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# Analysis of Financial Losses due to Poor Adherence of Patients with Chronic Diseases and Their Impact on Health Economics

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Additional information is available at the end of the chapter

<http://dx.doi.org/10.5772/intechopen.70320>

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## Abstract

Pharmaceutical drugs—prescription drugs, not over-the-counter drugs—have prices that are negotiated between pharmaceutical companies and National Ministry of Health or national agency for medicines or national health insurers in every country. Prescription drug expenditures have increased every country's healthcare costs. Medication adherence (defined as not obtained refills of prescriptions or suboptimal dosing of prescribed drugs) is a growing concern to physicians and healthcare systems because of the multiple evidence of noncompliance among patients and correlated adverse outcomes. A patient is considered adherent if he/she takes 80% of his/her prescribed medicine(s). Different studies showed that patients do not take their prescribed medicines about half the time. Financial losses due to poor adherence are the result of unnecessary time-consuming work and costs for potential harm to patients. Hospitalization rates are reduced at higher levels of medication adherence. There are two types of financial losses due to poor treatment adherence: medical costs (measured by hospitalization risk) and drugs costs (without patient copayments). This financial loss analysis underlines the promotion of medication adherence by the patients.

**Keywords:** adherence, drugs, costs, persistence, concordance, compliance

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## 1. Introduction

Chronic diseases such as diabetes, stroke, arthritis, and heart diseases are the main cause of disability and death throughout the world. More than 40% of the people suffer in their adult

life from a chronic disease, and approximately 20% are hospitalized because of it. Another perspective is that they are costly, but in many cases preventable. The main cause is usually lifestyle choices that are hard to change; eating foods that are low in fats, becoming more physically active, and avoiding tobacco can help from developing high-risk conditions and diseases.

Patients with multiple chronic diseases struggle with great challenges on their daily lives; also, they experience poor health outcomes and will tend to use health national services more than patients with single chronic disease. Not respecting treatment prescriptions have both personal health impact and health economics consequences. These people are regarded as the highest cost patient populations in the healthcare system [1], with a poor adherence to treatment and medical advices. Worldwide, experts are examining the situation in which health care can be better organized to meet the needs of every patient. It was demonstrated that every dollar spent for improving adherence saves seven dollars in total healthcare costs [2, 3].

The absence of appropriate clinical practice guidelines for patients with multiple chronic diseases is a huge problem, which healthcare providers contend. Furthermore, patient-centered care needs to be supported through the transition of a more oriented approach to help patients prioritize their condition.

Moreover, not taking the required medication prescribed can have both personal health impact and health economics consequences. Recently, patients have shown increased interest in their own healthcare possibilities, raising the overall rate of adherence to treatment. However, the cost-effectiveness is still a parameter that is often ignored when a medical expert chooses to treat different kinds of conditions. Adherence is defined as “persistence in a practice,” so this definition emphasizes the routine that people with chronic disease ideally engage in when taking prescription medication [4].

The term first used was “compliance.” Charavel et al. [5] described this concept like physician alone makes the treatment decision, while the passive and dependent patient is obliged to comply with it. But the patient is not so silent and the term “adherence” is more used, the patient is more engaged in taking prescription medication.

Adherence cannot be defined as an “all or nothing” response in which the patient either follows the prescriber’s instruction to the letter (adherence) or deviates from it in some way (nonadherence) [6]. A patient is considered adherent if he/she takes 80% of his/her prescribed medicine(s). In the current era of free and easy access to information, with a higher educational level across the population, the concept of “concordance” seems to win for some diseases, when the patient want to defer decisions entirely to their health professionals or family members. Some patients prefer a collaborative role, whereas others prefer a passive role.

The most common chronic diseases that have a low adherence rate to treatment are asthma, diabetes, heart disease, obesity, rheumatic diseases, eating disorders, chronic obstructive pulmonary disease (COPD), and psychotic disorders.

The estimated rate of adherence is only half of the percentage of the patients with chronic diseases. Ten days after a new prescription has been filled [7], another quarter of the patients have missed one dose of the medication (intentionally or unintentionally). This kind of behavior

causes concern among the medical experts, so they have to make strong decisions in order to make the treatment more functional for every patient.

