevalence, drivers, and impact on health outcomes and health care costs, as well as requesting examples of relevant interventions focussed on hypertension, diabetes and hyperlipidaemia. The Secretariat would like to add any additional information on country policies and practices that delegates may be able to provide. The Secretariat would also welcome any additional information on industry-led initiatives to improve adherence.

4. The paper is organised into four sections. The first section provides an overview of why it is necessary to invest in medication non-adherence. The second section provides an insight into what is known about the drivers behind medication non-adherence based on available literature and reviews. Section 3 then presents a snapshot of national approaches or interventions that have been implemented in some OECD countries drawing primarily from the short policy survey, and supplemented by actions identified by the authors. Section 4 reflects on these developments and considers the extent to which measures could be more effectively introduced or strengthened.

5. The main findings include:

- Poor adherence to medicines among patients with chronic diseases is a lost opportunity in terms of maximising health outcomes and health system efficiency. This is pertinent given small percentage of chronic patients who do take their medicines as prescribed.

- Non-adherence to medication is a multidimensional health care problem. The causes may be related to the patient, treatment, disease, health care provider and the health system.
- There is variation in the extent of initiatives to promote medication adherence among OECD countries. Most initiatives are focused on pharmacist delivered interventions.
- This report identifies four actions that are needed for improving adherence to medications at a system level. These actions can summarise as: Acknowledge, Inform, Incentivise, and Steer/Support.

6. Delegates are invited to:

- **DISCUSS** the extent to which improving medication adherence, especially to chronic disease medications, is seen as policy priorities in their country, and the coverage of relevant interventions.
- **COMMENT** on the findings of this paper and what further analyses in this field may be welcomed from the Secretariat.
- The paper will be published as a Health Working Paper. Countries are asked to submit written comments, corrections, further survey responses, and/or further examples of useful practices by **21 August 2017.**

2. EXECUTIVE SUMMARY

7. After four decades and despite mounting evidence, poor adherence to medication still affects approximately half of patients, leads to severe health complications, premature deaths, and an increased use of health care services:

- It is estimated to contribute to nearly 200 000 premature deaths in Europe per year.
- Patients with chronic diseases are particularly vulnerable to poor health outcomes if they do not adhere closely to their medications. Mortality rates for non-adherent patients with diabetes and heart disease are nearly twice as high as adherent patients.
- It is estimated to cost EUR 125 billion in Europe and USD 105 billion in the United States per year in avoidable hospitalisations, emergency care, and outpatient visits.
- Thus, avoidable costs related to poor medication adherence could amount to as much as 30% of the total annual pharmaceutical spending across OECD countries – estimated at USD 800 billion in 2013.
- The three most prevalent chronic conditions – diabetes, hypertension, and hyperlipidemia - stand out as the diseases with the highest avoidable costs, for which just one extra USD spent on medicines for adherent patients can generate between USD 3 to 10 in savings on avoidable emergency department visits and inpatient hospitalisations alone.
- These estimates do not include avoidable costs of long-term care or diagnostic testing and pharmacy costs related to therapy intensification.
- Combined the increases in pharmaceutical spending with the decreases in medical spending, average cost-benefit ratios from adherence for diabetes, hypertension, and hyperlipidemia remain favourable.

8. The prevalence of adherence varies considerably across conditions and patient groups. Unfortunately, most of the studies used different, unimodal indirect assessment methods making it difficult to compare adherence rates across health systems.

- Overall, 4 to 31% of patients initiated on diabetes or hypercholesterolemia and hypertension medicines never fill their first prescription.
- For those who do fill the first prescription, only 50 to 70% are taking their medicines more than 80% of the time and less than half of these patients are still continuing to take their medicines within 2 years of the initial prescription.

9. There are three broad reasons behind these low adherence rate to chronic disease medications:

- First, poor awareness. The problem of poor adherence to medication has generally been overlooked and only rarely explicitly included in national health policy agendas. Consequently, few OECD countries routinely measure rates of adherence to medication. Even fewer use those measurements to incentivise improvements in adherence. Moreover, nearly half of all health professionals – physicians, nurses, and pharmacists – are not fully aware of the problem. Research on how to improve adherence is incomplete, too.

- Second, wrong target for interventions and poor incentives. Discussions of non-adherence tend to attribute the problem exclusively to the individual patient, while the evidence suggests that health providers' behaviour, in particular the quality of patient-provider communication, as well as out-of-pocket costs of medicines and cumbersome procedures for refilling prescriptions are lead drivers. Most interventions tackling poor adherence have focused on patients, particularly their forgetfulness and incorrect beliefs about medicines, rather than understanding and changing the context in which health care is provided.
- Third, lack of patient involvement. Patients with chronic conditions frequently feel that the decision about their therapy did not involve them and are inclined to rebuff it or lack motivation to follow the therapy consistently. From a patient perspective, a chronic condition poses not only health problems but also long-term personal and social challenges. Yet, the current disease focused approach to healthcare delivery leaves little or no space for consideration of the personal aspects of a patient's condition.

10. This report identifies four priority actions that are needed for improving adherence to medication at a system level. These actions summarise as: Acknowledging; Informing; Incentivising; Steering and Supporting. No single intervention will guarantee that patients fill their prescriptions and take their medicines as prescribed - the identified actions must be combined.

- **Acknowledge**: Medication non-adherence harms health and increases healthcare costs. The first step for the relevant stakeholders is to acknowledge that this problem exists. Medication adherence needs to move up the policy agenda in order to raise awareness of the problem and mobilise adequate responses.
- **Inform:** Few countries systematically monitor adherence. Routine adherence measures as well as adherence quality and performance indicators should be encouraged to improve health system effectiveness and efficiency. The OECD can take stewardship in developing these indicators as part of the work on Health Care Quality and Outcomes.
- **Incentivise**: Changes in financial incentives for providers and patients are essential. Shifting from a fee-for-service model to payment systems that reward providers for better patient outcomes is critical to improving adherence. Medication adherence could be considered as a measure for performance-based contracts with providers as well as pharmaceutical companies. Where patients' co-payments for chronic medicines exist, their reduction or removal should be also considered.
- **Steer and Support:** The adherence process begins with a patient and a prescribing clinician, who should be supported by a suite of interventions/tools developed by other health system stakeholders: Payers/system designers can develop IT systems that ease prescribing and patient-clinician communication or renewing prescriptions by patients; Educators have a role in equipping health professionals with skills in managing adherence; Professional bodies' can issue guidelines on how to personalise medication plans and decision aids facilitating shared patient-provider decision making. There is a scope for industry to contribute with, for example, solutions such as simplified medication regimens or packaging.

3. WHY IS ADHERENCE TO MEDICATIONS IMPORTANT?

3.1. Poor medication adherence harms health and raises healthcare costs

11. Poor adherence or non-adherence to medicines means that patients do not start their prescribed therapy at all, discontinue it prematurely, or take their medicines in doses or frequencies different from those recommended by the prescribing clinician. In this report the term adherence refers strictly to medication use.

12. Poor adherence to medicines is a lost opportunity in terms of health outcomes and health care costs thus contributing to the inefficiency of health systems. Medication non-adherence results in complications that are often more expensive than the medicines not adhered to and worsen health outcomes. This leads to premature deaths as well as an increased use of health care services. Estimates suggest that it can contribute to the nearly 200 000 premature deaths and can cost European governments EUR 125 billion annually in excess health care services (European Council Policy Makers Debate, 2010). In the United States, it can cost approximately USD 105 billion per year in terms of avoidable hospitalisations alone (Iuga & Mcguire, 2014; Aitken and Valkowa, 2013; New England Health Care Institute, 2009). This means that avoidable costs related to poor medication adherence amount to nearly 30% of the total annual pharmaceutical spending across OECD countries – USD 800 billion, including pharmaceuticals used in hospital care, in 2013 (Belloni, Morgan, & Paris, 2016). These estimates do not include avoidable costs of long-term care or diagnostic testing and pharmacy costs related to therapy intensification. Also, broader societal costs of increased disability, reduced productivity and absenteeism at work are not considered.

13. Patients with chronic diseases are particularly vulnerable to poor health outcomes if they do not adhere closely to their medications. For example:

- Mortality rates for non-adherent patients with diabetes and heart disease are nearly twice as high as adherent patients (Brown & Bussell, 2011; Cramer, 2004).
- The risk of heart attacks among patients who discontinued their statin therapy, a lipid-lowering drug, is three times higher than among those who continue (Maningat et al., 2013).
- Patients who do not adhere to their prescribed beta-blockers, used in high blood pressure therapy, are 4.5 times more likely to have complications from coronary heart disease than those who do adhere (Cramer et al., 2008).

