

# Estimation of Increases in Direct Medical Expenditures Associated With Medication Nonadherence and Potential Savings From Increased Adherence

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## BACKGROUND

- Medication nonadherence is highly prevalent and results in increased hospital and nursing facility admissions, additional medical treatment and medications, increased mortality, and other effects.<sup>1</sup>
- Medication nonadherence results in estimated increases in direct medical costs in the United States by at least \$106 billion in 2009 dollars.<sup>1</sup>

## OBJECTIVE

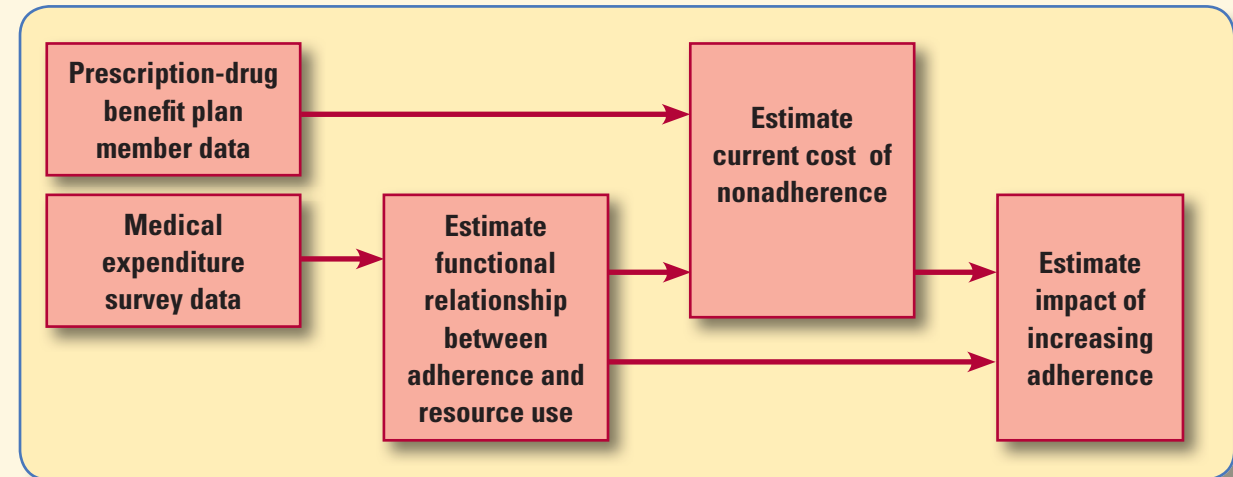
- We estimated annual increases in medical expenditures due to medication nonadherence and potential annual savings from increasing adherence for members of a prescription-drug benefit plan taking medications in four drug therapy classes (TCs).

## METHODS

### Model/Overall

- A decision-analytic model was constructed to estimate the current cost of nonadherence and potential savings from increasing adherence in the Express Scripts, Inc. (ESI) prescription-drug benefit plan member population. Figure 1 outlines the steps used in the model to conduct the analysis.

Figure 1. Model Structure



- Four TCs were considered: depression, diabetes, high blood cholesterol (“hi blood chol”), and high blood pressure or heart disease (“hi BP/heart”).
- Resource use included all-cause and disease-specific annual hospitalizations and emergency room (ER) visits.
- Two levels of resources were considered for ESI users in each TC:
  - Disease-specific resources: Resource use related to the TC only based on ranges of International Classification of Diseases, 9th revision (ICD-9) codes relevant to each TC
  - All-cause resources: All resource use
- The model assumes a third-party payer economic perspective.

### Data

- Data sources
  - ESI prescription-drug benefit plan (“ESI data”)
    - Patients ≥ 18 years, continuously enrolled, with at least one claim in first quarter and at least two retail claims or one home delivery claim during 2008
  - Medical Expenditure Panel Survey (“MEPS data”) panels 11 and 12 (the most recent available panels) conducted from 2006-2007 and from 2007-2008<sup>2</sup>
    - Patients who purchased medication in a TC (identified by National Drug Codes) in the first interview round and were eligible for all five survey rounds
- Model parameters populated by ESI data
  - Number of medication users in ESI population by TC (Figure 2)
  - Current member population distribution among 5% adherence levels by TC (Figure 3)
  - Daily medication cost = total cost of TC-related medications ÷ total days’ supply across TC-related medication prescriptions (Figure 4)

