

Disclosure: *Wayne Katon, MD*

With respect to the following presentation, there has been no relevant financial relationship between the party listed above (and/or spouse/partner) and any for-profit company in the past 24 months which could be considered a conflict of interest.

Pathways Study

Wayne Katon, MD¹

Mike VonKorff, ScD²

Elizabeth Lin, MD, MPH²

Greg Simon, MD, MPH²

Evette Ludman, PhD²

Paul Ciechanowski, MD, MPH¹

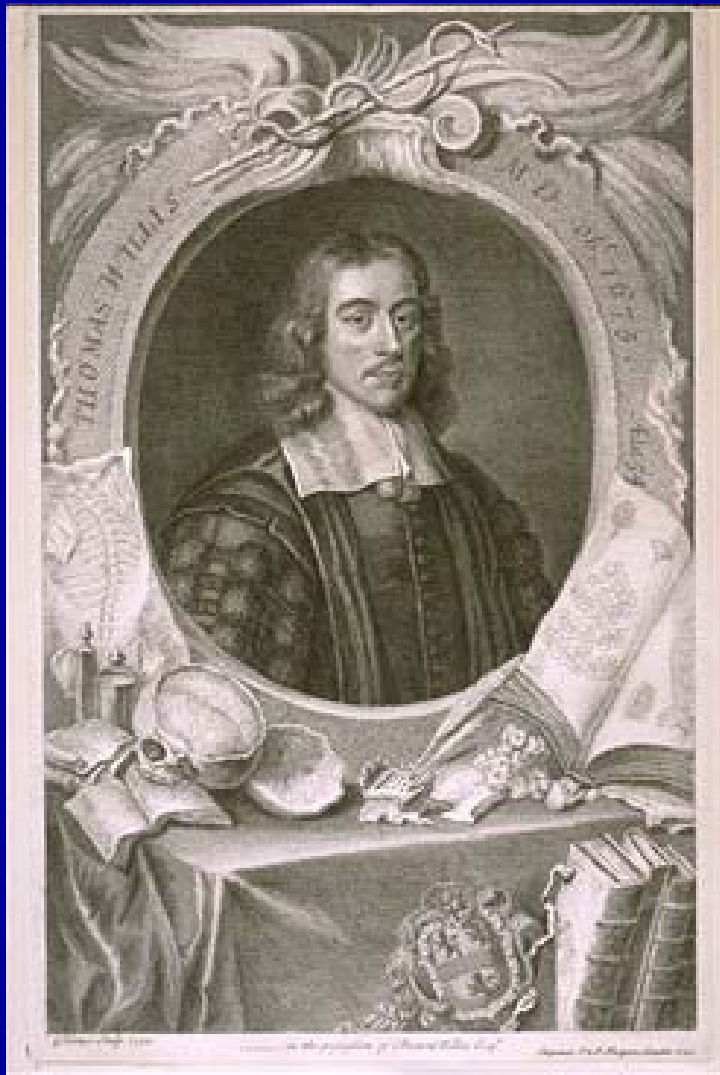
Joan Russo, PhD¹

Carolyn Rutter, PhD²

Bessie Young, MD, MPH¹

¹ *University of Washington School of Medicine*

² *Center for Health Studies, Group Health Cooperative
NIMH Grants MH 4-1739 and MH 01643 (Dr. Katon)*



*Diabetes is caused by
“sadness or long
sorrow and other
depressions and
disorders”*

Thomas Willis, English Anatomist (1621-1675)

Depression as a Risk Factor for Onset of Type 2 Diabetes Mellitus: A Meta-Analysis

- Nine studies met inclusion criteria for meta-analysis
- The pooled relative risk for depression as a risk factor was 1.26 (1.13-1.39) using a fixed effect model and 1.37 (1.14-1.63) using a random effect model

Adverse Bidirectional Interaction

Major

Depression

- Smoking
 - Sedentary lifestyle
 - Obesity
 - Lack of adherence to medical regimens →
 - Psychophysiologic
 - ↓ Insulin sensitivity
 - ↑ Autonomic NS
 - ↑ Inflammatory markers
 - Medical illness at earlier age
 - Poor symptom control
 - ↑ functional impairment
 - ↑ complications of medical illness
 - ↑ mortality
-

Study Setting

- 9 primary care clinics of Group Health Cooperative
- Patients with diabetes from these clinics were surveyed based on diabetes registry

Population-Based Screening Survey

- Over 9,000 patients screened in sequential waves of approximately 700 questionnaires per month
- \$3 gift certificates from local store was included to encourage response

Diabetes Registry: Criteria for Inclusion

- Currently taking any diabetic agent
- Fasting glucose ≥ 126 mg/dL confirmed by second out-of-range test within 1 year
- Random plasma glucose ≥ 200 mg/dL confirmed by second test within 1 year
- Hospital discharge diagnosis of diabetes at any time during enrollment or 2 outpatient diagnoses of diabetes

Patient Health Questionnaire (PHQ)

- 9-item PHQ was used to diagnose major depression and minor depression
- Diagnosis of major depression has high Kappa with clinician administered SCID

GHC Automated Diagnostic Pharmacy and Lab Data

- Rx risk
- Diabetes complications: retinopathy, nephropathy, neuropathy, cerebrovascular, cardiovascular, peripheral vascular, metabolic)
- HbA_{1c} (level closest to return date of screening questionnaire used)

Screening Survey

Approach letter from the primary care physician describing study



First mail survey sent (38% response rate)