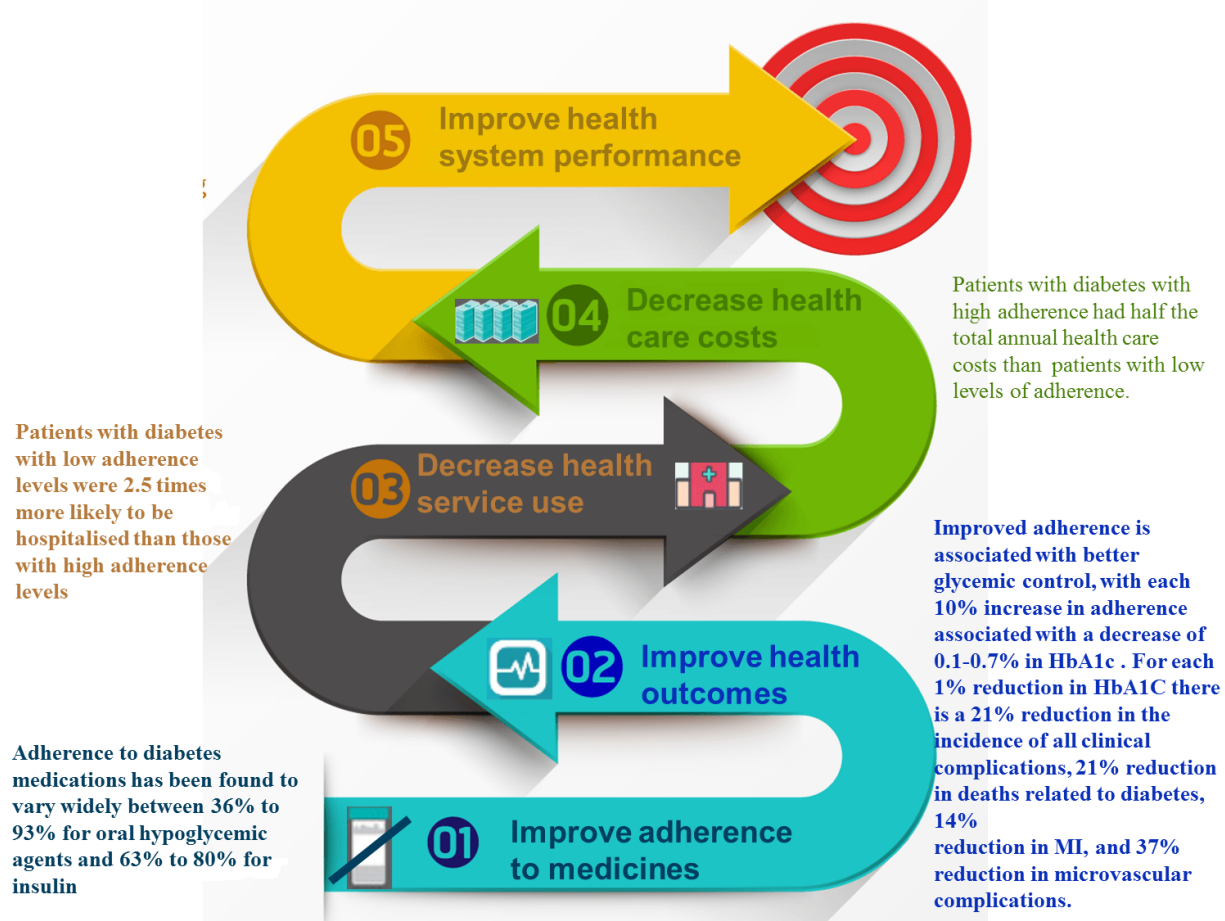
14. Consequently, there is an increase in the use of secondary care services, such as outpatient care, emergency department visits and hospitalisations. Roebuck's large observational study of patients with diabetes, hypertension, high cholesterol and congestive heart failure (n=135,000) found that for all four conditions, hospitalisation rates were significantly higher for patients with low medication adherence. Higher levels of adherence were found to be associated with significantly lower annual inpatient hospital days, ranging from 1.2 fewer days for hyperlipidemia to nearly 6 days fewer for congestive heart failure (Roebuck et al., 2011). Other studies have shown that among diabetes patients, the one year risk of hospitalisation was more than double for patients with low adherence than for patients with high adherence (Jimmy & Jose, 2011).

Similarly, hypertension patients with poor adherence have a 1.5 times higher risk of hospitalisation compared to the risk of patients with good adherence (Kneeland & Fang, 2010). In terms of adherence to lipid lowering therapies (statins), the risk of emergency department visits was nearly 30% higher among non-adherent patients relative to adherent ones (Li & Huang, 2015; Gatwood & Bailey, 2014).

15. The increased risk of hospitalisations due to poor health outcomes translates to significant excess costs. Annual health care costs are much higher for chronic patients with poor adherence to medication (Aitken & Valkova, 2013; Osterberg & Blaschke, 2005; Martin et al., 2005). Among diabetes patients, for example, those with low levels of adherence have a total annual health care costs per patient of USD 16,498, nearly twice the amount of patients with good adherence – USD 8,886 (Sokol et al., 2005). Roebuck's study also found that annual per person savings due to good adherence amounted to USD 7,823 for congestive heart failure, USD 3,908 for hypertension, and USD 1,258 for hyperlipidaemia.

16. Combining the increases in pharmaceutical spending with the decreases in medical spending, average cost-benefit ratios from adherence for the four conditions examined was 1:10 for hypertension, l:8 for congestive heart failure, 1:7 for diabetes, and 1:3 for hyperlipidaemia. Hence, just one extra USD spent on medicines for adherent patients with congestive heart failure, high blood pressure, diabetes and high cholesterol can generate between 3 to 10 USD in savings on emergency department visits and inpatient hospitalisations (Roebuck et al., 2011).

Figure 1. Improving adherence to medications leads to a high performing health system



3.2. The magnitude of non-adherence is much larger than perceived

17. At first, measuring adherence might seem quite straightforward, but in practice it is far more complex. There are several ways to measure adherence and this, combined with varying definitions, makes it difficult to compare adherence rates across health systems. Overall, 4 to 31% of patients initiated on diabetes or hypercholesterolemia and hypertension medicines never fill their first prescription (Blackburn et al., 2013; Shin et al., 2012; Raebel et al., 2012; Karter et al., 2009). For those who do fill the first prescription, only 50 to 70% are taking their medicines more than 80% of the time and less than half of these patients are still continuing to take their medicines within 2 years of the initial prescription (Lee et al., 2016; Halava et al., 2016; Karter et al., 2009) The prevalence of reported adherence rates is highly variable which may in part be attributable to differences in the populations studied, the medication that patients were taking and the adherence measures used among included studies.

18. The general term adherence encompasses several constructs depending on when in a patient's medication journey, adherence is being measured. Medication adherence refers to the degree or the extent to which a patient acts in accordance with the prescribed

interval and dose of a dosing regimen. Medication persistence refers to the act of continuing the treatment for the prescribed duration. When patients do not fill their first prescription, it is called primary non-adherence to distinguish it from the far more commonly studied secondary non-adherence (when prescriptions are filled, but the medication is not taken as prescribed). Adherence is assessed in two ways, either through self-reported surveys or using claims databases. Each method has its advantages and disadvantages and depends on the research question and availability of data. The most common measures used in studies based on claims databases is the medication possession ratio (percentage of time a patient has access to medication) whereas for self-reported surveys, the Morisky Medication Adherence scale (self-reported scale for measuring medication-taking behaviour) is used (Lehmann et al., 2014; Clifford et al., 2014)

19. **Primary non-adherence** poses a problem because timely initiation of medications is critical for treating both acute and chronic conditions. Primary non-adherence has been difficult to assess till the advent of electronic prescribing (e-prescribing) which has greatly enhanced the ability to calculate it. Primary non-adherence rates for the three chronic diseases range from 4 to 31% depending on the patient cohort, health care setting, health care system and copayments. Rates of primary non-adherence for diabetes therapies have been reported between 4 and 31% (similar to hyperlipidaemia therapies – 5 to 22% and hypertensive therapies – 7 to 28%) (Blackburn et al. 2013; Shin et al. 2012; Thengilsdottir et al, 2015; Raebel et al. 2012; Tamblyn et al, 2014). Most studies rely on claims data and begin tracking adherence when the patient first fills a prescription; in effect measuring "persistence" as never filled a second prescription. Studies show about 18-34% of patients failed to fill second prescription for either their diabetes, cholesterol or hypertension medications (Karter et al., 2009; Svensson et al. 2015; Vrijens et al. 2017).