Figure 2. Number of Medication Users in ESI Population

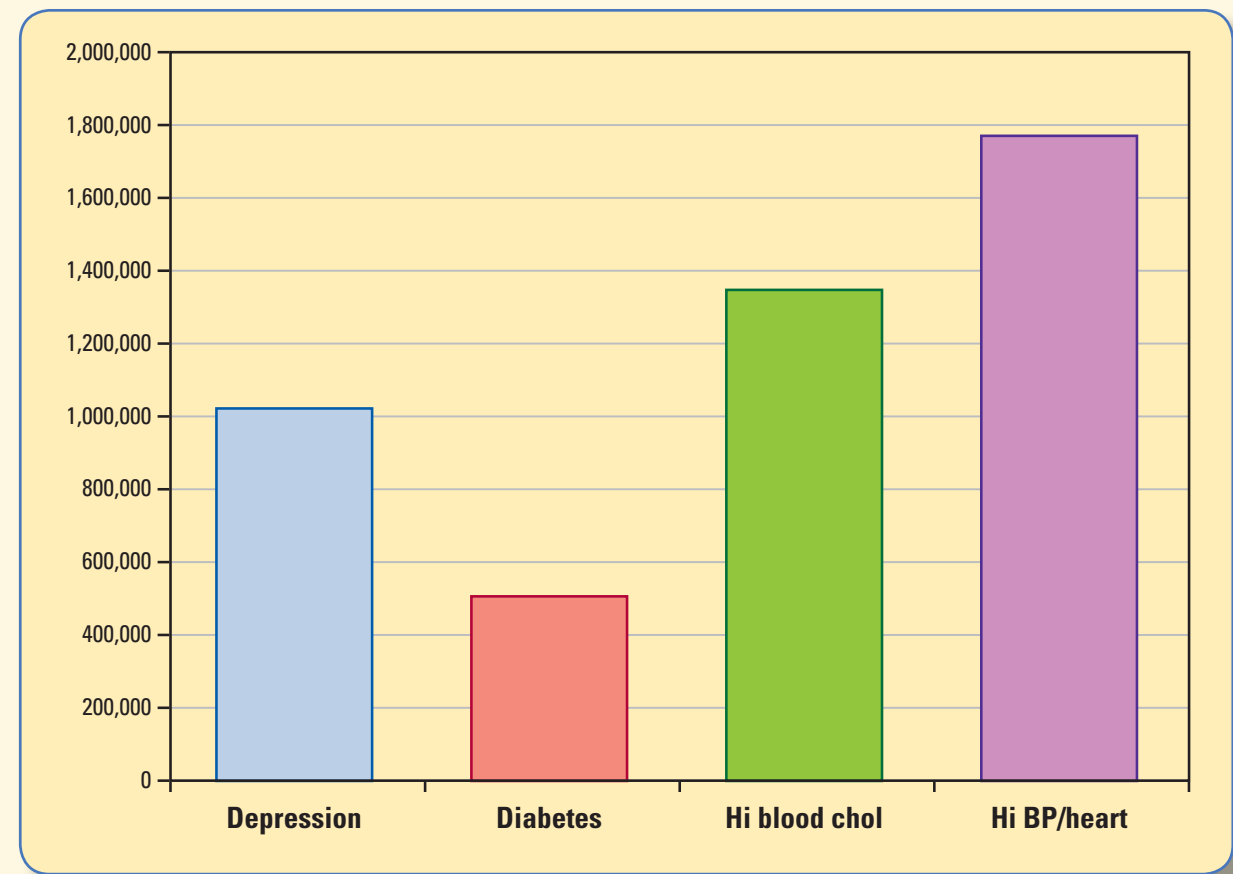