The top three therapy classes used for chronic diseases are inflammatory conditions, multiple sclerosis, and cancer. These three account more than a half of the total spend for all specialty medications. The new trend is that patients often shift from using brand medications to lower cost generics; as they do this, the copayments decline and also the adherence drops significantly.

The medications used to treat diabetes, high blood cholesterol and high blood pressure, ulcer, and asthma were the most expensive traditional therapy class. Also these classes had the minimum nonadherence rate (between 20 and 35%). In the case of ulcer disease, it is more likely for aged people to be more adherent to the treatment. Asthma is another case of strong nonadherence cases for the pediatric patients.

Correct understanding of barriers for adherence and strategies used can help physicians educate their patients more appropriately, reducing the risk of nonadherence and achieving an improvement of the healthcare system [8].

A lot of studies were done to estimate the costs related to nonadherence to drug therapy in developed countries, making distinctions between primary nonadherence (prescriptions not being filled by the patient) and secondary nonadherence (medication not being taken as prescribed). World Health Organization (WHO) published in 2003 a report of poor adherence to treatment of chronic diseases in which developing countries were found to have a higher rate of nonadherence than the 50% average of nonadherence to long-term therapy for chronic diseases in developed countries [9].

Mills et al. [10] examined both developed and developing nations in a systematic review of adherence and reported the same important barriers (fear of disclosure, substance abuse, forgetfulness, suspicions of treatment, too complicated regimens, too many pills, and decreased quality of life), with some facilitators reported by patients in developed nation (having a sense of self-worth, accepting their disease, understanding the need for strict adherence, making use of reminder tools, and having a simple regimen).

## 2. Pharmacoeconomic tools

An economic evaluation of adherence consists in assessing the outcomes and costs of intervention designed to improve health. It is like we evaluate a new intervention when the new one is not compared with usual health care, for example the standard intervention, but with no intervention at all. The incremental cost-effectiveness ratio (ICR) is the difference in costs (C) between the drug and no drug divided by the difference in effects (E) between the drug and no drug.

$$ICR = \frac{C_{drug} - C_{no\ drug}}{E_{drug} - E_{no\ drug}} \quad (1)$$

There are four form of economic evaluation of interventions:

- Cost-effectiveness analysis
- Cost-utility analysis
- Cost-benefit analysis
- Cost-minimization analysis

A summary of the characteristics of these types of economic evaluation is described in **Table 1**.

The most used techniques are cost-effectiveness analysis (CEA) and cost-utility analysis (CUA). A budget impact analysis (BIA) might be added to the economic evaluation.

**2.1. Cost-effectiveness analysis**

A cost-effectiveness analysis of adherence shows effects in naturally occurring units, such as death, illnesses or burns prevented, and the costs in monetary units (Euros, Dollars, etc.). We can use this type of analysis because it provides information about the relative efficiency of alternative interventions that serve the same goal, what happened if the adherence is smaller comparative with a higher value. A cost-effective analysis must contain effect outcomes and the costs for the different values of adherence and should compare them. Cost-effectiveness analysis is the simplest type of economic evaluation to explain the differences in outcomes.

Measuring benefits in natural units is the main advantage and focusing on a single outcome—adherence—could be considered a disadvantage.

**2.2. Cost-utility analysis**

Cost-utility analysis evaluates the difference in costs relative to the difference in quality adjusted life years (QALYs). Both types of effects—on the life expectancy and on quality of life—are used to justify the costs. QALYs are represented by the number of gained life

Methods	Costs	Effects	Evaluation question
Cost-effectiveness analysis (CEA)	Monetary units	Natural units (life-years gained, burns prevented, etc.)	Comparisons of interventions with same objective
Cost-utility analysis (CUA)	Monetary units	Utility and QALY (quality-adjusted life-year) or DALY (disability-adjusted life-year)	Comparison of interventions with different objectives
Cost-benefits analysis (CBA)	Monetary units	Monetary units	Are the benefits worth the costs?
Cost-minimization analysis (CMA)	Monetary units	The effects are not measured, since they are considered to be equal	Least-cost comparisons of programs with the same outcome

**Table 1.** Characteristics of the four types of pharmacoeconomic evaluations [11].

years corrected for quality of life. The QALY is the standard outcome measure existed in health economic evaluations, but there are some countries (Germany, Spain, and USA) that decided to ban the use of QALY in Health Technologies Assessment (HTA), after considering that QALY is methodologically and ethically not robust for health decision making. It is based on the use of subjective parameters, which are less robust than the chemical and biochemical parameters.