20. **Secondary non-adherence** is commonly understood as "adherence" and means that patients obtain their prescriptions but do not take their medication in doses and/or time intervals recommended by their clinician. There is no real consensus on the optimal level of adherence. In some cases, researchers have concluded that 80% is acceptable in many disease states. However, there are others in which even greater levels of adherence are required to avoid negative outcomes. Most studies based on claims data have large samples but there is great variation in adherence estimates.

21. Studies that define adherence as an 80% ratio of days on which medication was dispensed to days in the study period, report adherence rates ranging from 25 to 64% for patients initiated on statins for their high blood cholesterol (McGinnis et al., 2007; Lee et al., 2016; Maninget, 2013). Pharmacy claims data reveal that one year after treatment, nearly half of the patients prescribed a statin did not take their medication as prescribed. A larger cohort study found that after 5 years only 1 in 4 patients prescribed a statin maintained adherence of at least 80% (Benner et al., 2002).

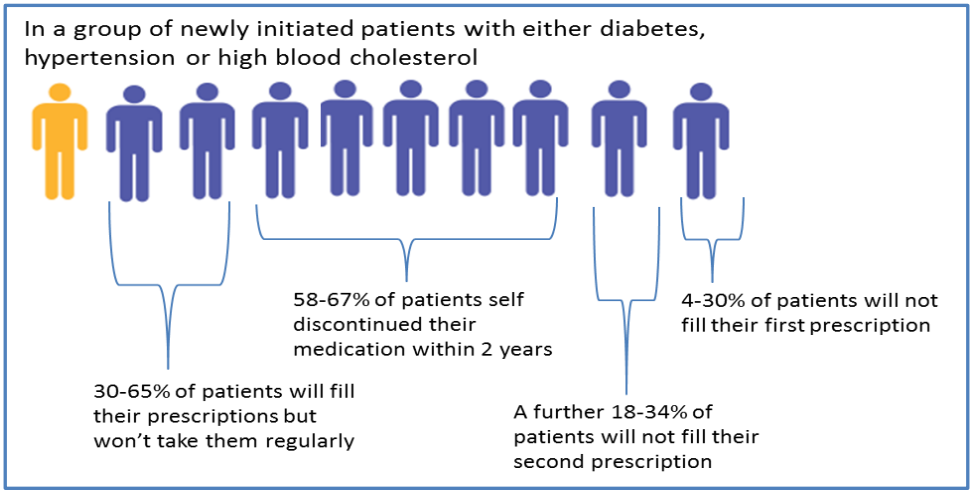
22. In diabetes, non-adherence rates for oral medications among patients who filled at least one prescription range from 39% to 92% (Krass, 2015). In a recent retrospective analysis of the health records of patients with type 2 diabetes who had recently initiated oral diabetes medication only 65% of patients reported good adherence (80% of medication). Adherence was 62% and 64% for long-term and new-start insulin users, respectively.

23. A meta-analysis using self-reported data found overall, non-adherence to antihypertensive medications was 45% (95% confidence interval 34.4–56.1) Nearly one-third (31.2%) of hypertensive patients with various comorbidities showed non-adherence

to medications. A higher proportion (83.7%) of uncontrolled hypertensive patients was non-adherent to medications (Abegez et al, 2017). Studies using claims databases that defined adherence as an 80% ratio of days on which medication was dispensed reported adherence rates ranging from 52 to 74% (De Geest & Sabaté, 2003).

24. **Persistence** is reported either as a continuous variable in terms of proportion of days for which therapy is available or as a dichotomous variable measured at the end of predefined time period for example 6, 12 or 24 months. Persistence is low among people with chronic diseases and rates steadily decline from initiation to two years (Yeaw et al, 2009). Among diabetes patients, 73% of those who started the therapy continued their diabetes medication at 6 months and only 39% remained persistent at 24 months. 25 to 50% of patients with hypercholesterolemia discontinued statin use within 6 to 12 months after initiation (Svensson et al. 2015; McGinnis et al. 2007). 16 to 50% of patients with hypertension discontinue their antihypertensive medications within the first year of treatment (Brown & Bussell, 2011). At 24 months, only 33% of patients prescribed a lipid-lowering drug and 41% of patients prescribed an antihypertensive persisted with therapy (Davis et al, 2011). These estimates exclude those who never filled the first prescription.

Figure 2. Only a minority of chronic disease patients take their medicines as prescribed



Source: Authors' compilation based on review of literature.

4. WHY DO PATIENTS WITH CHRONIC DISEASES NOT TAKE LIFE-SAVING MEDICATIONS?

25. Oftentimes, discussions of non-adherence tend to attribute the problem to patients alone, their forgetfulness in particular, while the reviews of evidence from patient surveys and adherence interventions reveal a number of other significant factors. Using the World Health Organisation multidimensional model of adherence, the drivers of non-adherence can be classified into five broad categories: (i) health care system/health team barriers

(e.g. limited drug reimbursement, poor understanding between patients and providers), (ii) therapy-related barriers (side-effects, complexity of drug regimen), (iii) condition-related factors (presence of comorbidities, lack of symptoms), (iv) patient-related factors (forgetfulness, wrong beliefs about diseases and medicines, preferences), and (v) unmet social needs (poverty, low social support) (WHO, 2003; AlGhurair et al., 2012; Kardas et al., 2013).

4.1. There are significant health care system/health care team barriers to adherence

Poor patient-provider understanding

26. Many patients with chronic condition report disagreeing with a clinician's advice, feeling that the decision process about therapy did not involve them, or the perception that the therapy does not represent their best interest (Commonwealth Fund, 2012; Kardas et al., 2013). This apparent lack of understanding between patients and health care professionals reflects the discrepancy between patients experiencing a disease in the context of their life and providers focusing on organs affected by a particular condition (Cenci, 2016).

27. From the patient perspective a chronic condition poses not only health problems but also long-term personal and social challenges. A simple prescription of a drug without words giving meaning to this prescription makes patients feel that they did not reach a common ground with the prescribing clinician. Patients are also frequently concerned about the therapy's effects on their daily functioning or might have specific preferences for a dosing regimen because of their work routines. Yet, the disease-focused, as opposed to person-focused, communication between patients and providers leaves little space for consideration of personal aspects of a patient's condition (Cenci, 2016). In consequence, patients are inclined to rebuff the treatment decision or, due to unaddressed concerns or preferences, lack sufficient motivation to follow the therapy consistently in the long-term.

28. The problems related to the dominance of the disease-centred, as opposed to person-centred, model of health care delivery, pose particular challenges to adherence among chronic patients with multiple co-morbidities and/or older than 75 years. For these patients, a simple application of clinical guidelines, developed for each condition separately, might result in the intake of more than 10 drugs a day, which seriously calls into question their efficacy and safety. Moreover, clinical trials do not include those patients, which makes the need to account for individual experience of a therapy and personalisation of treatment decisions even more acute. The health system's failure to develop a systematic, multi-disciplinary, and participatory approach to the development of health care plans for these patients means that they are left alone to analyse the sum of the impacts from diseases and medicines, notably their side effects, on their life (Cenci, 2016). Those patients often perceive their medication use as excessive and decide to discontinue one or more of their medications, not necessarily choosing the optimal combination (Kardas et al., 2013; Steinman et al., 2017).

Patient out-of-pocket payments and limited prescription coverage

29. Patients with chronic diseases are taking less medication than prescribed due to limited prescription coverage and the related out-of-pocket costs. In particular, patients with low incomes and/or multiple health problems use significantly less medication than prescribed (Piette, 2004); Commonwealth Fund, 2012; OECD, 2015; Morgan & Lee, 2017). In this context, it is again essential to recognise the need for patient-provider communication focusing on patient's personal situation and not only the disease. Patients

who simultaneously suffer from a number of health problems might be selective about the treatments they forego due to out-of-pocket costs. When the financial pressures are not discussed together with the prescribing clinician, the choices made by patients alone might be sub-optimal at best and catastrophic at worst.