Figure 3. Current Member Population Distribution Among 5% Adherence Levels

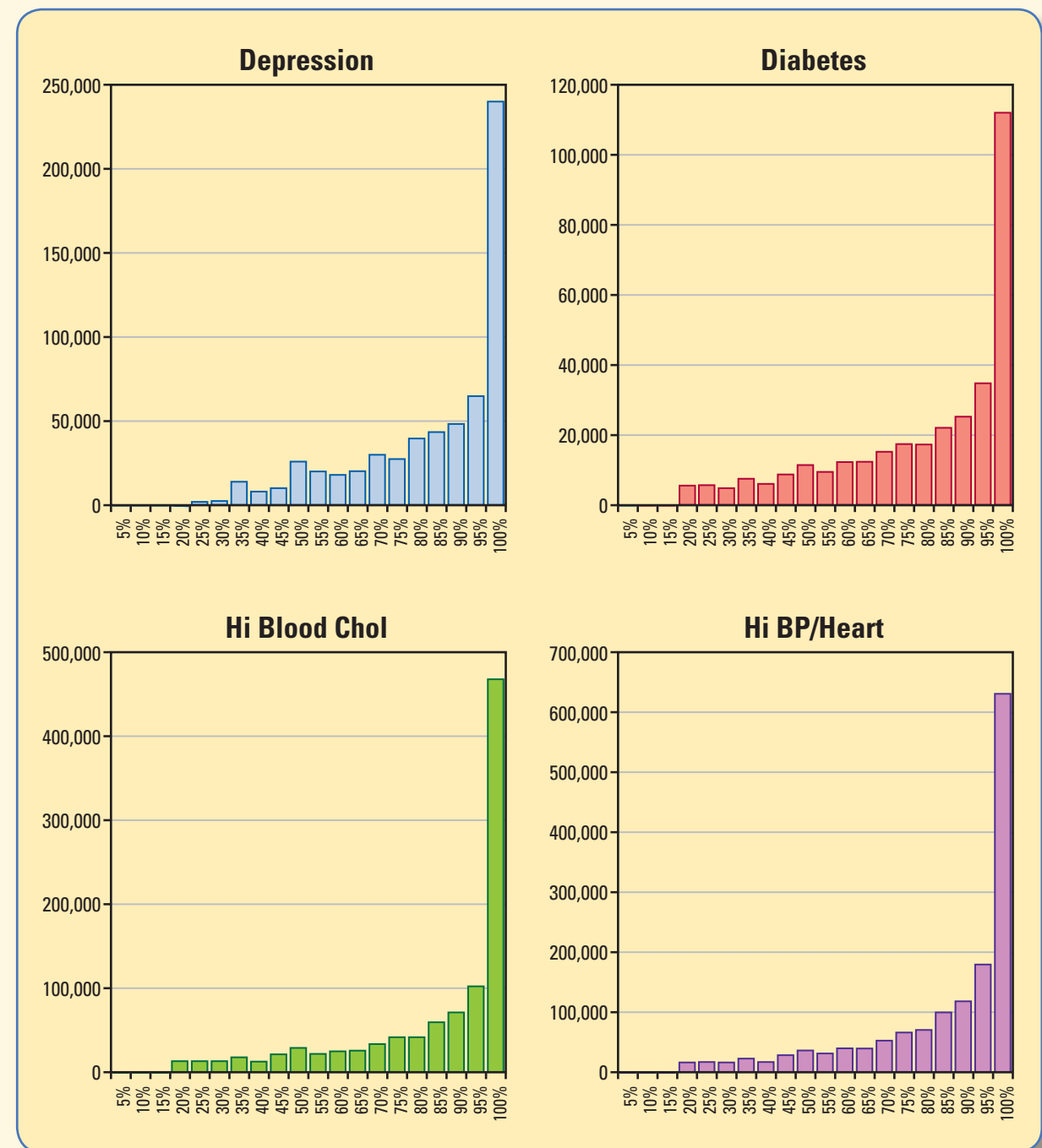