QALYs are determined with the aid of generic measurement instruments like EQ-5D [12], SF-6D (Short Form 6D), DCE (discrete-choice experiment), or MCDA (multi-criteria decision analysis). Another examples of generic instruments are Nottingham Health Profile (NHP), quality of well-being scale (QWB), sickness impact profile (SIP), and Health Utilities Index (HUI) Mark III.

EQ-5D is one of the most commonly used questionnaires to measure health-related quality of life (HRQOL). It consists of a questionnaire about five dimensions of current health (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression) and a visual analogue scale (EQ-VAS). It was developed for adults, but a new version has been recently developed for children aged 8–18 years old (EQ-5D-Y) and the five dimensions are: walking about, look-after myself, doing usual activities, having pain or discomfort, feeling worried, sad or unhappy.

Nottingham Health Profile (NHP) [13] includes two parts: Part I about distress within the following domains: emotions, sleep, social isolation, energy, pain, and mobility and Part II about health-related problems within the domains: occupation, housework, social life, home life, sex life, hobbies, and holidays.

Quality of Well-Being Scale (QWB) [14] includes questions about symptoms/problems, mobility, physical activity, and social activity.

Sickness impact profile (SIP) [15] includes questions about sleep/rest, eating, work, ambulation, mobility, communication, home management, recreation and pastimes, body care and movement, alertness behavior, emotional behavior, and social interaction.

Health Utilities Index (HUI) Mark III [16] includes questions about vision, hearing, speech, ambulation, dexterity, cognition, pain and discomfort, and emotion (**Figure 1**).

The complexity of assessing outcomes in cost-utility analysis is a disadvantage, even if this analysis can decide the best way of spending a given treatment budget or the healthcare budget as a whole.

### 2.3. Cost-benefit analysis

Cost-benefit analysis evaluates the difference in costs relative to the difference in benefits, with the benefits expressed in monetary units. This is the only pharmacoeconomic analysis that could determine how much more or less of society's resources could be allocated to pursuing increasing patient adherence.



**Mobility**

I have no problems in walking about ☐

I have some problems in walking about ☐

I am confined to bed ☐

**Self-Care**

I have no problems with self-care ☐

I have some problems with washing or dressing myself ☐

I am unable to wash or dress myself ☐

**Usual Activities** (e.g. work, study, housework, family or leisure activities)

I have no problems with performing my usual activities ☐

I have some problems with performing my usual activities ☐

I am unable to perform my usual activities ☐

**Pain / Discomfort**

I have no pain or discomfort ☐

I have moderate pain or discomfort ☐

I have extreme pain or discomfort ☐

**Anxiety / Depression**

I am not anxious or depressed ☐

I am moderately anxious or depressed ☐

I am extremely anxious or depressed ☐

**Visual Analogue Scale**

Please indicate on this scale how good or bad your own health state is today.

The best health state you can imagine is marked 100 and the worst health state you can imagine is marked 0.

Please draw a line from the box to the point on the scale that indicates how good or bad your health state is today.

Your own health state today

Best imaginable health state

100

90

80

70

60

50

40

30

20

10

0

Worst imaginable health state

**Figure 1.** EQ-5D health questionnaire.

Measuring benefits in monetary units is a disadvantage because it is a problem to value benefits, including death and disease, in money units.

## **2.4. Cost-minimization analysis**

This analysis is performed when two health alternatives are equal, but few interventions are actually equally effective. Some evidence must support the assertion that outcomes are the same.

Cost-minimization analysis is not an appropriate method of analysis adherence costs.

In order to estimate costs, studies must include costs for hospitalization, outpatient services, hospital stays, emergency care, clinical visits, laboratory tests, professional services, pharmaceuticals, and medical devices. Patients' copayments and deductibles must not be included in costs assessment. Indirect costs (cost to society due to illness) and direct nonmedical costs (costs to the patient such as travel) could have a significant impact on total costs.

## **3. Adherence measuring**

The concept of adherence or compliance can be measured in many different ways, including multi-item questionnaire scales, individual questionnaire, independent observations from patients and physicians, electronic monitoring devices, etc.