30. Unfortunately, evidence suggests that patient-physician discussions about adherence problems owing to costs rarely occur (Alexander et al., 2003; 2017). Clinicians noticing lack of improvement in a patient's condition, but unaware of the reasons why patients do not adhere to medicines, might decide to prescribe another drug. This often means discarding the previous prescription before all of the purchased medication is used, which further exacerbates the financial pressure. Therefore, even in the absence of changes to prescription coverage, there are important opportunities for clinicians in discussing remedies such as switching to generics or lower cost branded medicines or providing information on possible financial assistance (Piette, 2004; OECD, 2015).

Cumbersome procedures for refilling prescriptions

31. Due to the long-term character of chronic condition therapies, the ease or difficulties with which patients can renew/refill prescriptions also matter for rates of adherence. Chronic patients frequently report having no time to re-fill prescriptions. Indeed, cumbersome procedures, involving, for example, monthly visits to health care facilities for picking up a renewed prescription only, queuing at pharmacies, or the need to carry around paper records contribute to non-adherence (Alghurair, Hughes, Simpson, & Guirguis, 2012).

4.2. Therapy-related barriers such as concerns about side-effects often remain unresolved

32. The most commonly reported therapy-related barrier to adherence is occurrence of side effects, especially when patients perceive them as decreasing quality of their life. Another frequently reported therapy-related factor behind non-adherence is complexity of drug regimens – complex and/or frequent dosing, inconvenience associated with administration of injection formulations, or high number of prescribed medicines. Also, interference of medication taking with daily routines or work schedule has been reported as a barrier to good adherence among patients with long-term conditions (Alghurair et al., 2012).

33. The above aspects of therapies remain barriers only if they cannot be resolved by the prescribing clinician. In most cases alternative medication regimen can be prescribed that might reduce the magnitude of side-effects, especially as perceived by a patient, or better meet patient preferences for dosing frequency and form. The precondition for finding such alternatives is that patients and providers discuss the issues at hand and both participate in weighting of advantages and disadvantages of various alternatives. As mentioned in earlier subsection 3.1, the quality of patient-provider communication is not always optimal and patient engagement is limited, however. In many instances, the health care team-related barriers aggravate the therapy-related barriers to good adherence.

4.3. Condition-related factors such as lack of strong symptoms exacerbate the problem of non-adherence

34. At the onset, chronic conditions are not necessarily accompanied by strong symptoms, which might result in denial of the diagnosis or a reduced sense of urgency on

the patient's side - "I do not feel sick – I don't need the medicine" (Alghurair et al., 2012; NEHI, 2009). Here again, effective patient-provider communication addressing the asymptomatic nature of a condition at the time of the initial diagnosis could help to boost adherence. Therefore, as in the case of the therapy-related barriers, the sub-optimal quality of patient-provider interactions might aggravate this type of the condition-related barriers to adherence.

35. Condition-related barriers to adherence include also presence of co-morbidities, depression in particular (Alghurair et al., 2012). Yet, the underlying cause is in fact the health system's failure to develop a multi-disciplinary approach to the development of health care plans for chronic patients with depression, or other co-morbidities, that ensure adequate support in medication taking.

36. Patients might also experience problems with adherence due to the condition-related limitations in physical abilities. Evidence suggests that in some cases patients simply cannot open a medication bottle and/or read the print on medication, including instructions for drug dosage (Alghurair et al., 2012).

4.4. Patients' inaccurate beliefs about medicines or preferences are not always taken into account

37. Patients' deviation from the prescribed course of treatment is often a result of a conscious decision based on inaccurate beliefs about diseases and medicines or preferences for a different medication regimen. In contrast, simple forgetfulness and confusion are relatively less common drivers behind non-adherence to medication (Commonwealth Fund, 2012; Alghurair, Hughes, Simpson, & Guirguis, 2012; Olson, 2012; Kardas et al., 2013).

38. Patients' social environment, family, and culture profoundly influence mindsets about what can or cannot be done in connection to their condition. For example, a patient with hypertension and a family history of heart disease might believe that nothing can be done to prevent a heart attack and decide not to start on the course of medication. Similarly, patients in poverty, who often feel they lack control in their life, might believe that they would fail to follow consistently a long-term chronic condition therapy and decide not to start it at all.

39. While inaccurate beliefs about diseases and medicines are embedded in the patient population, they can be partially attributed to the health system in general and health care team in particular. Patients' inaccurate perceptions reflect a system/team's failure to elicit patient trust, which would allow for their therapy related concerns to be effectively resolved. In general, inaccurate beliefs about diseases and medication can be modified, for example, by carefully chosen wording of the message delivering the diagnosis, but are rarely addressed by health systems (NEHI, 2009; Alghurair et al., 2012; Crum and Zuckerman, 2017).

40. Similarly, patient preferences with respect to such aspects of the medication regimen as frequency of dosing, formulation of the medication, or risk-profile of a drug contribute to non-adherence when the prescribing clinician remains unaware of them. Such preferences are often motivated by patients' work schedules or other daily routines. While not all of the patients' preferences can always be met, taking them into account whenever possible could boost adherence. This, however, requires good patient-provider communication and patient's engagement in the decision making.

4.5. Unmet social needs are also associated with non-adherence

41. Unmet social needs such as shortage of basic food or household equipment - a refrigerator, for example - present serious barriers to adherence. As mentioned above, patients with low incomes use significantly less medication than prescribed (Piette, 2004); Commonwealth Fund, 2012; OECD, 2015; Morgan & Lee, 2017).

42. Health systems are still badly equipped to address unmet social needs, which are increasingly recognised as critical component of effective health care. Health care providers face only weak incentives or none at all to routinely identify social needs. Yet, even when aware of them, health care providers are often without means to act due to limited flexibility and/or funds to cover these non-medical costs of care as well as lack of integration with social service providers (Blumenthal and Abrams, 2016; McMullen and Katz, 2017).

43. Adherence is also a challenge for chronic patients with low social support - patients leaving alone and/or lacking social network (Kardas et al., 2013). While various programmes and systems are often in place to assist people in such circumstances, they often do recognise the problem of non-adherence as a target for intervention.

5. WHAT ARE HEALTH SYSTEMS DOING TO IMPROVE MEDICATION ADHERENCE AMONG PATIENTS WITH CHRONIC DISEASES?

44. Several systematic reviews and studies have assessed and mapped the availability of initiatives to improve medication adherence. These reviews report that most of the interventions aim at modifying individual patient behaviour only, mainly through general informational campaigns on benefits of adherence, followed by smaller, predominantly informational, initiatives at the provider level, either pharmacists or primary care physicians (Conn et al., 2016; Costa et al., 2015; Nieuwlat et al., 2014; Kardas et al., 2013). Overall, a survey administered to OECD countries' representatives provided a mixed picture across OECD countries in the development of policies and interventions for medication adherence. These results mirror the results of the literature review. Table 1 gives an overview of medication adherence programmes and initiatives that were identified exclusively from survey responses.

Table 1. Medication adherence programmes and initiatives identified from the survey responses - OECD countries.

Country	Routine monitoring of adherence at a national level	Research studies assessing adherence rates, reasons for non-adherence and impact on health outcomes and costs	Interventions to promote adherence
Australia	No	Yes	Yes, PDI, DTI
Belgium	No	Yes	No
Canada	No	Yes	Yes, PDI
Czech Republic	No	No	No
Estonia	No	Not reported	Not reported
France	No	Yes	Yes, PDI
Hungary	No	Yes	Yes, PDI
Iceland	No	No	No
Israel	Not at a national level, but at physician level	No	Yes, PDI, DTI
Japan	No	Yes	Yes, PDI
Korea	No	Yes	No
Latvia	No	No	No
Norway	No	Yes	Yes, DTI, PDI
Poland	No	Work-in-progress	Yes, IC (PDI is planned)
Portugal	No	Yes	Yes, IC
Slovenia	Not at a national level, but at a physician level	Yes	Yes, PDI
Sweden	Yes	Not reported	Not reported
Switzerland	No	No	Yes, PDI
Turkey	Not at a national level, but at a physician level	Yes	Yes, PDI
United Kingdom	No	Yes	Yes, PDI, IC, DTI
United States	Not at a national level, but at Centre for Medicare and Medicaid level	Yes	Yes, PDI, IC, DTI

Key: Provider delivered intervention with financial incentives for the providers – **PDI**. Public information/education campaigns – **IC**. Data & technology infrastructure – **DTI.**

45. Non-adherence is frequently not viewed as high priority on the national policy agenda in many countries at present. There doesn't seem to be a visible increase in efforts at the national level after the seminal report on medication non-adherence and call to action by the WHO in 2003. Interventions to enhance or support medication adherence are not well co-ordinated nor part of a larger strategic policy programme. Most of the interventions aim at modifying individual patient behaviour only. Relatively few aim at addressing the broader determinants of non-adherence - related to health care system and health care team - by improving patient-provider interaction, encouraging patient involvement and personalisation of medication regimen.