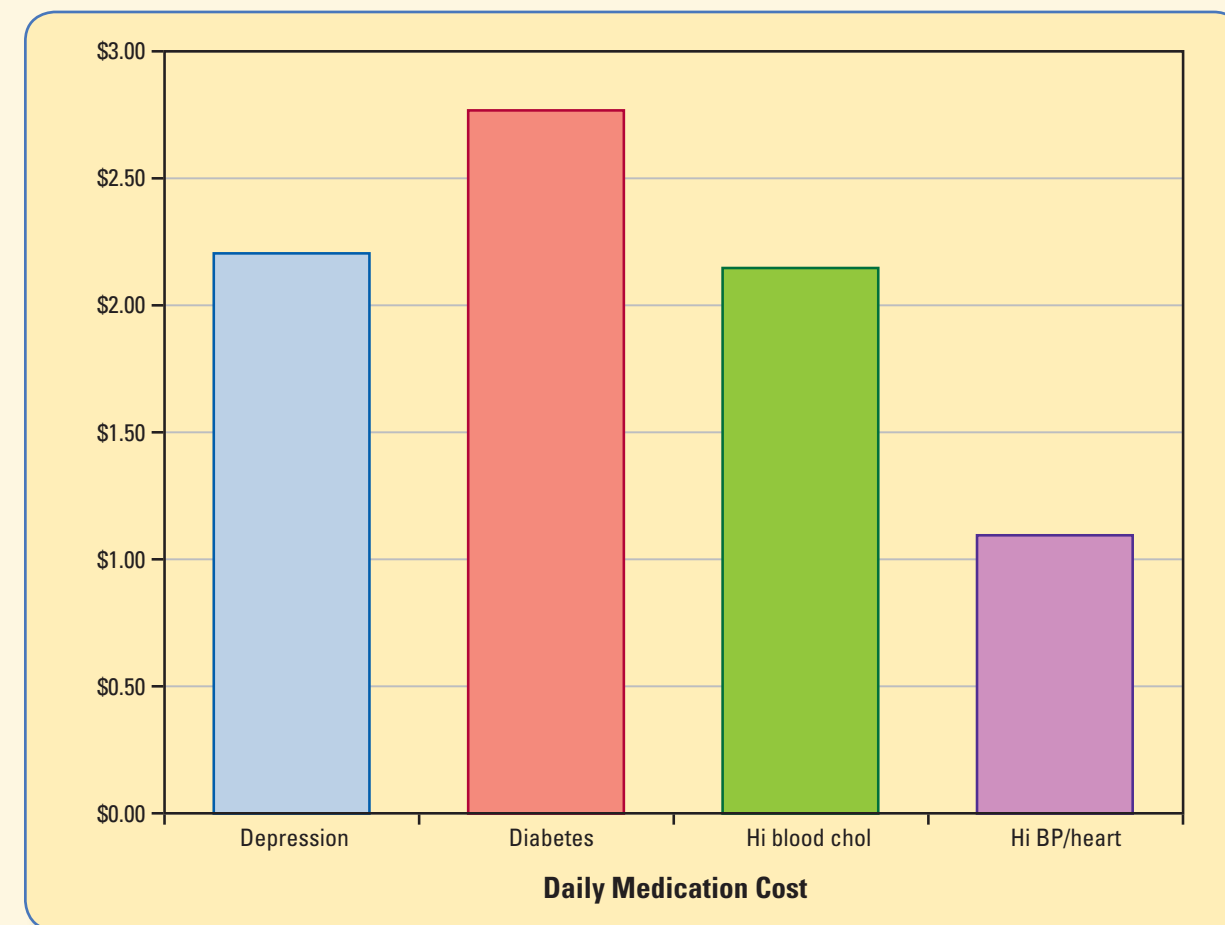
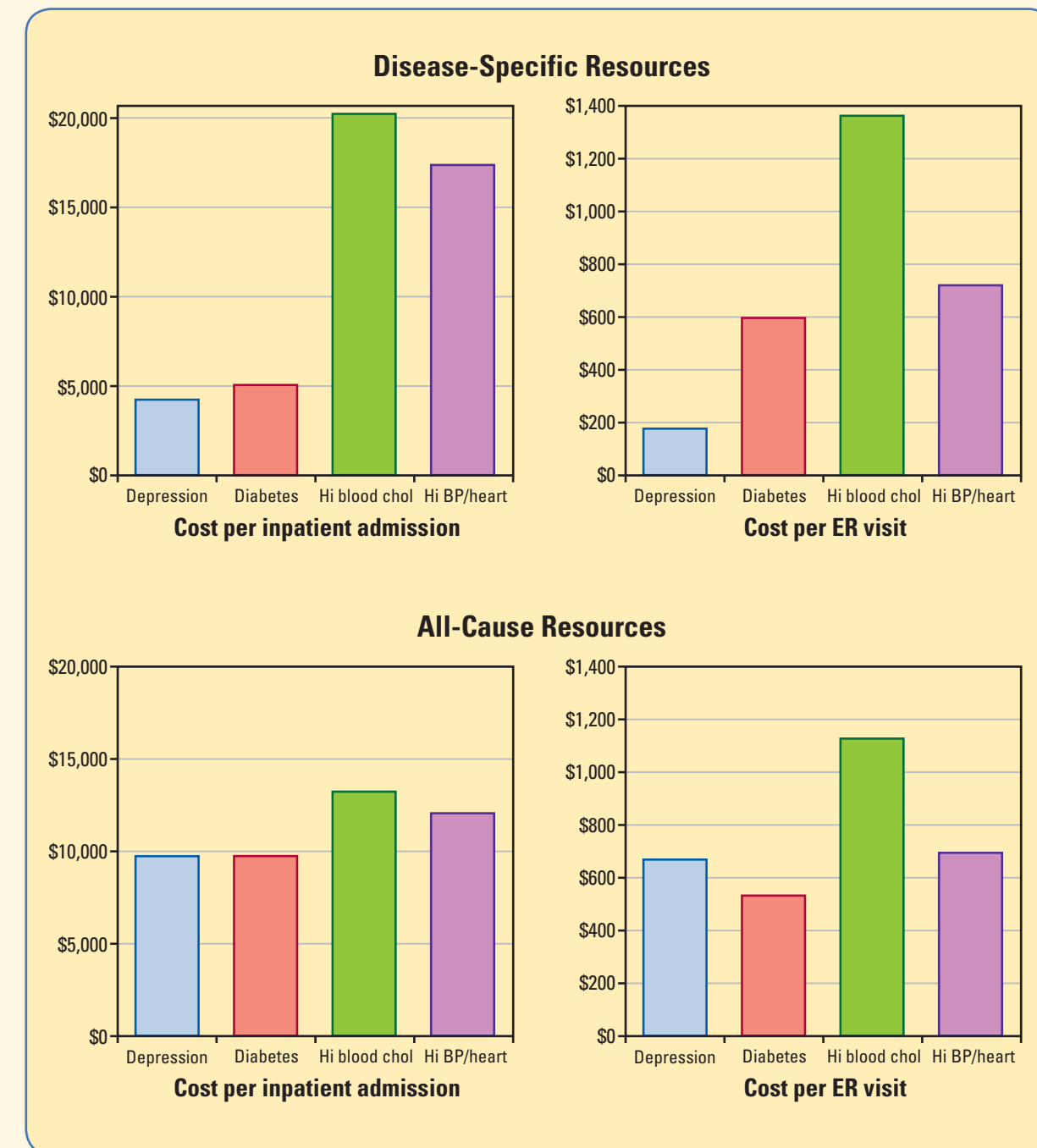