Many methods have been utilized to collect data for measuring medication adherence. Some data collection techniques include directly observing patients consuming medications, monitoring through electronic pill dispensers, and measuring clinical outcomes, such as, serum drug concentration levels. Other methods include clinical data from clinical trials, administrative claims data, electronic pharmacy databases, registries, patient and provider surveys, and paper medical records. There are several methods for measuring medication adherence using data obtained from these techniques that measure the time a patient has access to medication, including the medication possession ratio ( $\text{MPR} = \text{number of days of medication supplied within the refill interval} / \text{number of days in refill interval}$ ), proportion of days covered ( $\text{PDC} = \text{total days all drugs available} / \text{days in follow-up period}$ ), missing days, time to discontinuation, persistence rate, medication gaps, or self-reported questionnaires like Composite Adherence Score (CAS), Morisky Medication Adherence Scale (MMAS) with 4/8/9 questions, and Compliance Questionnaire for Rheumatology (CQR) with 5/19 questions.

### **3.1. Rheumatic diseases**

In rheumatology clinics, Berry et al. [17] found nonadherence patients who were answering 'no' to the question "Have you taken medicine regularly as prescribed or directed?", more common among new (28%) than follow-up patients (1%). Overall, the patients were more on nonsteroidal anti-inflammatory drug (NSAIDs) than on disease-modifying antirheumatic drug (DMARDs), also the adherence was better for them,



according to the symptoms and directed dose. Another difference measured in adherence is the cultural one, especially because of the economic impact of the treatment, that can lead to big cost problems. The follow-up adherence among patients with lupus depends on the medications prescribed. McElhone et al. [18] discussed that the perfect adherence rate is between 100% for treatment with azathioprine, 94% for oral steroids, and 68% for NSAIDs.

In the case of rheumatoid arthritis (RA), adherence is estimated at similar values. Researchers such as Neame and Hammond [19] found that 90% of the patients with RA are in fact taking their medication according to doctors' recommendations. Adherence rate is also correlated with the type of medication that is prescribed. The overall adherence is approximately 70% for NSAIDs, 50% for sulfasalazine and 80% for methotrexate, according to Klerk et al. [20]. Viewing the results, the weekly treatment with methotrexate may facilitate the enhanced adherence rate. In addition, patients' result are not as dependent on NSAIDs as it is thought, and this can be a good thing for the recent concerns about the cardiovascular risk associated with continuous usage of the high-dose drug.

3.2. Diabetes

The healthcare costs and the nonadherence to treatment for diabetes are both problems that need to be resolved. The information that is available at this moment regarding patient's adherence in diabetes is very poor. Studies have shown that adherence in diabetes is related more often to insulin (from 19 to 46%) [21], than to oral agents. The complications and the cost-effectiveness of antidiabetic drugs are a serious problem, according to the American Diabetes Association [22]. Inadequate use or poor adherence to insulin results in ketoacidosis that often requires hospitalization and more costs.

For people with diabetes, all-cause medical costs decrease as hypoglycemic drugs' adherence increases.

Sokol et al. [2] demonstrated that costs and hospitalization risk for people with diabetes monotonically decreased as adherence to drug treatment increased (Table 2).

Even if drug cost is bigger and medical cost is smaller in the case of adherent patients (adherence level>80), the total cost is the smallest. These savings probably reflect the effects of

Adherence level	Medical cost (\$)	Drug cost (\$)	Total cost (\$)	Hospitalization risk (%)
1–19	8812	55	8867	30
20–39	6959	165	7124	26
40–59	6237	285	6522	25
60–79	5887	404	6291	20
80–100	3808	763	4570	13

Table 2. Costs for people with diabetes.

improved glycemic level on related diseases like microvascular disease or neuropathy, reducing the need for medical services.

Balkrishnan et al. [23] found that a 10% increase in medication possession ratios (MPRs) for an antidiabetic medication was associated with an 8.6% reduction in total annual healthcare costs.

Cobden et al. [36] used MPR to assess diabetic patients and found that MPR of 80% or greater was associated with significant reduction in all-cause healthcare costs. MPR of 68% was associated with total mean costs of \$8056, whereas an MPR of 59% had total mean costs of \$8699.