46. These findings are largely in line with those reported in the 2012 European Union study *Assessing Barriers to Adherence – ABC Study* – Box 1. The study found that most policy implementations in the European Union addressing adherence had taken place at the patient level, for example, the provision of education and information about newly prescribed medicines and the benefits of adherence. This was followed by provider-level activity focused on improving patient–clinician interactions through the implementation

of a partnership approach to decisions about therapies. The lowest amount of activity was reported for policy solutions at the government or health care payer level, which included investment in research to identify effective interventions demonstrating value for money and increasing public awareness of medication adherence. The study also emphasised the "hidden" nature of adherence in both policy and practice. Despite policy documents making reference to adherence, these references are often distributed among a number of other topics, such as patient safety, rather than falling under the discrete label of medication adherence. This reduces the visibility of adherence as a focus in the policy arena (ABC project, 2012).

Box 1. European Union study *Assessing Barriers to Adherence* – main findings, 2012.

Based on a qualitative analysis of the available evidence as well as expert opinions, the 2012 European Union study *Assessing Barriers to Adherence - ABC study* stresses the need for creating a health policy agenda that promotes patient non-adherence to medicines as a priority concern. The countries (e.g., Netherlands, Finland, Germany and Malta) that have managed to elevate non-adherence to medication as a critical health care issue on the national policy agenda share characteristics such as co-ordinated multi-stakeholder forums and system level support and drive.

The ABC study found very little interest in medication adherence among key stakeholder groups in the European Union. As part of the project, surveys were sent to health care professionals (nurses, pharmacists, physicians), medical, pharmacy and nursing schools, and pharmaceutical companies:

- A survey sent to health care professionals – nurses, pharmacists, physicians - in Austria, Belgium, England, France, Germany, Hungary, The Netherlands, Poland, Portugal and Switzerland found that they are limited in the extent to which they intervene to assist patients having long-term conditions with medication adherence. Approximately half of the healthcare professionals in the survey ask patients with long-term conditions whether they have missed any doses of their medication on a regular basis. Pharmacists persistently report that they intervene less than physicians or nurses to support patients with medicines. The results did not vary significantly by country.
- Only ten out of 201 medical, nursing and pharmacy schools in the European Union responded to the survey to assess whether schools include medication adherence as part of the core curriculum. One out of the five institutions reported not having specific content on how to assess medication adherence in their curriculum and 25% of the institutions reported no specific content on how to improve or promote adherence. The median number of teaching hours spent on medication adherence was reported to be three contact hours.
- Only nine out of the 98 pharmaceutical companies responded to the survey on the current adherence promoting activities. Only four of the nine companies indicated that medication adherence was addressed in their strategic plan and that they were involved with medication adherence programmes.

5.1. Routine monitoring & reporting may provide the impetus to improve adherence

47. The United States and Sweden are the only OECD countries that report on adherence and persistence measures on a routine basis *at a system level*. In other countries like Israel, Slovenia and Turkey, primary care physicians monitor adherence routinely *at a patient level* (first column in Table 1). While very few countries report or use adherence

measures as either quality improvement or performance measures, most countries have conducted several one-off research studies measuring adherence and/or persistence for a range of diseases.

48. The experience of Sweden and the United States with system-level reporting is summarised below:

- **Sweden:** Sweden measures and reports one adherence measure, percentage of patients starting on antihypertensive therapy in a year who were still following the regimen after 12–18 months. This indicator is reported in a series of annual reports entitled *Regional Comparisons* with indicator-based comparisons of healthcare quality and efficiency among the counties of Sweden.

- **United States:** Since 2012, the Centers for Medicare and Medicaid Services (CMS) use its Medicare STAR program to measure adherence to three categories of drugs for management of cardiovascular disease risk factors: angiotensin converting enzyme inhibitors and angiotensin receptor blockers (ACEI/ARBs) to control hypertension; statins to control LDL-cholesterol; and oral antihyperglycemics to control glycosylated hemoglobin (HbA1c). Qualified Health Plans issuers in the Health Insurance Marketplace need to report the adherence measures using the standard Proportion of Days Covered (PDC) method separately for the three drug categories. The implementation of these measures emphasises the responsibility of health plans to monitor and improve medication adherence among their patients. Patient and provider indicators of medication adherence are tied to performance measures and are publicly reported at provider and healthcare system levels. Under current Medicare policy, Part D plans are required to report on quality measures for prescribing of and adherence to medications for diabetes, hypertension, and high cholesterol. The quality measures are used to evaluate Part D plan performance in publicly reported STAR ratings. These have significant financial incentives for the insurers involved.

49. Most countries (n=13 of the surveyed countries) reported one-off research studies being conducted on medication adherence either by universities or research institutions (Table 1, second column). These studies assess the magnitude of adherence and persistence as well as the impacts of medication non-adherence in terms of health outcomes and health care costs of patients. (The results of these studies have been incorporated in Sections 2 and 3).

50. Medication adherence is increasingly being considered as a measure for performance-based reimbursement contracts. A US study found that higher private health plan-level averages of medication adherence were associated with significantly lower rates of disease-related complications for both diabetes and congestive heart failure. The authors concluded that medication adherence measures are potentially useful tools for improving the performance of health plans and providing incentives for plans to improve adherence by tying measures to incentives could be an effective level to improve the overall quality of care (Seabury et al, 2015).

51. Measuring and reporting adherence *at a provider level* has also been suggested as a mechanism to improve adherence. One of the ways to do this is providing physicians with feedback on their individual patient's level of adherence. Interesting examples are offered by Israel and Slovenia.

- **Israel:** Health funds in Israel have consolidated primary care services into interprofessional teams to enhance support for patients with chronic diseases. The

funds provide doctors with extra resources to support patients through partnership-based relationship, regular monitoring of a patient's health indicators, including adherence to medication, and support tailored to the specific needs of patients. One of the ways health insurance funds in Israel support adherence is by providing physicians their individual patient's adherence feedback as well as highlighting patients with low adherence (percent of filled prescriptions by patient). These measures are also reported at a clinic level and there is extra support provided to the physicians in terms of improving care. These efforts are complemented by the Quality Indicators in Community Health Care programme consisting of 35 quality indicators, including selected health outcomes. This approach has focused on changing the structure of supply to influence provider behaviour, with some funds seeking to influence providers also through financial incentives. Evidence available from the second largest health fund – Maccabi – suggest that poor glycaemic control decreased by 29% and control of cholesterol increased by more than 90% (OECD, 2012). Moreover, the rates of diabetes-related hospitalisations, adjusted for rates of general hospital use, are among the lowest in OECD countries, (OECD, 2015).

- **Slovenia:** Chronic patients are routinely monitored on the individual level by general practitioners and within the so-called Family Medicine Model Practices. The latter are practices led by a General Practitioner supported by a registered nurse as well as a graduate nurse with specialised training in screening for chronic disease risk factors, preventive counselling, and care coordination for patients with stable chronic diseases. The graduate nurse provides intensive education, health guidelines, motivation for a change in lifestyle or referral to structured education programmes, assesses the attainment of individually set objectives (regarding target values of specific parameters), and also checks for the presence of possible side effects of medications and explains the importance of regular taking of medications. The goal behind this model of practice is to optimise care for chronic patients - including optimal use of medication – and empower patients to participate in their care and engage in self-management. This new model of work with chronic patients is regularly evaluated – using 36 indicators of structure, process and outcomes – in yearly reports.

5.2. Provider-delivered interventions have been shown to have a modest impact on improving adherence

52. Almost all of the surveyed countries reported interventions delivered by health care providers (PDI), notably pharmacists or primary care physicians. Health care providers (e.g., physicians, pharmacists and nurses) are ideal actors to implement adherence promoting interventions because of their existing relationships with patients, ongoing monitoring of patient's health outcomes and familiarity with patient's unique treatment needs. Most of these interventions required additional support to providers, including financial incentives or payment reform.