Figure 4. Daily Medication Cost



- Model parameters populated by MEPS data
  - Average annual number of inpatient admissions and ER visits per person by adherence level
  - Cost per inpatient admission and cost per ER visit (Figure 5)

Figure 5. Cost per Inpatient Admission and Cost per ER Visit



### Calculation of Patient Adherence

- Medication possession ratio (MPR) was used to represent adherence.<sup>3</sup>
  - MPR = total days’ supply of medication ÷ number of days between index prescription date and the survey panel end date
  - Total days’ supply = number of prescriptions across all survey rounds × average days’ supply per prescription (obtained from ESI data as proxy for MPR calculated in MEPS data)
- Patients were considered adherent when MPR ≥ 80%; patients were nonadherent when MPR < 80%.

### Calculation of Cost of Nonadherence and Potential Savings From Increasing Adherence

- Relationship between adherence and disease-specific resource use and all-cause resources were estimated by fitting curves (best between exponential, logarithmic, or linear approximation) to the average per-user resource use for each adherence level.
- Cost of nonadherence = cost for adherent patients – cost for nonadherent patients
  - Calculated for inpatient admission costs, ER visit costs, and net costs
  - Net costs = inpatient admission costs + ER visit costs – medication costs
- Increases in adherence were assumed to be an increase in MPR of 2% for patients at each adherence level who were considered nonadherent. For example, a nonadherent patient with an MPR of 45% was assumed to increase their adherence by 2% to 47%.

## RESULTS

- The data show that increased adherence results in savings in some, but not all TCs when considering either disease-specific or all-cause resources (Figures 6 and 7).
- Users of depression, diabetes, and hi blood chol medications have higher inpatient admission and/or ER visit expenditures when nonadherent. However, these increases in the disease-specific inpatient admission and ER visit expenditures were offset by lower medication expenditure, such that lower net disease-specific expenditure resulted among the nonadherent patients compared with adherent patients across all TCs (Figure 8).
- Nonadherence resulted in increased all-cause total expenditures in diabetes, hi blood chol, and hi BP/heart by \$241 million, \$150 million, and \$47 million per year, respectively (Figure 9).
- Increasing adherence by 2% reduced net annual all-cause expenditures by 11% to 21% across three TCs (Figure 10).