Gilmer et al. [24] estimated that medical care costs increased significantly for each 1% increase in HbA1c (glycosylated hemoglobin) above 7%. For a person with an HbA1c value of 6%, successive 1% increases in HbA1c resulted in cumulative increases in charges of almost 4, 10, 20, and 30%. For adults with diabetes and other diseases the costs are also increased. The most substantial cost increments occurred in individuals who had diabetes in combination with heart disease and hypertension: a 1% improvement in HbA1c level from 10 to 9% was associated with increasing in costs of \$4116. The differences in costs are lower if the HbA1c value is smaller. If the patient isn't adherent to the antidiabetic medicines, the increased HbA1c will rise the costs for healthcare system (**Table 3**).

Nonadherence to oral hypoglycemic medications may partly explain why only 43% of patients with diabetes mellitus have HbA1c below 7% level [21].

### 3.3. Pulmonary diseases (chronic obstructive pulmonary disease)

Chronic obstructive pulmonary disease (COPD) is a chronic limitation that is usually progressive and not reversible. The main treatment for this condition aims to reduce symptoms, prevent exacerbations and delay the progression of the disease. Although medication has not been shown to modify the long-term of lung disease, various medications are available to prevent and control patients' symptoms, and improve health. Patient adherence to medication for COPD is very poor compared with rates for medicines and other long-term conditions. Nonadherence to medication is a risk factor for morbidity, hospital admission and increased mortality.

Zaniolo et al. [27] made a budget impact study to demonstrate the implications of the adherence to patients with chronic obstructive pulmonary diseases. The target population that they

	Changes in HbA1c levels			
	10–9%	9–8%	8–7%	7–6%
Patients with diabetes, heart disease, and hypertension	\$4116	\$3090	\$2237	\$1504
Patients with diabetes and heart disease	\$2796	\$2088	\$1503	\$1002
Patients with diabetes and hypertension	\$1703	\$1260	\$897	\$588
Patients with diabetes	\$1205	\$869	\$601	\$378

**Table 3.** Costs for patients with diabetes and other diseases.

examined corresponds to the entire sick population. They simulated that the same target population is managed under the same strategies of medical purpose. The current strategy is defined in order to reproduce the actual pattern of healthcare resource consumption and related costs for COPD management.

Toy et al. [28] had examined in their study the adherence level among patients with inhaled COPD medications. They used the data from real-world clinical practice, as well as the national healthcare database. As a conclusion, it was emphasized that a correct management of COPD can be aided by the frequency which the patient is using the drug. Drugs with fewer daily doses are associated with improved adherence, and as well with lower healthcare resource use and cost. For 1000 COPD patients, a 5% increase in proportion of days covered (PDC) reduced the annual number of inpatient visits with 2.5% and emergency room visits with 1.8%, with a slightly increased outpatient visits (+0.2%) and a net reduction in annual cost of approximately \$300,000. This study suggests that dosing frequency should be an important method in increasing adherence of COPD patients because patients with once-daily dosing frequency had highest adherence levels relative to patients with twice-daily, three times daily and four times daily dosing frequency.

Simoni-Wastila et al. [25] used administrative data with COPD patients, medication continuity and proportion of days covered (PDC) for assessing adherence. COPD patients with higher adherence to prescribed treatments experienced fewer hospitalizations and lower medicare costs than those who presented lower adherence behaviors. Both lack of interruption in drug dispensing and higher adherence were associated with better clinical outcomes.

### 3.4. Heart diseases

The costs for heart diseases are creating a burden on the patients' finances. Most commonly they experience acute myocardial infarction, known as heart attack. The costs include ambulance rides, diagnostic test, hospital stays, and also surgery if needed. Employees suffering from heart disease require additional days off, so they are less productive at work, so it is not cost-effective for the economy. Additionally, the premature deaths caused by heart diseases are growing in the United States. In 2010, according to George and Hong [26], \$41.7 billion was lost in potential productivity due to cardiovascular diseases.

To lower the high costs of this condition, patients must make small changes in their lifestyle. These preventive changes include weight lost, exercising, avoiding smoking, eating healthy, also they can monitor their blood pressure and cholesterol levels every month, for lowering the rate of mortality.

Sokol et al. [2] demonstrated that hospitalization risk for people with hypertension monotonically decreased as adherence to drug treatment increased. Differences were significantly higher than the outcome for adherence >80% in the case of low adherence (<60%). We observe higher costs only for adherence in the interval [20].