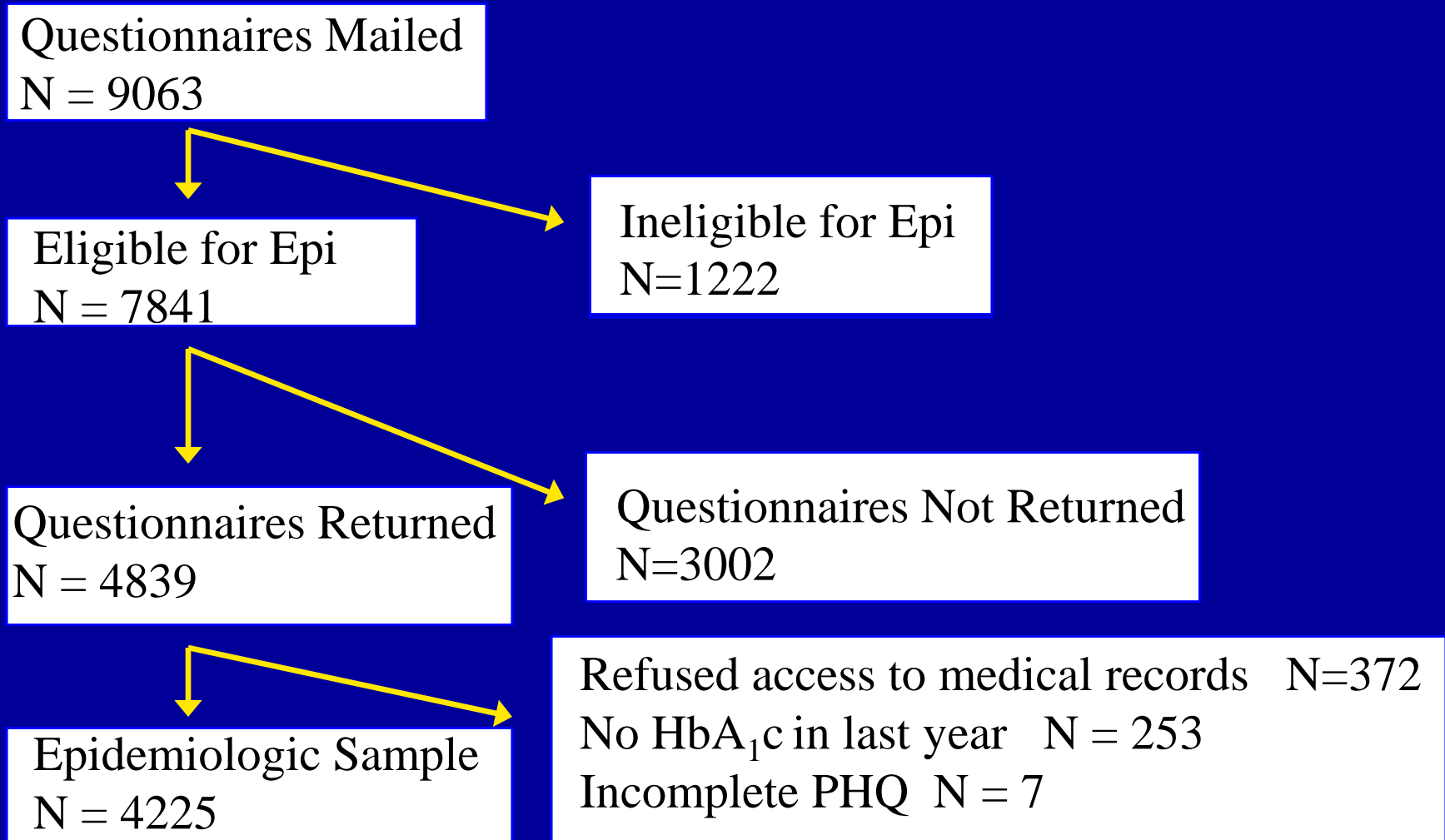


If not returned in 4 weeks second mail survey sent (↑ response rate to 47%)



If not returned within 2 weeks, patients received a telephone reminder call. Final response rate 61.7%

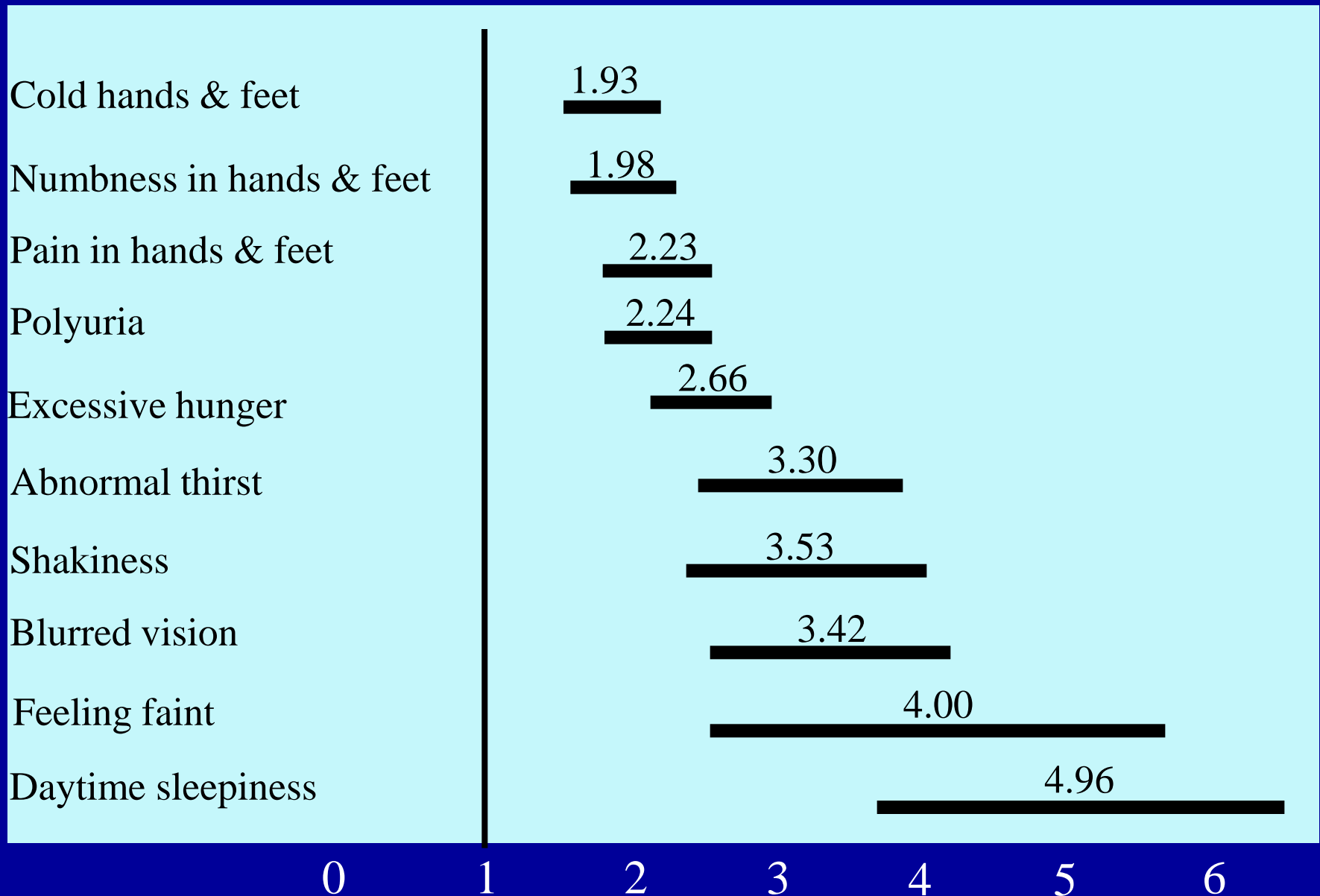
Recruitment for Randomized Controlled Trial