Figure 6. Relationship Between Adherence and Disease-Specific Resources

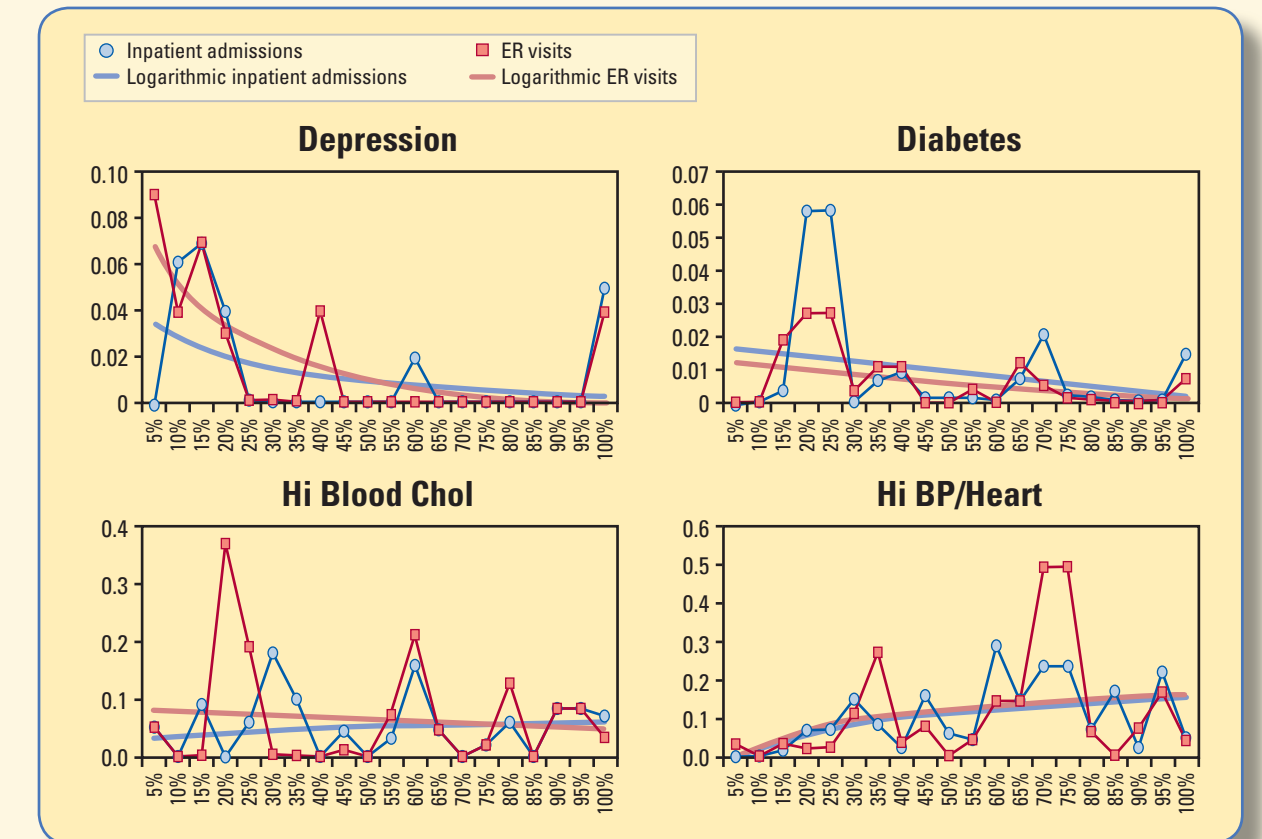


Figure 7. Relationship Between Adherence and All-Cause Resources

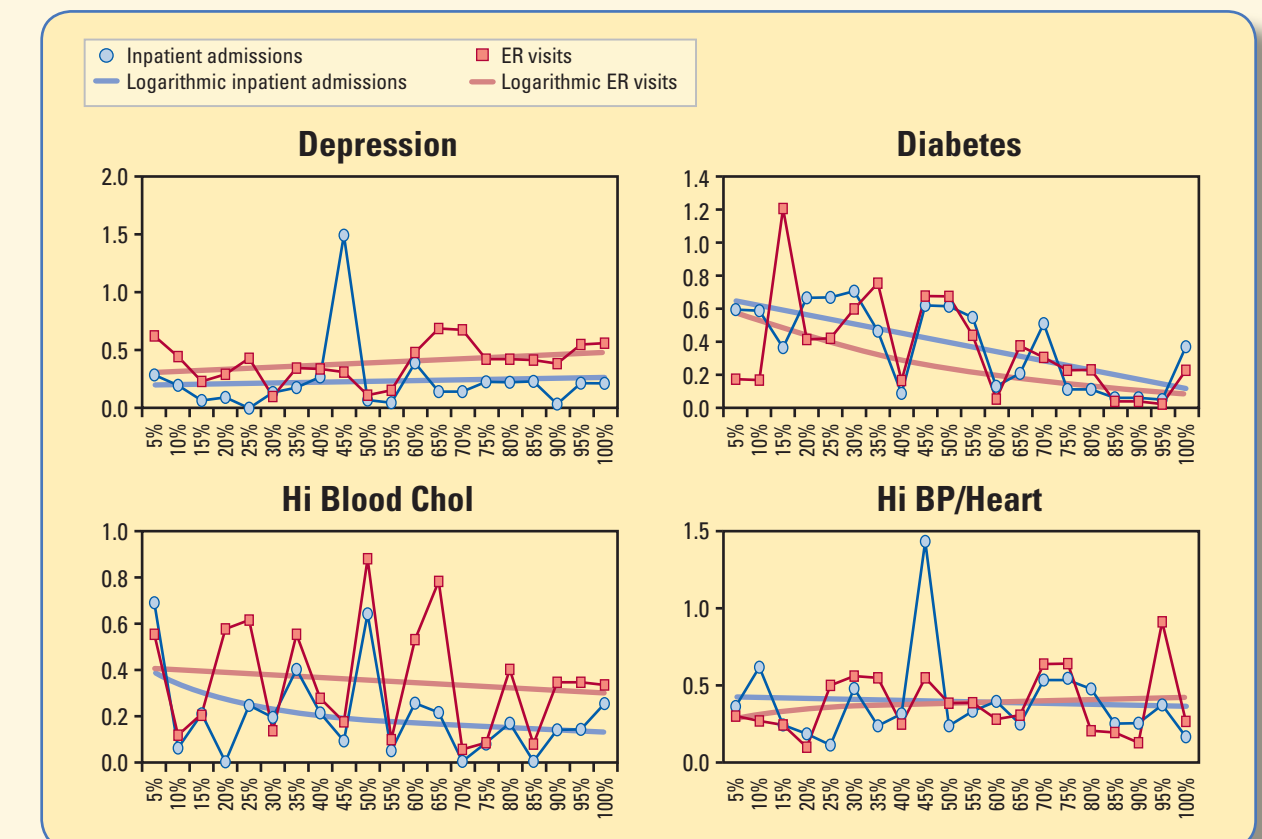