In the case of congenitive heart failure, the differences in costs were not so obvious like in the case of hypertension. The total costs are the highest in the case of adherent patients (adherence level >80%). Hospitalization risk is significant higher than the outcome for adherent patients with congenitive heart failure in the case of patients with adherence in the interval (**Tables 4 and 5**) [20].

Adherence level	Medical cost (\$)	Drug cost (\$)	Total cost (\$)	Hospitalization risk (%)
1–19	4847	31	4878	28
20–39	5973	89	6062	24
40–59	5113	184	5297	24
60–79	4977	285	5262	20
80–100	4383	489	4871	19

**Table 4.** Healthcare costs and hospitalization risk at different levels of adherence for patients with hypertension.

Adherence level	Medical cost (\$)	Drug cost (\$)	Total cost (\$)	Hospitalization risk (%)
1–19	9826	15	9841	58
20–39	7643	90	7733	63
40–59	11244	134	11378	65
60–79	13766	158	13924	64
80–100	12261	437	12698	57

**Table 5.** Healthcare costs and hospitalization risk at different levels of adherence for patients with congenitive heart failure.

Similarly, for hypertensive patients, the total costs are the smallest even if the drug cost is higher. These values reflect the impact of related conditions like, for example, renal disease.

Levine et al. [29] estimated for cardiology patients in USA that 125,000 deaths per year lead to a societal cost of 20 million lost work days and \$1.5 billion lost earnings.

McCombs et al. [30] used individual patient inpatient and outpatient claims data to identify increased health service costs associated with interruptions in therapy. The medicines costs were lower with \$281, but the healthcare costs were higher with \$873 (\$637 due to increased hospitalization).

### 3.5. Barriers to chronic disease treatment and management

Morbidity from nonadherence to medications is a major public health problem in many therapeutic areas [31]. About one in four people do not adhere well to prescribe drug therapy. Poor adherence is considered a critical barrier to treatment success and remains one of the challenges to healthcare professionals [32]. Combining adherence to drug therapy with adherence to other interventions limits the ability to examine the relation between adherence to drug therapy and health outcomes. The effect of adherence should be measured on an objective health outcome, such as mortality. Individual studies have reported that good adherence was associated with a lower risk of mortality. The association between adherence to harmful therapy and mortality is a very important subject in the light of recent issues of the safety of patients and postmarket drug surveillance.

The correlations between the mortality/morbidity rates for most chronic diseases are shown in **Table 6**.

Most nonadherence is intentional. Patients make the decision to not take their medicines based on some reasons:

- **Fear:** Patients may be scared of potential side effects or side effects they had previously with the same or similar medication.
- **Cost:** The prices of medicine can be a barrier to adherence.
- **Misunderstanding:** Patients do not understand the need for medicine, the side effects or the expected time it will take to see some results.
- **Too many medications:** The greater the number of different medicines prescribed and the higher the dosing frequency, the more likely a patient is nonadherent.
- **Lack of symptoms:** Patients who do not feel any differences when they start or stop to take their medicines may see no reason to take it.
- **Worry:** Concerns about becoming dependent on a medicine leads to nonadherence.
- **Depression:** Patients who are depressed are less likely to take their medications as prescribed.
- **Mistrust:** Patients may be suspicious of their doctor's motives for prescribing certain medications, for example because of the marketing efforts of pharmaceutical companies to influence some prescribing patterns.

The costs of new drugs often exceed the costs of existing drugs. Such increased costs can be compensated by savings in other areas of health system (costs-offsets). For example, a new drug has fewer side effects and fewer costs to cure them. But, the first step is the patient to be adherent and to respect the prescription.

We cannot say that nonadherence always leads to financial losses. Nonadherence is not always bad for the patient. Nonadherence is protective if the prescription is inappropriate or has adverse reactions. It is not useful to pay for an inefficient drug. New undesired costs will appear if side effects occur. Savings associated with undercompliance with overprescribed medications are positive economic effects. We must highlight the fact that the doctor, the pharmacist and the patient carry mutual responsibility for the outcome of the treatment. Further work is needed to develop optimal adherence patterns for individual patients and treatments. Important policy decisions need to be made about increasing nonadherence.

Physicians play a key role in medication adherence. Trust and communication are two elements critical in optimizing adherence. Various studies have shown that physicians trust is more important than treatment satisfaction in predicting adherence to prescribed therapy. In consequence, physicians trust correlates positively with the acceptance of new medication, and improves the self-reported health status. A recent meta-analysis of physician communication and patient adherence to treatment found that there is a 19% higher risk of

nonadherence among patients whose physician communicates poorly than among patients whose physician communicates well [34].