53. Several countries described pilot programmes delivered by ***pharmacists*** to improve medication adherence. Most of these pilots have been or are currently being evaluated. Pharmacist interventions to improve medication adherence generally use an educational component combined with behavioural, affective or provider-targeted strategies. Results vary in terms of the effectiveness of these interventions.

- **United Kingdom:** NHS England has recently embedded a pharmacist-based programme as part of a national roll out. The "New Medicines Service" (NMS) is

the largest national interventions aiming to support patients optimise their use of medicines in hypertension and diabetes. This is a service where patients receive extra consultations with a community pharmacist. The service provides support for people with long-term conditions newly prescribed a medicine. The primary aim of the consultation (which can be face-to-face or telephone-based) is the patient-centred identification of any problems with the treatment and any support or action needed. Within the NHS community pharmacy contractual framework, the NMS is classified as an Advanced Service, whereby accredited pharmacies can opt to provide the service from a community pharmacy. NMS generated a mean of 0.06 (95%CI: 0.00, 0.16) more QALYs per patient, at a mean reduced cost of -£190 (95%CI: -929, 87). Therefore the NMS service dominates current practice, with an ICER (Incremental cost-effectiveness ratio - 95% credibility range) of -£3 005 (-£17 213, £4 543).

- **Canada:** A pilot community pharmacist programme - "Health Inform" - based on providing periodic patient education was conducted in 2005. The programme mailed out brochures from the participating pharmacy to its patients that included: information on the disease, information on the medication's action and side effects, and administration of the medication as well as reinforcement of the commitment to take the medication as prescribed. The programme required the pharmacists to seek permission for such mailing and permitted the reinforcement role of the pharmacist. Pharmacists were reimbursed for enrolling the patients in the program. The pilot study was evaluated and reported that at the end of one year, enrolled patients demonstrated higher persistence to statins, bisphosphonates and antihypertensives than those who were not invited to the programme (i.e., "comparison patients") by 11.7%, 11.9% and 14.3%, respectively (McLean, 2007).
- **Switzerland:** In spring 2016, the Federal Office of Public Health, the Association of Pharmacies, and the Association of Insurers launched a pilot project that aims at improving adherence among patients with diabetes. The pilot involves 20 pharmacies with 10 patients per pharmacy per month, for a period of 12 months. Pharmacists, using the pharmacy databases, identify non-adherent patients and devise a personalised intervention in collaboration with a prescribing physician. The interventions involve additional consultations, re-validation of treatment plans, and/or motivational discussions. The project assesses the interprofessional collaboration by collecting information on satisfaction with the collaboration, means of communication, and the quality of the exchange. The project will be evaluated in 2018. A similar approach has been under consideration in **Poland.**
- **Japan:** A pilot community pharmacists' project - the "COMPASS project" - was trialled to improve the blood glucose level through improving adherence to medicines in patients with type 2 diabetes. The intervention was provided by pharmacists who use coaching skills and motivational interviewing as well as provide advice to patients. This project is currently being evaluated. Another initiative is the electronic medication notebooks which are provided to patients to record their medication history. There are fee schedule incentives in place whereby there is an additional payment for pharmacist when they provide patients with guidance on medicines.
- **Australia:** In 2016, a New Medicine Support Service (2015-16) programme was piloted across nine pharmacies in New South Wales, Australia. This service aimed to improve medicine adherence by providing pharmacist support to patients newly

prescribed a medicine for long-term conditions, including dyslipidaemia, hypertension and type 2 diabetes. The New Medicine Support Service (2015-16) was evaluated with a focus on referrals back to General Practitioners. Referrals occurred for 13% of patients at the intervention stage and 5% of patients at the follow-up stage. For the remainder of participants, reassurance and advice to carry on using their medicines was sufficient.

54. Most countries have in place guidelines, frameworks and financial incentives for ***primary care physicians*** to improve care for patients with chronic diseases. However, there were no specific physician delivered adherence interventions that countries reported. Most of the physician-delivered interventions are part of broader chronic disease management plans.

- **France:** In France, a number of different programmes have been established to improve diabetic care outcomes. The physician receives an additional annual payment for patients diagnosed with the listed condition. This payment covers the care co-ordination required to implement specific care protocols. A pay-for-performance (P4P) scheme, initially introduced in 2009 as the Contrat d'Amélioration des Pratiques Individuelles (CAPI, Contract to improve individual practices), and now known as the Rémunération sur Objectifs de Santé Publique (ROSP, Remuneration of public health objectives) incentivises improvements in quality of care and more efficient prescribing. Currently, the ROSP includes 29 indicators from four different areas: organisation of practice, chronic conditions, prevention and efficiency. Eight of the indicators measuring care for chronic conditions relate to diabetic patients. The calculation of the performance payment for each physician is rather complex taking into account the doctor's individual performance, the average performance of all doctor's per indicator and the target objectives which are set annually by the Haute Autorité de Santé (HAS, the public entity responsible for setting health care quality standards). The indicators are a mix of measures for procedural quality (e.g. number of HbA1c tests) and intermediate outcomes (e.g. share of diabetics below HbA1c thresholds). They also include cholesterol thresholds and indicators to measure the intake of statins and aspirin among diabetics at high risk of developing cardiovascular diseases (CNAMTS, 2014; Cashin et al., 2014). The bonus payments GPs can generate through the ROSP accounted for 4.1% of total GP payment in 2014 (Rapport de la Commission des comptes de la sécurité sociale, 2015). In 2015, the average bonus was around EUR 6 800 (CNAMTS, 2016). An additional service for patients with diabetes called "SOPHIA" was put in place in 2009. SOPHIA provides diabetes counselling and education by nurses over the phone employed by the statutory health insurance. GPs are also financially rewarded for submitting a completed medical questionnaire to health insurance funds for each patient registering for this service.
- **Norway:** Patients in Norway are listed with one physician (General Practitioner) only who follows them over time and coordinates care with specialists and other health care professionals. The physician discusses with the patients the effects, side effects and patients preference (dose and timing) regarding their medication. This often includes measurements and blood tests for evaluating the effect of the prescriptions. It is also usual to ask the patient if they remember taking their medicine as prescribed. The current guidelines for chronic conditions (diabetes, cardiovascular disease) include advice regarding follow-up. The GP is responsible for each patient's medication list and is responsible for follow-up of individuals

according to the guidelines. With the introduction of electronic prescribing, the GP can see any prescription, date of prescription, and date the medication is dispensed from the pharmacy. This allows the physician to have a discussion if the patient does not take out their medication at proper intervals.

5.3. Many interventions are focussed on providing information to patients

55. Various interventions to tackle poor adherence have focused on changing patients, particular their forgetfulness and beliefs about medicines, through informational campaigns (IC). This can range from providing leaflets and brochures at the provider level, either at a physician office or a pharmacy, public educational campaigns, as well as online tools.

56. Public educational campaigns to promote medication adherence and raise awareness among patients and their family caregivers about the importance of taking medication as prescribed are often seen as a vital first step toward better health outcomes. Examples of such campaigns include:

- **Portugal*:*** *Responsável do Medicamento campaign* is part of a broader responsible use of medicines campaign. It is a joint campaign by the pharmacists' association and INFARMED (the national authority in charge of medicines and health products). It is a multi-stakeholder campaign with a website, events, posters, pledge and social media.
- **United Kingdom**: *Adherence, Let's take care of it* campaign aims to increase awareness of the issue of medication non-adherence. The campaign includes a website, National Medication Adherence Week, social media and a pledge. The campaign started in 2015 and is funded by Omnicell, a company offering automated medication dispensing systems.
- **United States**: *Script your future* is a campaign including co-ordinated national communications, paid advertising, and targeted outreach in six cities. The goal is to raise awareness among patients and their family caregivers about the importance of taking medication as prescribed as a vital first step toward better health outcomes. The campaign focuses on patients affected by three serious chronic conditions – diabetes, respiratory disease, and cardiovascular disease. The campaign is led by the National Consumers League – a private, non-profit advocacy group.

57. The particular examples of such campaigns in the OECD countries have not been evaluated with regard to their effectiveness or cost-effectiveness. The systematic reviews of adherence interventions show, however, that interventions such as simple reminders or campaigns aiming to inform and educate patients or their families tend to be low in effectiveness, especially as compared to interventions involving interaction with clinicians (Cost et al., 2015; Nieuwlaat et al., 2014; Aitken and Gorokhovich, 2012).