Figure 8. Additional Annual Expenditures (in \$ Millions) Attributable to Nonadherence: Disease-Specific Resources

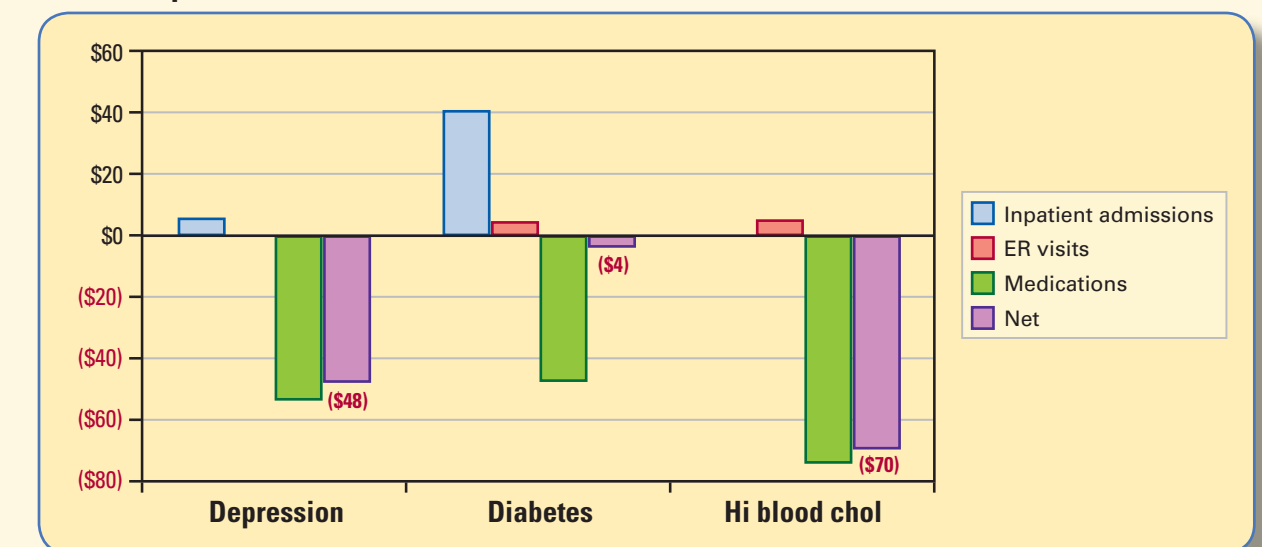


Figure 9. Additional Annual Expenditures (in \$ Millions) Attributable to Nonadherence: All-Cause Resources