Healthcare providers play a unique role in assisting patients to carry out healthy behaviors and also to change patient's beliefs about the risks and benefits of new medication. Another factor is concordance, in which patients and their providers (and physicians) agree whether

Chronic noncommunicable diseases	Percentage mortality	Percentage morbidity
<i>Cardiovascular disease</i>		
Rheumatic heart disease, hypertensive heart disease, ischemic heart disease, cerebrovascular disease, inflammatory heart disease	49.90	21.23
<i>Malignant neoplasms</i>		
Mouth and oropharynx cancers; esophagus cancer; stomach cancer; colon and rectum cancers; liver cancer; pancreas cancer; trachea, bronchus, lung cancers; melanoma and other skin cancers; breast cancer, cervix uteri cancer; corpus uteri cancer; ovary cancer; prostate cancer; bladder cancer; lymphomas; multiple myeloma; leukemia	21.23	10.83
<i>Respiratory diseases</i>		
Chronic obstructive pulmonary disease, asthma	11.04	7.90
<i>Digestive diseases</i>		
Peptic ulcer disease, cirrhosis of the liver, appendicitis	5.87	6.66
<i>Neuropsychiatric conditions</i>		
Unipolar depressive disorders, bipolar disorder, schizophrenia, epilepsy, alcohol use disorders, Alzheimer's and other dementias, Parkinson disease, multiple sclerosis, drug use disorders, post-traumatic stress disorder, obsessive-compulsive disorder, panic disorder, insomnia, migraine, lead-caused mental retardation	3.32	27.70
<i>Diabetes mellitus</i>	2.95	2.32
<i>Genitourinary diseases</i>		
Nephritis and nephrosis, benign prostatic hypertrophy	2.53	2.18
<i>Endocrine disorders</i>	0.72	1.14
<i>Other neoplasms</i>	0.44	0.25
<i>Musculoskeletal diseases</i>		
Rheumatoid arthritis, osteoarthritis, gout, low back pain	0.32	4.32
<i>Skin diseases</i>	0.21	0.54
<i>Congenital anomalies</i>		
Abdominal wall defect, anencephaly, anorectal atresia, cleft lip, cleft palate, esophageal atresia, renal agenesis, Down syndrome, congenital heart anomalies, spina bifida	0.15	3.92
<i>Sense organ diseases</i>		
Glaucoma, cataracts, age-related vision disorders, adult-onset hearing loss	0.01	9.94
<i>Oral conditions</i>		
Dental caries, periodontal disease, edentulism	0.01	1.06

**Table 6.** Morbidity and mortality rates for chronic diseases [33].



and how a medication should be taken. Adherence requires the patient to believe there is a benefit to the medicine being prescribed and agree with the instructions on how to take it. Building trust and developing skills for successful communication between the patients and their provider, demands time, effort, knowledge, and practice.

Even those patients who fill and refill their prescriptions appropriately may have lapses in the continuity of their doses. One in five patients who receives a prescription medication cannot read the label.

Elliot et al. [35] concluded there is not possible to make definitive conclusions about the cost-effectiveness of Adherence-Enhancing Interventions (AEIs) due to the heterogeneity of the reported studies: unclear reported adherence and outcomes, poorer quality of costs data, and omitted some cost elements.

## 4. Conclusions

The assessment of pharmaceutical drugs and healthcare programs has been in recent years expanded beyond efficacy and safety to cover economic implications and other consequences. The incorporation of an economic perspective into the decision making process as to which therapies will be reimbursed by the national healthcare system and not only that, has made the subject of debate and discussion. National programs combining patient education with behavioral intervention strategies could decrease the financial losses due to poor adherence. The intention of this chapter was to highlight a very important problem of adherence in direct symbiosis with the economic situation. To ascertain the true extent of financial losses due to low adherence in emerging countries, more studies are urgently required. The absence of national policies grows the financial losses due to poor adherence. The answer, in our opinion, is not to spend more money on drugs and expensive treatment costs, but to work towards the patient in general. As individuals we are constantly making choices as to how we use our time and money, but we do not always think about our well-being regarding the health.

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