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## Determinants of Cost-Related Nonadherence to Medications among Chronically Ill Patients in Maccabi Healthcare Services, Israel

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### ABSTRACT

**Background:** The effectiveness of value-based insurance design is based on nonadherence, which derives solely from patients' economic constraints. **Objective:** Our objective was to examine the extent of cost-related nonadherence to chronic medications and to analyze its potential determinants. **Methods:** We conducted a telephone survey among a representative sample of Maccabi Healthcare Services chronically ill patients aged 55 years or older ( $n = 522$ ). We developed a 12-month recall questionnaire that included demographic and socioeconomic characteristics, out-of-pocket expenditure on prescribed medication, physician's provision of explanation regarding prescribed therapy, adherence, and reasons for nonadherence. Respondents were defined as nonadherent if they reported that they did not purchase prescribed medications in the previous year because of their cost. We applied the multivariable logistic regression model to examine predictors of nonadherence. **Results:** Median (interquartile range) age of the study sample was 69 (13) years (53% males). One hundred sixty-five patients (31.6%) reported not purchasing prescribed medications mainly because of medications' adverse effects and/or cost. Fifty res-

pondents (9.6%) reported cost-related nonadherence. The multivariable logistic regression model revealed that cost-related nonadherence was associated with respondent's income lower than 4600 New Israeli shekel (odds ratio [OR] = 10.86; 95% confidence interval [CI] 1.45–81.12), unemployment (OR = 4.32; 95% CI 1.47–12.66), lack of physician explanation about the prescribed medication (OR = 2.38; 95% CI 1.18–4.78), and age (OR = 0.95; 95% CI 0.91–0.99). **Conclusions:** Cost-related nonadherence to chronic pharmaceuticals is self-reported among nearly 10% of the chronically ill patients and is strongly affected by low socioeconomic status, even under universal health insurance coverage and with relatively low co-payments as applied in Israel. Lack of information provided by physicians regarding the therapy is associated with a higher likelihood of cost-related nonadherence. **Keywords:** chronic medications, co-payment, cost, nonadherence, value-based insurance design.

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### Background

Co-payments for pharmaceuticals and other health care services are usually used by health insurers as a measure of reducing health care costs. Co-payment policies may achieve two main goals: first, curbing excessive utilization of unnecessary health services, and second, shifting the burden of health care financing from public to private sources. Although patient co-payments may prevent excessive health expenditures, they may be a barrier to essential care, thus resulting in adverse health outcomes and increased health care expenditures [1–3].

Following the enactment of the National Health Insurance Law in Israel (1995), all citizens have universal health insurance coverage providing access to a broad benefits package including physician consultations, ambulatory care, hospitalization, and

medications. Citizens are free to enroll in one of four competing nonprofit health plans (health maintenance organizations) that are obligated to provide them equal access to all the services specified by the National Health Insurance Law. As of 1998, in an attempt to increase their revenues, health plans were allowed to increase co-payment charges [4]. The co-payments for chronic medications in the second largest health plan in Israel, Maccabi Healthcare Services (MHS), is 10% to 15% or 15 New Israeli shekel (NIS) per prescription (~US \$4.3). In the absence of exemptions, co-payments place a substantial financial burden on the poor, the elderly, and the chronically ill. To minimize access barriers to the care of these vulnerable populations, a quarterly ceiling for pharmaceuticals' co-payments was set for chronically ill patients, those receiving welfare payments, and holocaust survivors. Results from a recent survey in Israel conducted by the Myers-

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JDC-Brookdale Institute, however, suggested that 14% of chronically ill patients reported not buying a prescribed medication because of its cost [5].

Value-based insurance design (VBID) is a measure to contain costs while improving quality of care, through linking patient's co-payments to service value in terms of benefit to patient's health, rather than to its cost. It is expected that reducing co-payments to those who will benefit most will increase patient adherence, improve health outcomes, and may reduce overall costs to the patient and the health insurer [6–8]. These designs are commonly applied by employers and health insurers in the United States on prescription drug therapy for chronically ill patients [9]. They were found to be cost-effective in post-myocardial infarction and angiotensin-converting enzyme inhibitor therapy for diabetic patients [10,11], and were associated with favorable health benefits [12] without increasing overall health care spending [9,12–15]. These favorable implications of VBIDs stem predominantly from the improvement in patients' adherence to prescribed medications [2,13,14,16–23]. Poor adherence to chronic medication therapy has been long recognized as a major driver of adverse health outcomes. Recent examples reinforced this argument, by demonstrating positive association between adherence to medication and health outcomes among chronic conditions such as cardiovascular disease, hypertension, and diabetes [24–26].