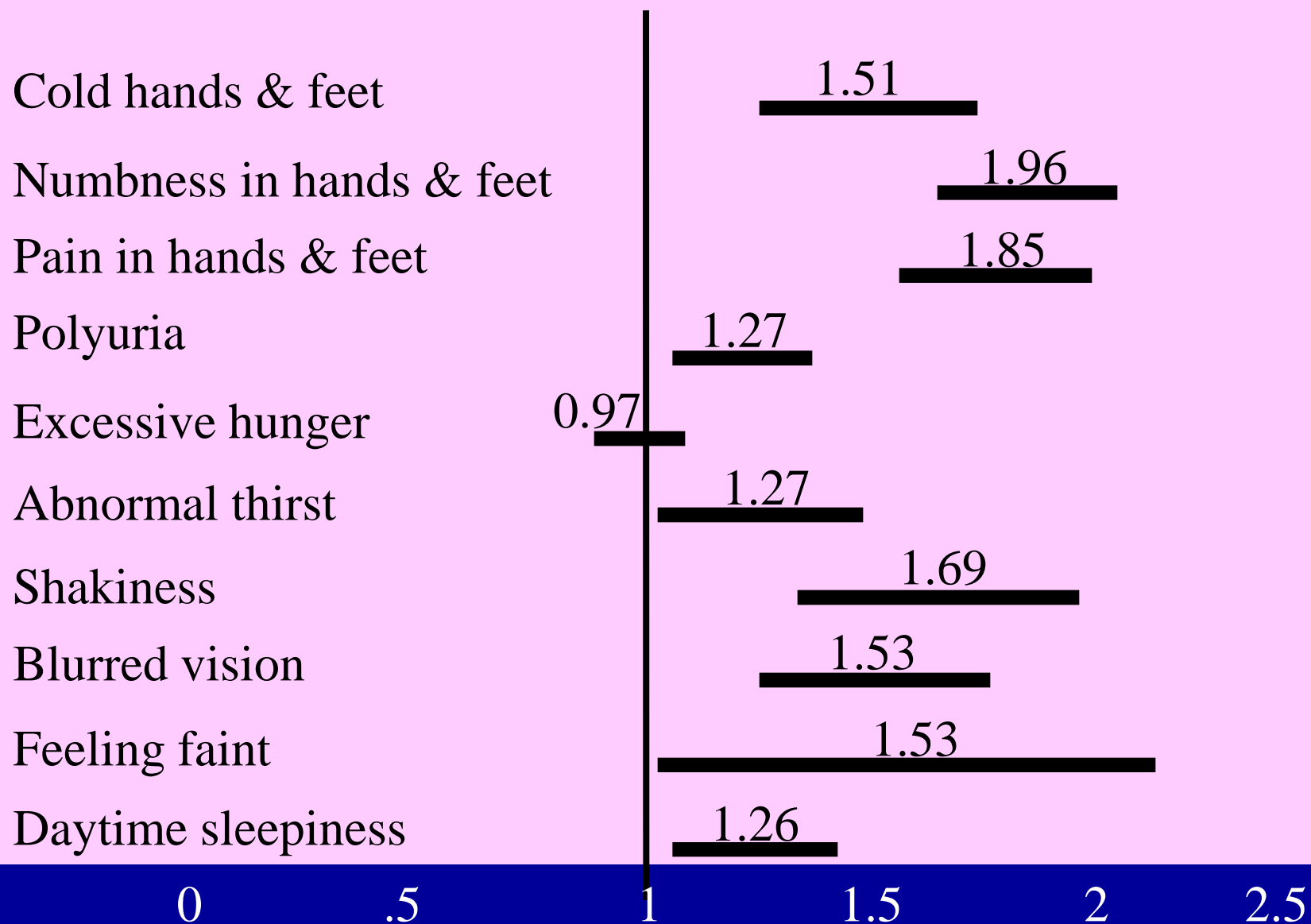
Pathways: Prevalence of Minor and Major Depression

	Total	Males	Females
Minor Depression	8.5%	7.8%	8.9%
Major Depression	12%	10.1%	14.3%

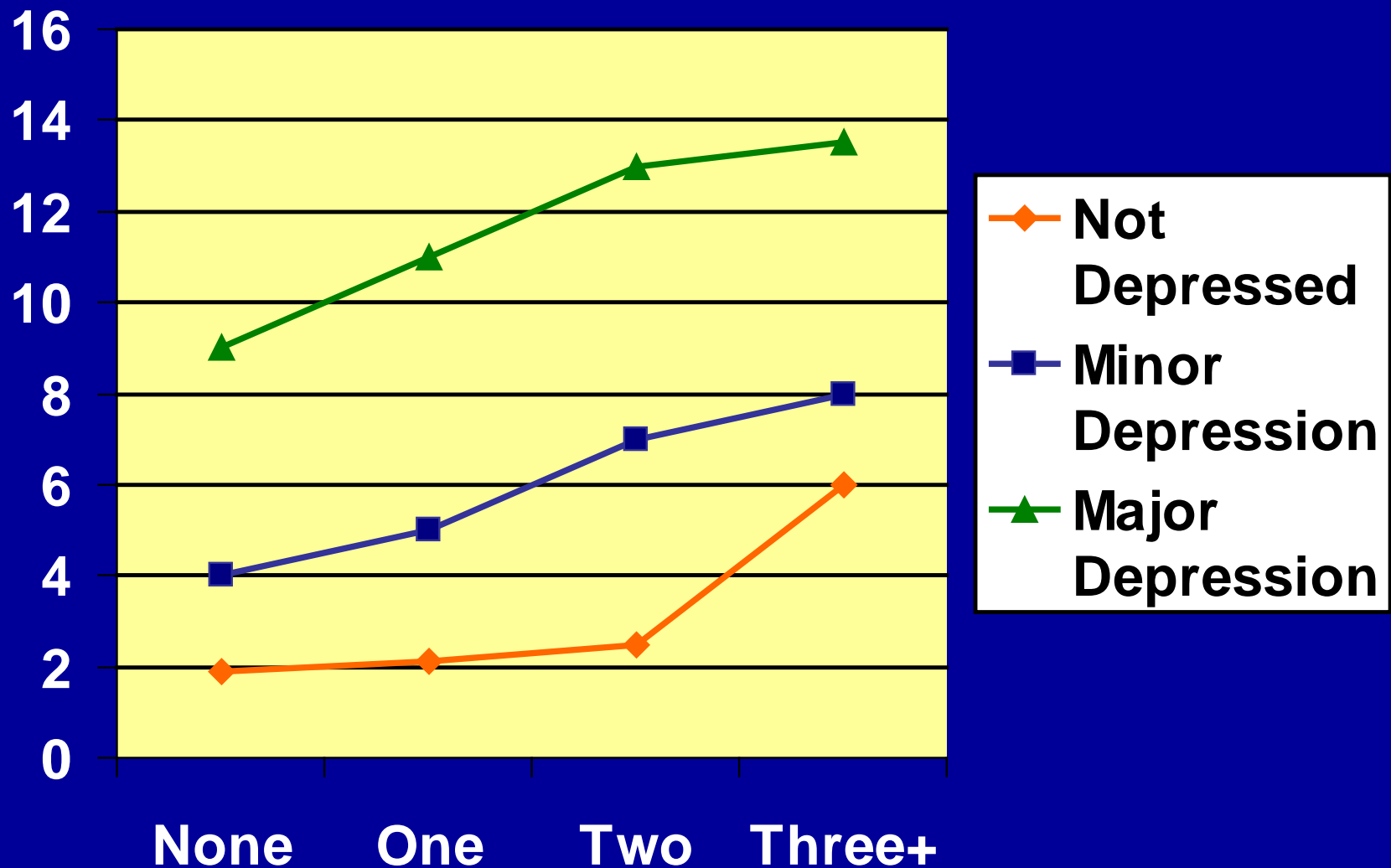
Relationship of Major Depression to Diabetes Symptoms – Odds Ratios