58. Pharmaceutical companies also provide information to patients about their medicines and the importance of taking them. For example, Novartis launched a customisable patient adherence and education programme – BP Success Zone Patient Management Program (BPSZ)[1] - to help patients monitor their blood pressure, manage medication regimes, and track improvement while providing educational information, diet

[1] http://www.bpsuccesszone.com

plans, and exercise programmes to help enhance their overall health. Another example is eResources4Health - created by Daiichi Sankyo - an unbranded health education Web-based tool that contains more than 100 unbranded, customisable health resources. It is intended to educate people with chronic diseases with appropriate self-management tools and help them work more closely with their health care providers[2]. There is limited published information on the effectives or cost-effectiveness of these initiatives.

5.4. Financial incentives play a role in improving adherence

59. Payment reform and financial incentives for providers have the potential to improve medication adherence. Shifting to payment systems that reward providers for better patient outcomes and encourage co-ordination of care is critical to providing the incentives and investments that are required for improving adherence. Most of the provider-delivered interventions reported by countries rely on financial incentives for individual clinicians or organisations to provide the additional service of improving adherence.

60. There are arguments for medication adherence becoming a part of reimbursement through value-based pricing and performance-based contracting between payers and pharmaceutical companies (Barlas et al., 2016). Such contracts align payer and manufacturer incentives to improve adherence to medicines. An example with concrete outcomes is the performance-based agreement concluded by pharmaceutical company Merck and Cigna insurance in 2009 regarding the cost of diabetes medicines Januvia and Janumet. Under the agreement, Merck offers Cigna's discounts on the two medications if the percentage of patients who are adherent to diabetes medicines increases. The discounts increase also if patients show that blood glucose is under control. Within this agreement, Cigna's efforts to improve adherence are rewarded with the discounts on drugs, while the pharmaceutical producer benefits from higher volumes of sales. The agreement is also helping Cigna to offer lower co-payments for adhering patients. Cigna has assigned the two drugs a preferred status on its drug coverage lists and committed to apply a range of initiatives to help patients improve adherence, including phone calls to investigate why they are failing to take their treatments. The infrastructure necessary for implementation of the agreement, such as collection of pharmacy data and lab results for internal use, was already in place as Cigna had an active diabetes management programme before. In 2010, Cigna announced that its medicine adherence programmes have helped patients with diabetes reduce emergency room and other hospital visits by 50% for those reaching blood glucose goals, and reduced diabetes-related costs by 24%. Moreover, among 165 000 members taking the two oral diabetes drugs, blood sugar levels improved by over 5% on average. Participants also registered a 4.5% increase in blood sugar lab testing. Medical adherence improved across the board, rising to 87% for those taking Januvia and Janumet (Neumann et al., 2011).

61. Regarding financial incentives of patients, a host of observational studies demonstrate that reducing patient co-payments for highly effective chronic therapies can substantially improve adherence, especially in countries with high co-payments (Morgan et al., 2017; Kesselheim et al, 2015). Others have posited that simply reducing co-payments may not be sufficient, and have proposed that providing financial rewards for

[2] http://www.pharmavoice.com/article/payers/

better adherence may be an even more effective mechanism to promote behaviour change (Bosworth et al, 2011). Whereas physician pay-for-performance has received substantial attention in the medical literature, patient pay-for-performance is a concept that needs further research to understand its long-term effectiveness and cost-effectiveness (Jochelson, 2007).

5.5. Data and technology infrastructure could be leveraged to boost adherence

62. Data and technology infrastructure (DTI in Table 1) could be developed or, where existing, leveraged to boost adherence. A common trait among successful adherence interventions is that they leverage information technology and patient-level data. The initiatives focus on understanding the patients' attributes using data and tailoring interventions to those attributes. As such, the technology infrastructure supports further interventions such as patient follow-up and personalised support provided by health care professionals who are trained and empowered to work closely with patients to improve adherence (Cutler, 2010).

63. Several OECD countries, for example, Norway, Denmark, Finland, Sweden, England, Estonia and the United States, have e-prescribing infrastructure in place. When medication information is shared electronically, prescribers have access to information that allows them to assess a patient's medication regimen at the point of care and to identify non-adherence. Electronic systems may also be able to notify a prescriber or pharmacist about refills, which can help trigger an intervention to avoid a potential gap in medication use.

64. Kaiser Permanente in the United States has been at the forefront of adherence research in terms of assessing the magnitude of the problem, its consequences and effectiveness of interventions for the last twenty years. Many of the research findings on medication adherence have been translated into the system changes. These interventions include using e-prescribing to identify patients who do not fill their prescriptions. For the ease of refilling prescriptions, patients can mail order their prescription or use online refill option and home delivery. Also, patients have access to their electronic personal health records. Kaiser Permanente has consistently scored 5-star rating (excellent) for the Medicare STAR quality rating system's measures of medication adherence for diabetes, hypertension, and high cholesterol in nearly all of its regions. This level of achievement reflects a comprehensive strategy that includes multiple interventions and the whole-system approach to tackling non-adherence.

65. Pharmaceutical industry is also investigating ways to use big data for improving the understanding of patient non-adherence. For example Sanofi has been working with the Duke Clinical Research Institute (DCRI) and the Center for Assessment Technology and Continuous Health (CATCH) in the United States on tools to help predict how people with type 2 diabetes will adhere to their medication. Another example include the partnership between Novo Nordisk, IBM Watson, and Glooko, which will combine Novo Nordisk's insulin therapy and education expertise, Glooko's software, apps, and data expertise, and IBM Watson's intelligent computing power to create personalised digital tools, and even a virtual "diabetes coach". One of the goals of this partnership is to improve adherence to insulin therapy among patients with diabetes.[3]

[3] https://www.novonordisk.com/bin/getPDF.2069517.pdf

66. There are also technological advances that attempt to facilitate remote patient-provider interactions, depending upon the desired level of involvement. Consumer eHealth tools, such as personal health records and mobile phone applications represent an attempt to nudge patients to play a more active role in managing their medication. These tools, for example, provide electronic reminders, allow patients to track their adherence, and provide real-time information back to the provider for intervention and/or targeted follow-up. Substantial innovation has also taken place in the form of smart pills and packaging. Proteus Digital Health, for instance, has developed pills with embedded ingestible sensors, which track medication adherence and send data to a provider or care giver. The motivation behind such interactive capabilities comes from the known association between patient engagement and improved treatment adherence.

67. There are also solutions that could prove appropriate for patients who are unintentionally non-adherent due to forgetfulness and lack of planning. Care4Today™ Mobile Adherence, a secure messaging platform, mobile application and website, is designed to improve adherence to treatment regimens through reminders to take medications, refill prescriptions, and visit health care providers. The mobile platform is developed by Janssen Healthcare Innovation and is product agnostic. Another example is the smart pill bottle – developed by Adhere Tech - that lights up, buzzes and sends text and voice messages to remind patients of their pre-scheduled dosages.

68. The above-described examples of the industry-led initiatives have not been fully evaluated with regard to their effectiveness and cost-effectiveness yet. Such data could be useful for assessing in what ways payers/system designers and industry could partner to boost adherence.

6. CONCLUSIONS AND RECOMMENDATIONS

69. While more advanced methods are needed to complete the research on how to improve adherence, this report identifies four priority actions that are needed for improving adherence to medication at a system level. These actions can be summarised as: Acknowledging; Informing; Incentivising; Steering and Supporting. No single intervention will guarantee that patients fill their prescriptions and take their medicines as prescribed - the identified actions must be combined.

Acknowledging: Medication adherence needs to be on the policy agenda

70. Medication non-adherence harms health and increases healthcare costs. The first step for the relevant stakeholders is to acknowledge that this problem exists. Medication adherence needs to move up the policy agenda in order to raise awareness of the problem and mobilise adequate action.

71. Although the challenge of poor medication adherence has been discussed and debated for at least four decades, the problem has generally been overlooked as a major health care priority. Compounding the situation, adherence problems have been exacerbated by limited evidence on how to improve it cost-effectively as well as the

fragmented approach by which hospitals, primary health care organisations, and other parts of the health system intervene with patients and providers to encourage adherence. Medication adherence should be elevated as an important health care issue and be on the policy agenda in order to develop a systematic approach to improving it.