Patient-related reasons for nonadherence include among others forgetfulness, competing priorities, decision to omit doses, lack of adequate awareness of the clinical importance of the medication, and emotional factors. A considerable portion of respondents, however, does not provide reasons for their underuse [27]. Cost-related nonadherence is a well-explored phenomenon in developed countries and is prevalent in 13% to 28% of the respondents in the United States [25,28–40], 12% in Switzerland [41], 4% to 12% in different provinces in Canada [39,40], and 3% to 13% in United Kingdom, The Netherlands, Germany, Australia, and New Zealand [39]. Reduction in cost-related nonadherence was associated with improved health outcome [25,42,43]. People with more generous health insurance coverage may be less vulnerable to cost-related underuse [39,40,44]. The extent to which VBID may be an effective and feasible policy in Israel relies primarily on the proportion of chronically ill patients who do not refill their prescription solely for financial reasons. In addition, a negative association between nonadherence, adverse health outcomes, and overall health care spending needs to be confirmed.

To provide preliminary information on the expected effectiveness of VBID in our health care system, the present study aimed to examine to what extent nonadherence of chronically ill patients to medication regimens is related to financial reasons. We analyzed the determinants associated with cost-related nonadherence in the context of the Israeli health system, which provides more generously universal health insurance coverage, as compared with the United States. We hypothesized that nonadherence stems to some extent solely from financial reasons even in the Israeli health care system and that socioeconomic status is an independent determinant of cost-related nonadherence.

## Methods

A telephone survey was conducted during 2012 among enrollees of MHS, the second largest health plan in Israel, providing health care for approximately 2 million members. The study was approved by the Institutional Ethics Committee. The study population was a representative sample of MHS enrollees aged 55 years or older, who are included in the Diabetes and

Cardiovascular Disease Registry of the MHS. The algorithm used to enroll patients in this registry is based, among other criteria, on evidence of prescription refill of chronic medications. This sample was chosen using computer-generated random selection.

We developed a 12-month recall questionnaire that was partially based on a validated questionnaire developed by the Myers-JDC-Brookdale Institute [5]. The questionnaire included demographic and socioeconomic characteristics such as age, sex, marital status, education, and income; self-reported out-of-pocket expenditure on prescribed medication; question on whether physician provided them explanation regarding prescribed medications; self-reported adherence; and reasons for nonadherence.

Respondents were defined as nonadherent because of financial reasons if they reported not purchasing at least one of their prescribed medications over a period of 12 months before the interview date because of their cost (i.e., patients' co-payment). Respondent who reported not purchasing prescribed medications because of different reasons, such as adverse effects, difficulties in adapting to dosage regimens, forgetfulness, interest in alternative treatment, or having a feeling that they are healed, were not defined as nonadherent because of financial reasons.

All continuous variables were non-normally distributed and presented as mean  $\pm$  SD and median (interquartile range). Dichotomous indicator values are presented as proportions. Comparison between group medians and proportions was done using Mann-Whitney *U* test and chi-square test, respectively. We used multivariable logistic regression analysis to examine predictors of nonadherence (dependent variable). Independent variables included age, sex, marital status, being a new immigrant to Israel, possession of supplemental insurance, employment status, education, income, out-of-pocket expenditure on prescribed medication, and receiving physician explanation regarding prescribed medications. Data were analyzed using STATA software (version 11.0, StataCorp, College Station, TX.) *P* values of  $<0.05$  determined statistical significance in all analyses.

## Results

Five hundred twenty-two chronically ill patients were included in our analysis (median age of 69 years (13) and 53% males). One hundred sixty-five patients (31.6%) reported not purchasing prescribed medications mainly because of their adverse effects and/or cost. Fifty patients (9.6% of the study sample) reported cost-related nonadherence. Of these, 36 (72%) stated that they did not adhere to at least one of their prescribed chronic medication solely because of its cost and 14 (28%) reported cost-related underuse in addition to other reason (mainly adverse effects). Forty-three patients (86% of the nonadherent patients) stated that they would have bought the medication if its cost was lower (one patient reported that he would not purchase even if its cost was lower, and six patients reported that they were not sure).

As depicted in Table 1, adherent patients ( $n = 464$ ) were comparable to nonadherent patients in their demographic and socioeconomic characteristics (e.g., age, sex, education, and possession of voluntary supplementary health insurance), with only two exceptions. First, a significantly lower proportion of nonadherent respondents reported that they had worked during 3 months before the interview date (10% vs. 31.9%, respectively;  $P = 0.001$ ). Second, a significantly higher proportion of nonadherent respondents reported having a household income lower than 4600NIS (US \$1314) per month (52.0% vs. 26.5%, respectively;  $P = 0.002$ ). However, no significant differences between groups were found with regard to the reported monthly out-of-pocket expenditure on prescribed medications (Table 2). Finally, as presented in Table 2, a significantly lower proportion of

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