Relationship of Diabetes Complications (≥ 2) to Diabetes Symptoms – Odds Ratios



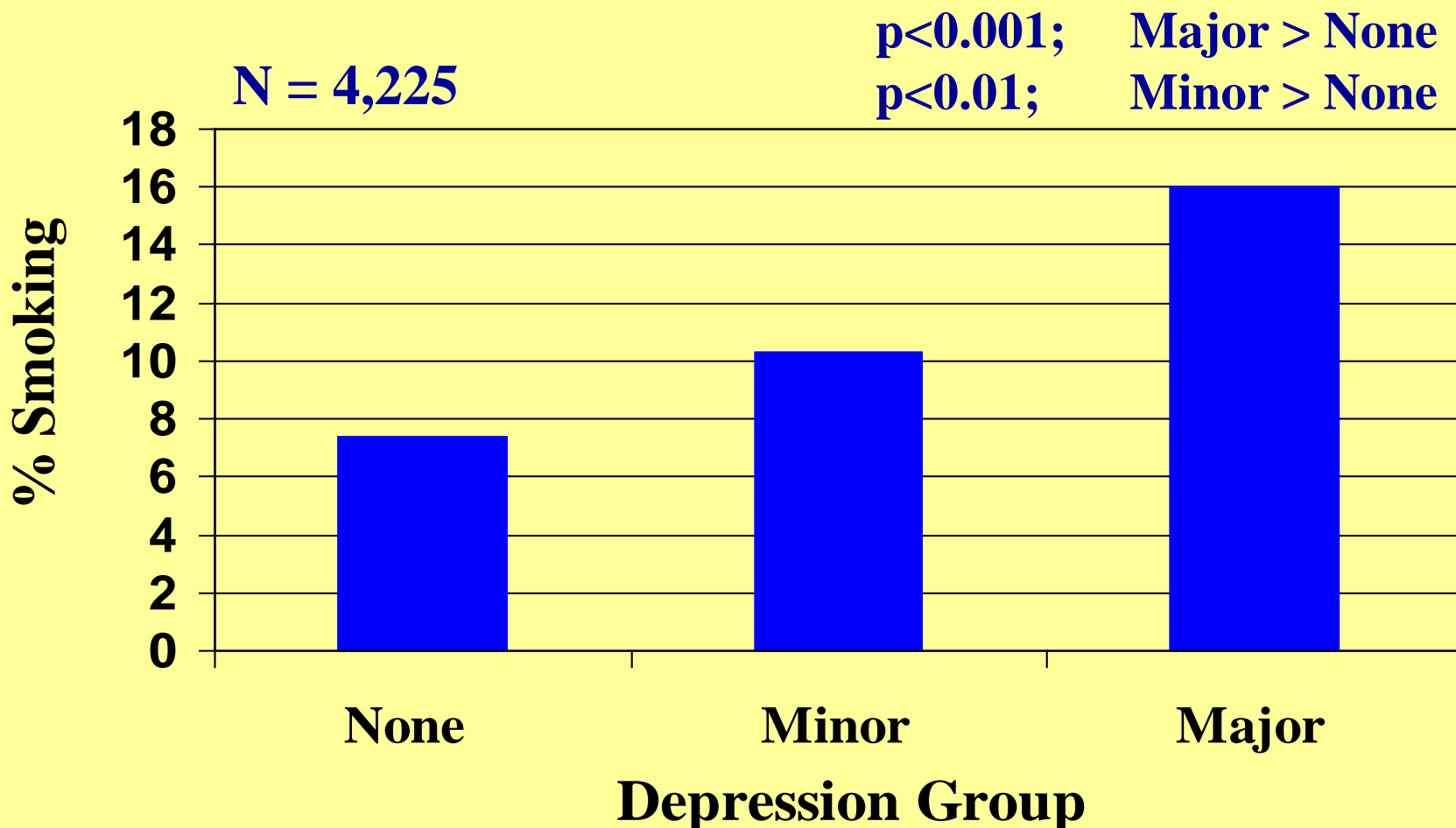
Mean Number of Days Reduced Household Work



Meta-Analysis of the Effect of Depression on Patient Adherence

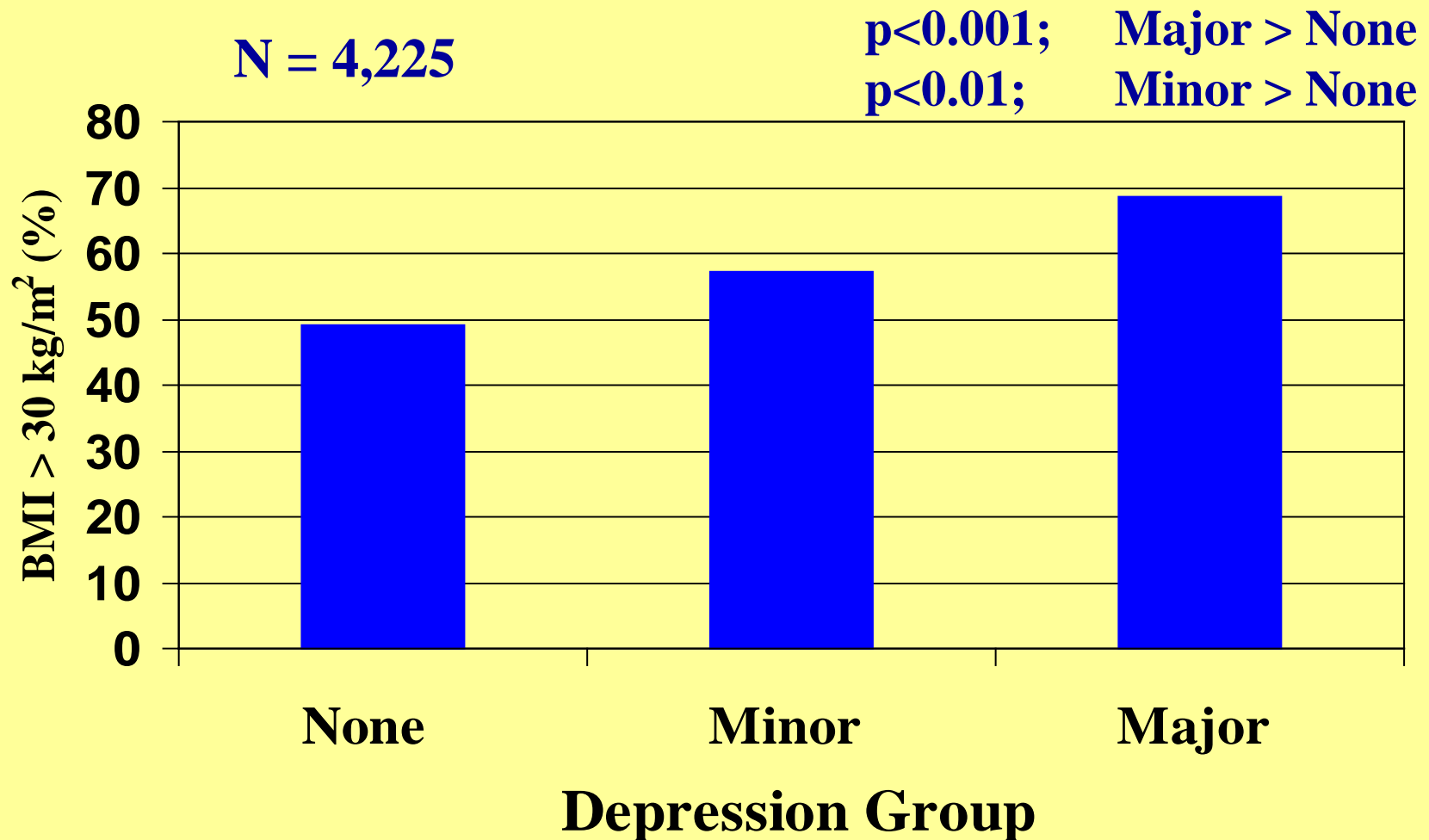
- Compared to nondepressed patients, the odds are 3 times greater that depressed patients would be nonadherent with medical treatment recommendations