72. Medication non-adherence is a problem that applies to all chronic diseases, diminishes the ability to treat not only diabetes or heart disease, but also osteoporosis, asthma, and many other diseases and results in suffering, death, and suboptimal utilisation of health care resources. Despite this profound impact, patient adherence is not on the radar of policy makers and many health professionals, which has meant inconsistent government policies and a lack of resources for research, education, and professional development. Health care policy makers, practitioners and other stakeholders should recognise the extent of non-adherence, its contribution to negative health outcomes, and its cost in order to improve the situation.

73. Perhaps due to the limited visibility of adherence on health policy agendas, the research on effectiveness of various countermeasures is incomplete and the cost-effectiveness of interventions is rarely inspected. Systematic reviews show that interventions addressing patients alone - such as informational campaigns, simple reminders, or simplified dosing - tend to be low in effectiveness. This is because, the patient adherence initiatives often lack a thorough consideration of the root causes of discontinuing and not adhering to treatment and fail to address the issue holistically. Individual tactics are tried and then discontinued as budgets and priorities shift, before their impact is known. Successes are not always pulled through and expanded across the system.

74. The existing evidence suggests that no single strategy will guarantee that patients fill their prescriptions and take their medicines as prescribed. Therefore investment in multifaceted interventions addressing health system in general and interaction with health professionals in particular are most promising. Yet, the research in this field needs advances such as more objective adherence measures, improved design of long-term interventions, and larger patient groups to provide stronger evidence base (Kardas et al., 2013; Clyne et al., 2016; Nieuwlaat et al., 2014).

Informing: The need for routine monitoring and reporting of adherence

75. Very few countries measure and report adherence and persistence measures routinely at a system level. Developing and reporting adherence measures as quality improvement indicators or as performance measures could help in improving health system efficiency. These measures need to be comparable in order to benchmark and assess best practice between countries and interventions. The OECD can take stewardship of developing these indicators as part of the Health Care Quality and Outcomes work.

76. Reporting of medication adherence measures arguably could serve two main purposes: to provide transparency and inform decision-making about overall priorities and system-level strategies; and to inform quality improvement activities of service providers. To achieve these purposes a combination of both national level reporting and reporting at lower levels, for example at a local or provider level, could be required.

77. Measuring the quality of care provided to patients is an increasingly common element of evaluating and improving healthcare delivery. Measuring and reporting performance indicators allows making policy priorities explicit, defining

responsibilities/expectations, facilitating accountability, and focusing resources (OECD, 2001). Measuring alone is insufficient, rather the public reporting of performance data has been recommended as one key strategy for stimulating improvement of quality of care by putting the focus on transparency and accountability of healthcare providers. The introduction of public reporting programmes at different levels of the health sector is a challenging but rewarding strategy. Existing research covering different clinical outcomes supports the idea that public reporting could, in fact, stimulate providers to improve healthcare quality.

78. There is scope for cross-national comparisons of adherence rates and empirical analyses of the causes of differences between countries so that lessons can be learned from those countries with the best adherence rates, including how they have used different policy and programmatic interventions. It is essential that future policies are fully informed by this emerging evidence.

79. Data on adherence and the technology infrastructure provide support for further interventions to boost adherence such as personalised support for patients. When medication information is shared electronically, prescribers have access to information that allows them to assess a patient's medication regimen at the point of care and to identify non-adherence. Electronic systems may also be able to notify a prescriber or pharmacist about refills, which can help trigger an intervention to avoid a potential gap in medication use.

Incentivising: Changes in financial incentives for providers and patients are key to addressing non-adherence

80. Shifting from a fee-for-service model to payment systems that reward providers for better patient outcomes is critical to providing the incentives and investments that are required for improving adherence. Health professionals, physicians especially, face serious limitations in promoting adherence, including reimbursement schemes that reward brief encounters with patients and do not reimburse services like counselling and motivational discussions with patients. As a result, there is limited scope for discussion of individual aspects of a patient's condition and personalisation of the medication regimen.

81. Rewarding the time spent by providers on resolving patient concerns about medications does not necessarily create a financial burden on organisations and providers but, by facilitating treatment adherence, it can significantly improve health outcomes and reduce total treatment time and costs. The clinically significant gain in involving patients occurs in terms of obtaining information that is crucial to understanding and managing patient needs to foster improved health outcomes. The data generated from patient-centred communication can lead to a better understanding of specific approaches that may work best for an individual patient (Reiss-Brennan et al., 2016). Studies suggest that the physicians' "whole person" knowledge of patients increases the number of patients adhering to the recommended course of treatment by 50 to 230% (Safran et al., 1998; Stweart et al., 2000; Nieuwlat et al., 2014). In general, investment in patient-centred communication has positive effects for patients' long-term health status, improves the patient-provider working relationship, and ultimately patient as well as practitioner satisfaction (Lein & Wills, 2007).

82. The existing provider payment-related constraints undermine also effectiveness of other adherence improving initiatives such as physician access to electronic pharmacy records. Studies have shown that despite the ability to electronically review adherence

through pharmacy refill records of medications at the time of the patient visit, primary care providers' assessments of adherence did not agree with more objective pharmacy fill assessments about half of the time. Reasons for this have been that the review of such refill records requires time, for which primary care doctors are not reimbursed (Meddings et al., 2012).

83. Moreover, reducing patient co-payments for highly effective chronic therapies can substantially improve adherence, especially in countries with high co-payments. Providing financial rewards for better adherence may be an even more effective mechanism to promote behaviour change. It is, however, a concept that needs further research to understand its long-term effectiveness and cost-effectiveness.

84. There are arguments for medication adherence becoming a part of reimbursement based on value-based pricing and performance-based contracting with pharmaceutical companies. Examples of such contracts are in place and it is worthwhile to review their effectiveness.

Steering and Supporting: System-level interventions/tools can improve ease of access to medicines and patient-provider interactions

85. The adherence process begins with an individual patient and a prescribing clinician, who should be supported by a suite of interventions/tools developed by other health system stakeholders: payers/system designers, medical education institutions, professional regulatory bodies and industry.

86. Payers/system designers should focus on modifying system-level barriers to poor adherence. This means investing in information technology systems that, among other functions, ease providers' access to and review of patient medication regimens. Interventions that focus on improving adherence and reducing medication adherence disparities by providing behavioural "nudges" to large populations of patients should address system-level barriers to poor adherence such as cumbersome procedures for routine renewing/refilling of prescriptions for long-term therapies. At times, such simpler interventions that result in even small effect size at the individual level, when broadly implemented on a population level, may provide substantial cumulative public health benefit by significantly leveraging therapeutic efficacy. Initiatives like long-term medication supply, online refills of prescriptions, and calendarised blister packaging all have been shown to improve adherence.

87. The limited support patients receive with their medicine taking is in part due to the fact that health professionals rarely receive formal training in how to assess and tackle the problem. There is a strong case for educators to reflect on the nature and the extent of the education and training provided to health care professionals for supporting patients in their use of medicine. In particular, supporting patients in their medication therapy through the patient-centred communication requires specific competencies/skills that ensure the patients' narratives about their experience of illness are cost-effectively translated into improved care plans. The goal in the skills development is that the time investment and the quality of patient assessment become optimally balanced. The specific skills needed for the patient-centred approach to management and support of medication adherence have been described in detail in an educational framework developed under the EC funded project *Ascertaining Barriers to Compliance – ABC Project* (ABC Project, 2012; White et al., 2012).

88. Health professionals also need support through evidence-based tools such as clinical guidelines. In particular, clinical guidelines developed for the purpose of personalisation of treatment are needed, for elderly multimorbidity and polypharmacy patients in particular. Moreover, the growing number of patients with chronic conditions in nearly all age groups along with the expanding number of medications, often involving different mechanisms of action and safety profiles, can be a challenge for clinicians.

89. Engaging patients in an open, transparent manner might lead to discussing with them complex health-care choices, for instance, adverse-effect profiles of different medicines. In order to facilitate such discussions without undue burden, health professionals need support in form of decision aids – written materials, videos, or interactive electronic presentations designed to inform patients about care options and guiding patient-provider discussions. The decision aids should be certified or issued by professional regulatory bodies to assure that they are evidence-based, balanced, and able to meet patients' informational needs.

90. There is also a scope for industry to contribute with innovative solutions such as simplified medication regimens, smart pills and packaging, or technological advances (apps) that could facilitate follow-up on adherence. These solutions might ease following the therapy and/or patient-provider communication, provide electronic reminders to patients, or allow patients to track their adherence.

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