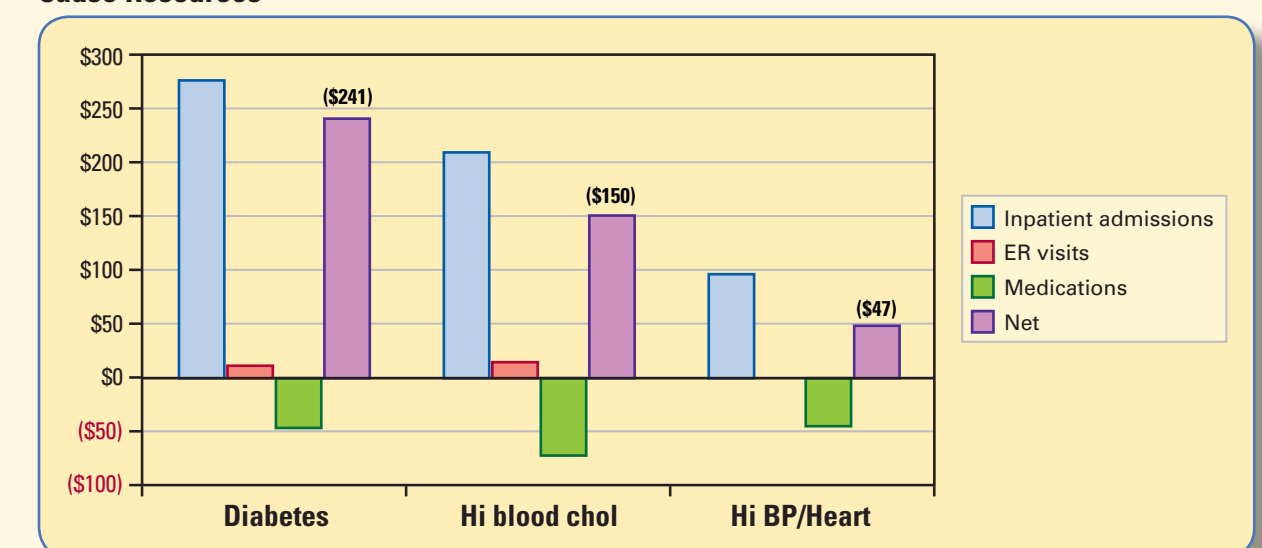
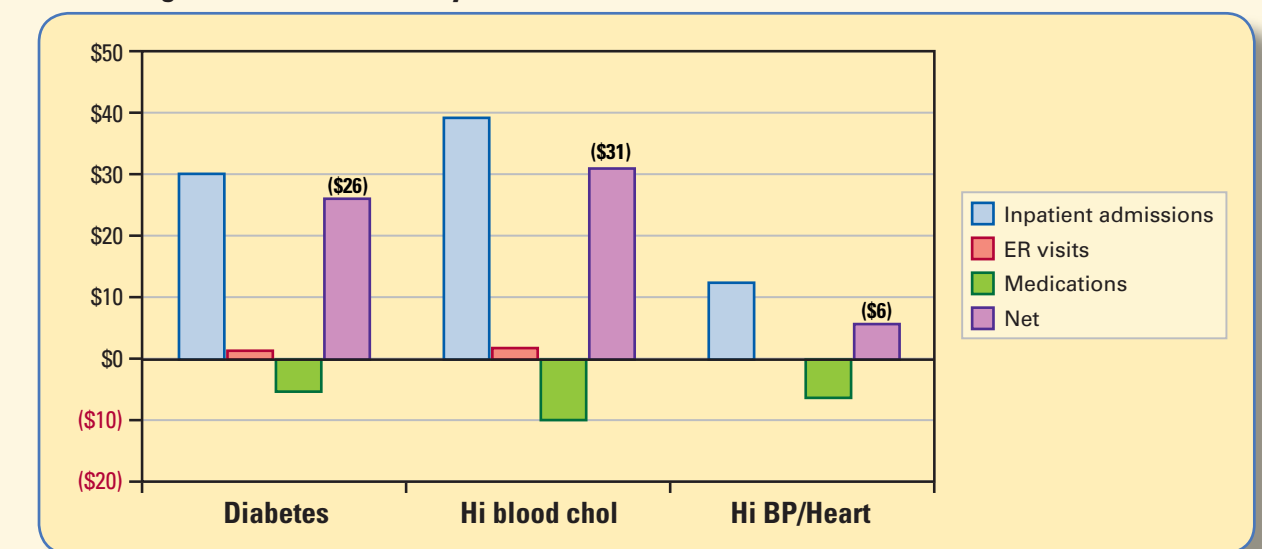


Figure 10. Potential Annual Savings in All-Cause Expenditures (in \$ Millions) From Increasing Overall Adherence by 2%



## CONCLUSIONS

- Medication nonadherence can be costly to payers. Increasing adherence even by small amounts in some TCs may result in significant savings.

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