% Smoking by Depression Level



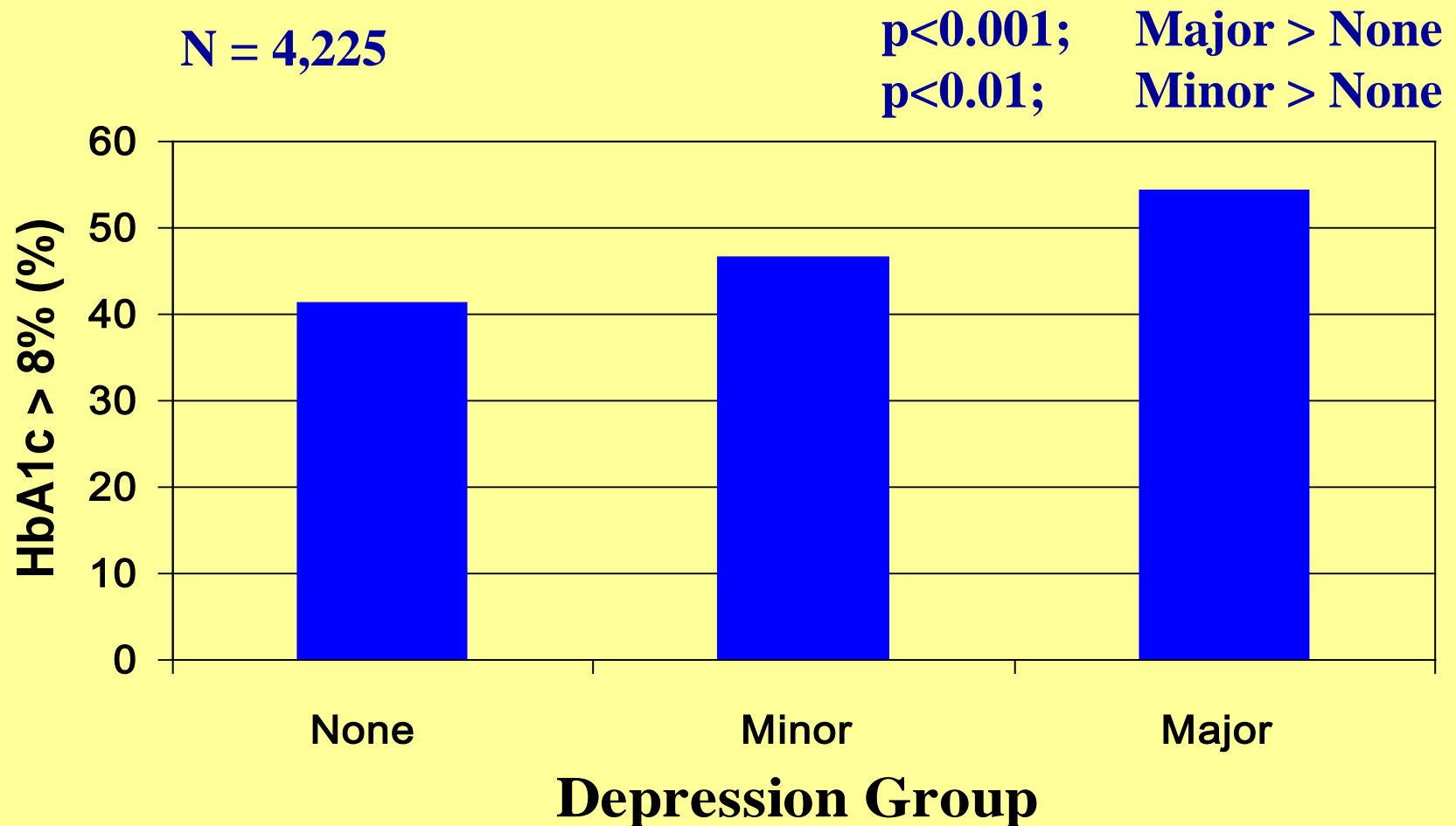
Adjusted for demographics, medical comorbidity, diabetes severity, diabetes type and duration, treatment type, HbA_{1c} and clinic

% BMI > 30 kg/m² by Depression



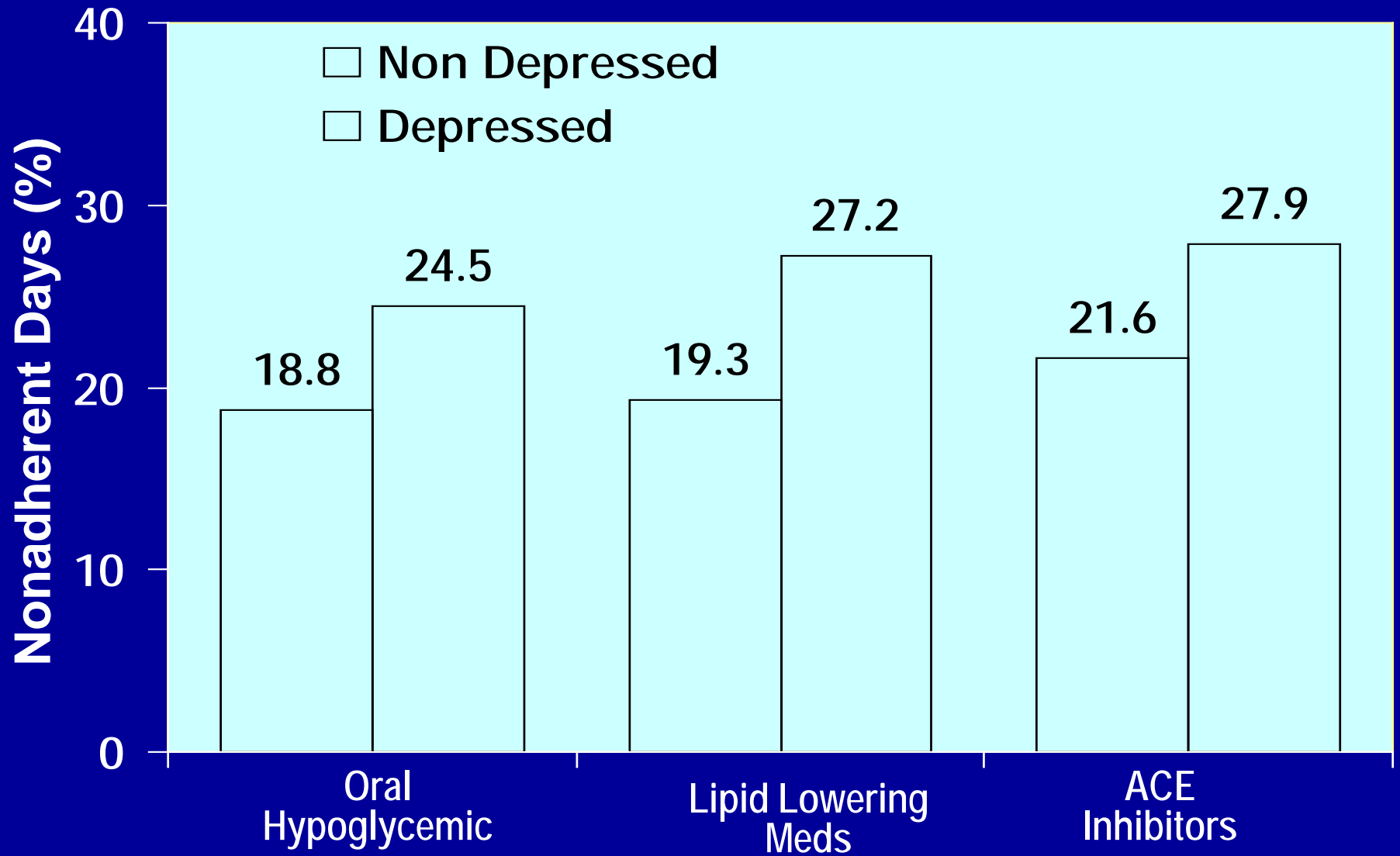
Adjusted for demographics, medical comorbidity, diabetes severity, diabetes type and duration, treatment type, Hb_{A1c} and clinic

HbA_{1c} > 8% by Depression Level



Adjusted for demographics, medical comorbidity, diabetes severity, diabetes type and duration, treatment type and clinic

Medication Adherence in Patients with Diabetes



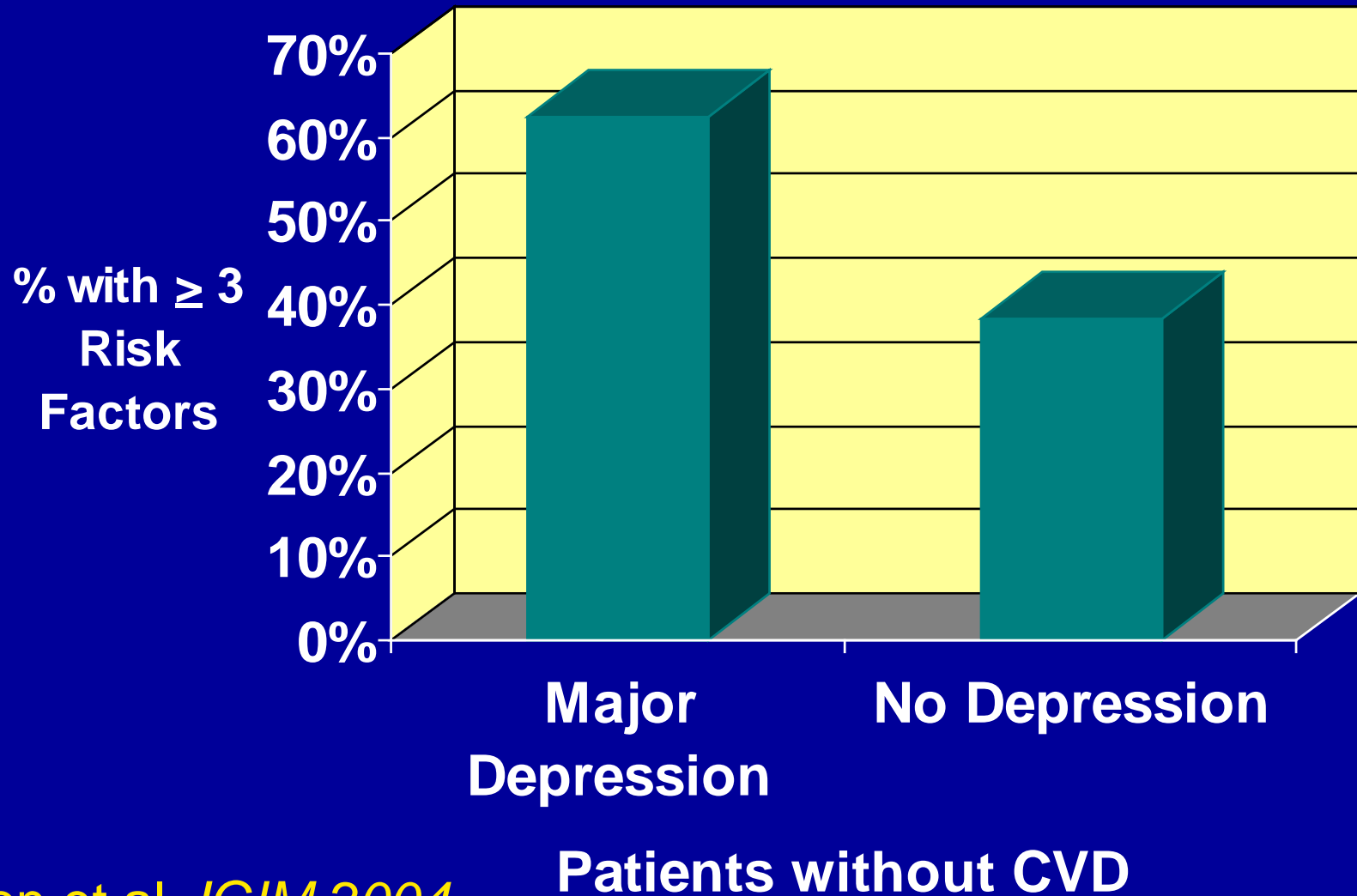
Impact of Antidepressant Adherence on Comorbid Medication Use and Resource Utilization

- 8040 patients with evidence of coronary artery disease, dyslipidemia or diabetes (or any combination of these 3) who were initiating antidepressant medication were selected from the Managed Care Benchmark Database.

Impact of Antidepressant Adherence on Comorbid Medication Use and Resource Utilization

- Controlling for predepressive chronic medical illness medication adherence, those found to be adherent to antidepressant medication were more likely to be adherent to medical disease medications (ORs 1.45 to 2.13)
- Patients adherent to antidepressant medications had significantly lower total medical charges (6.4% in CAD/dyslipidemia, 18% lower in DM, 19.8 lower in CAD/dyslipidemia)

Cardiac Risk Factors in Patients with Diabetes Mellitus and Major Depression



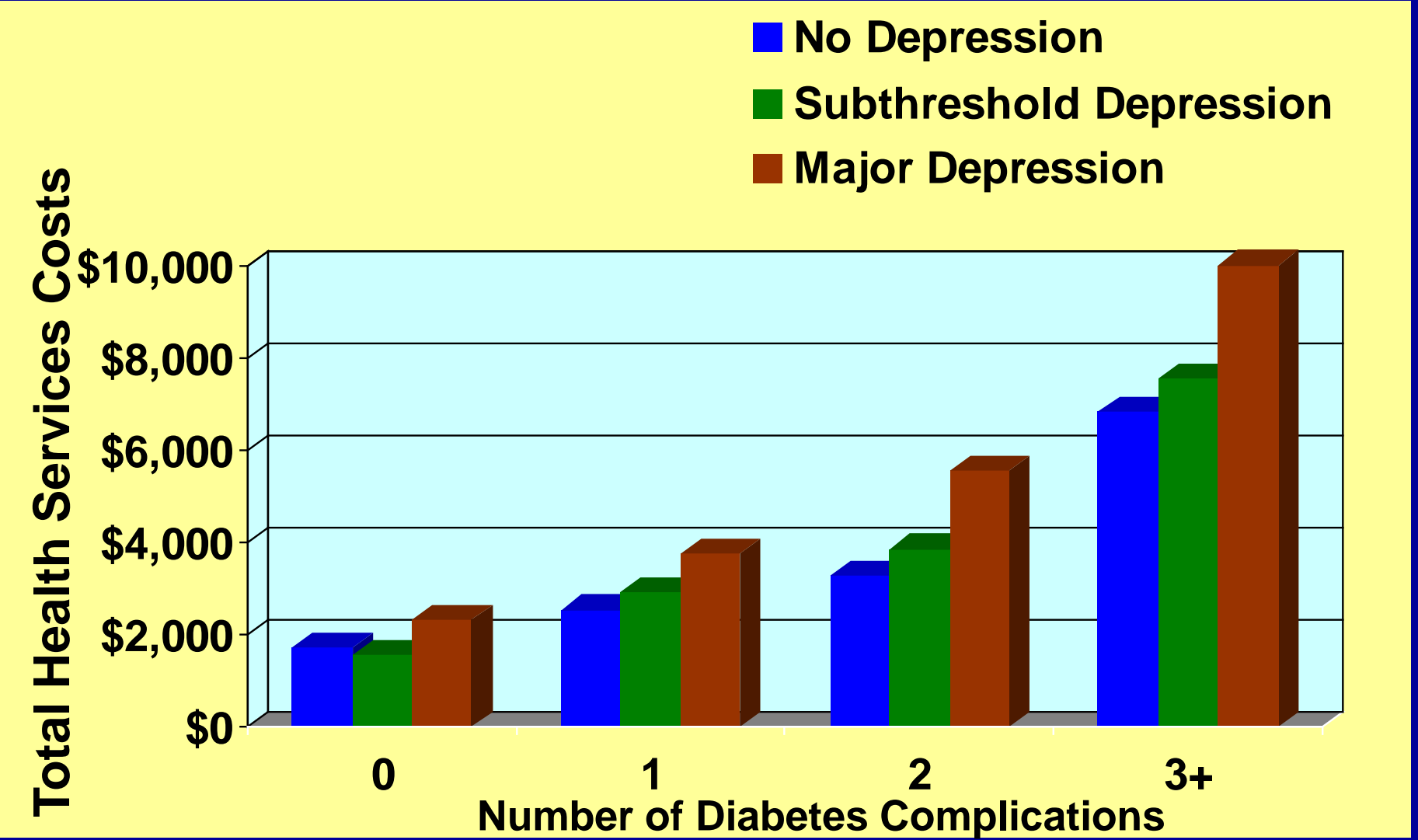
Depression and Diabetes Complications

- Meta-analysis of 27 studies showed a significant association between depression and a range of diabetes complications with effect sizes in the small to moderate range (95% CI 0.17 to 0.32)

Pathways: Association of Minor & Major Depression with Mortality

Variable	Model 1 Hazard Ratio	Model 2 Hazard Ratio
Minor Depression	1.66	1.46
Major Depression	2.19	1.43
Male	1.25	1.11
Some College	0.93	0.97
Age (Years)	1.09	1.08

Total Health Services Costs by Depression Status and Number of Diabetes Complications



Pathways Randomized Controlled Trial

- Participants randomly assigned to Pathways nurse collaborative care intervention (N = 165) vs. usual care (N = 164)
- Usual Care
 - Primary care or referral to specialty MH care as available
- Pathways Care
 - Collaborative/stepped care disease management program for depression in primary care

Treatment Protocol

- 1) Behavioral Activation / Pleasant Events Scheduling
- 2) Antidepressant medication

– usually an SSRI or other newer antidepressant

OR

Problem Solving Treatment in Primary Care (PST-PC)

– 6-8 individual sessions followed by monthly group maintenance sessions

- 3) Maintenance and Relapse Prevention Plan

- for patients in remission

Collaborative Care

Patient

- Chooses treatment in consultation with provider(s)

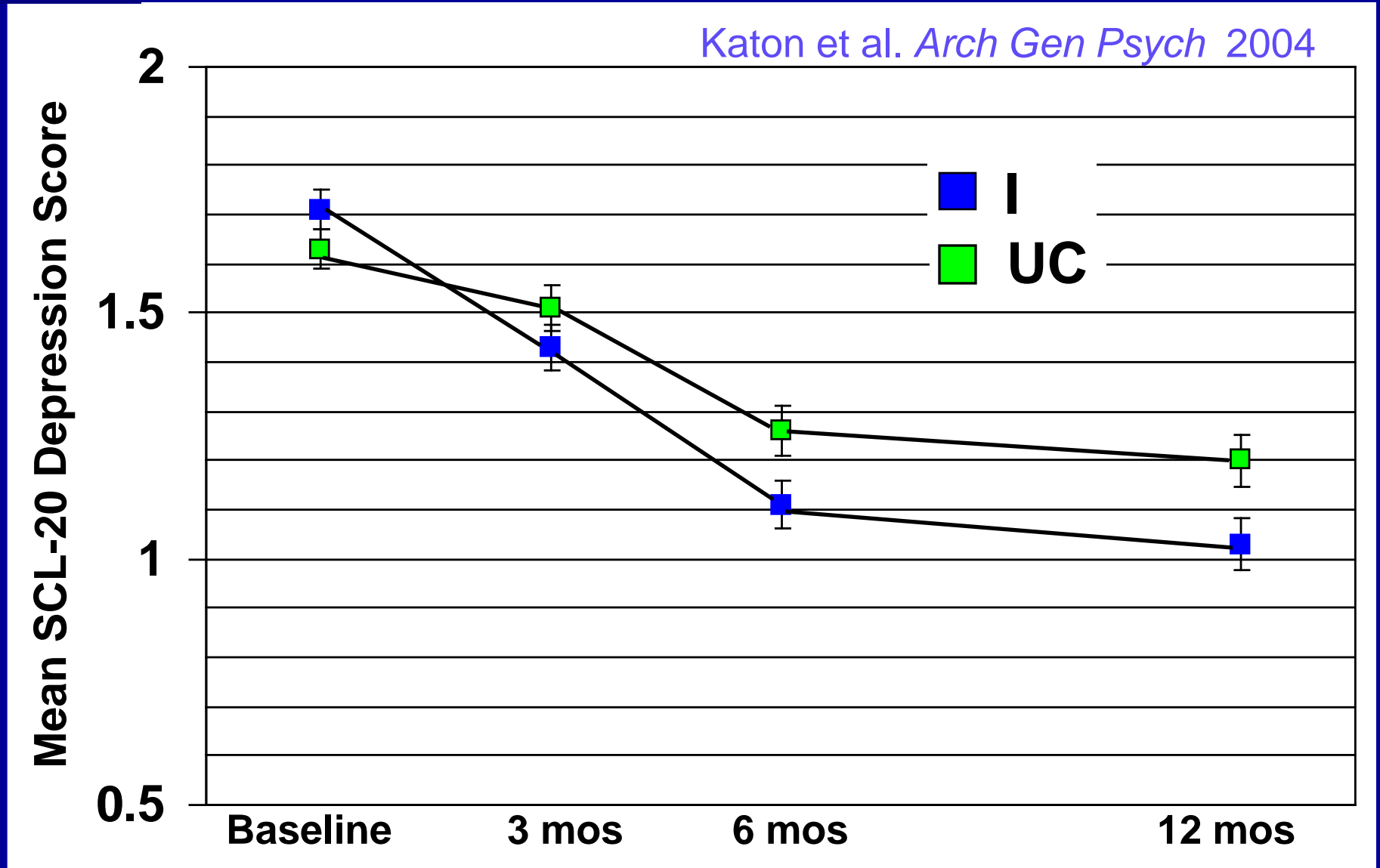
Primary care provider (PCP)

- Refers; prescribes antidepressant medications

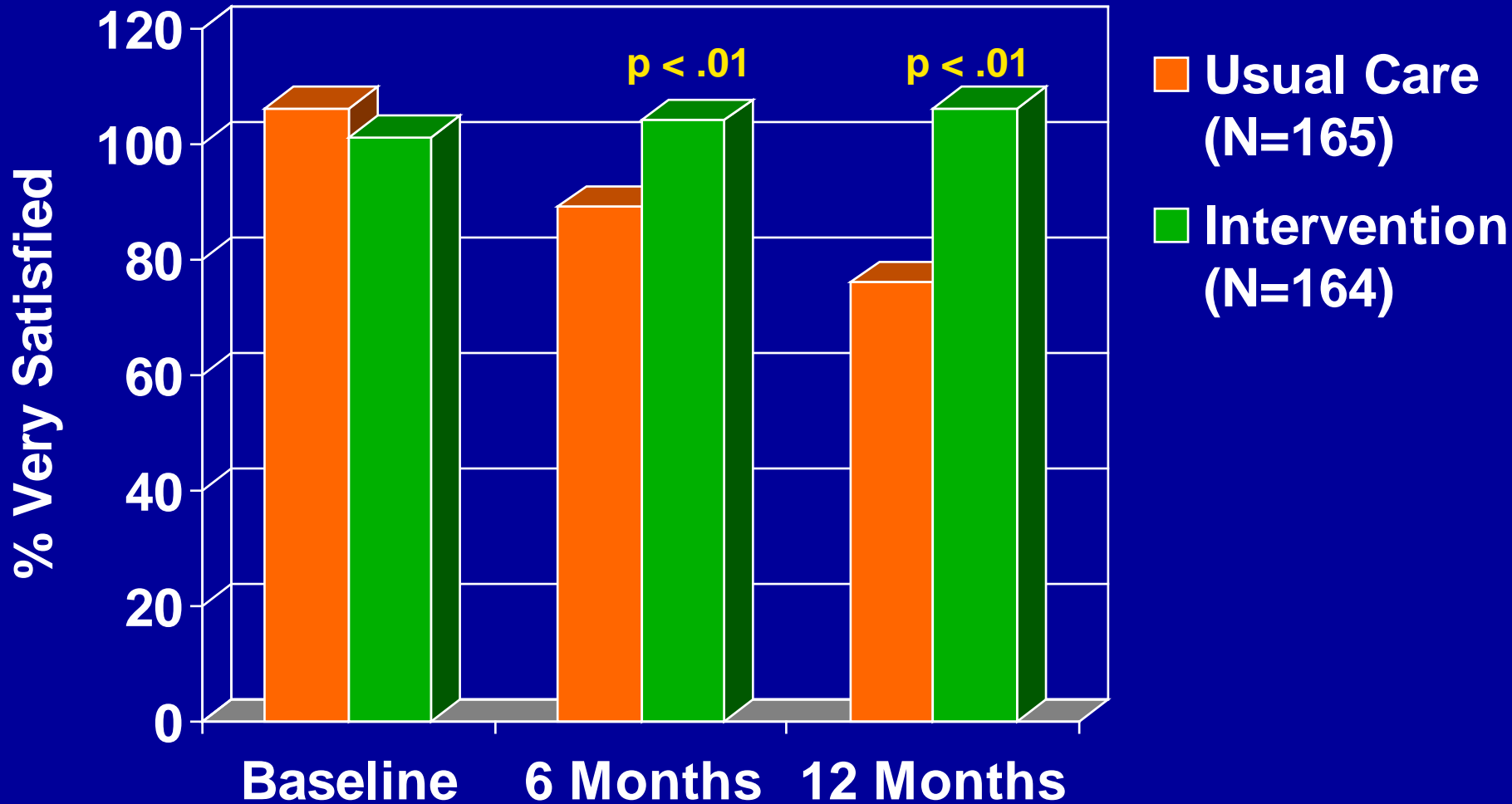
+ Depression Care Manager

+ Consulting Psychiatrist

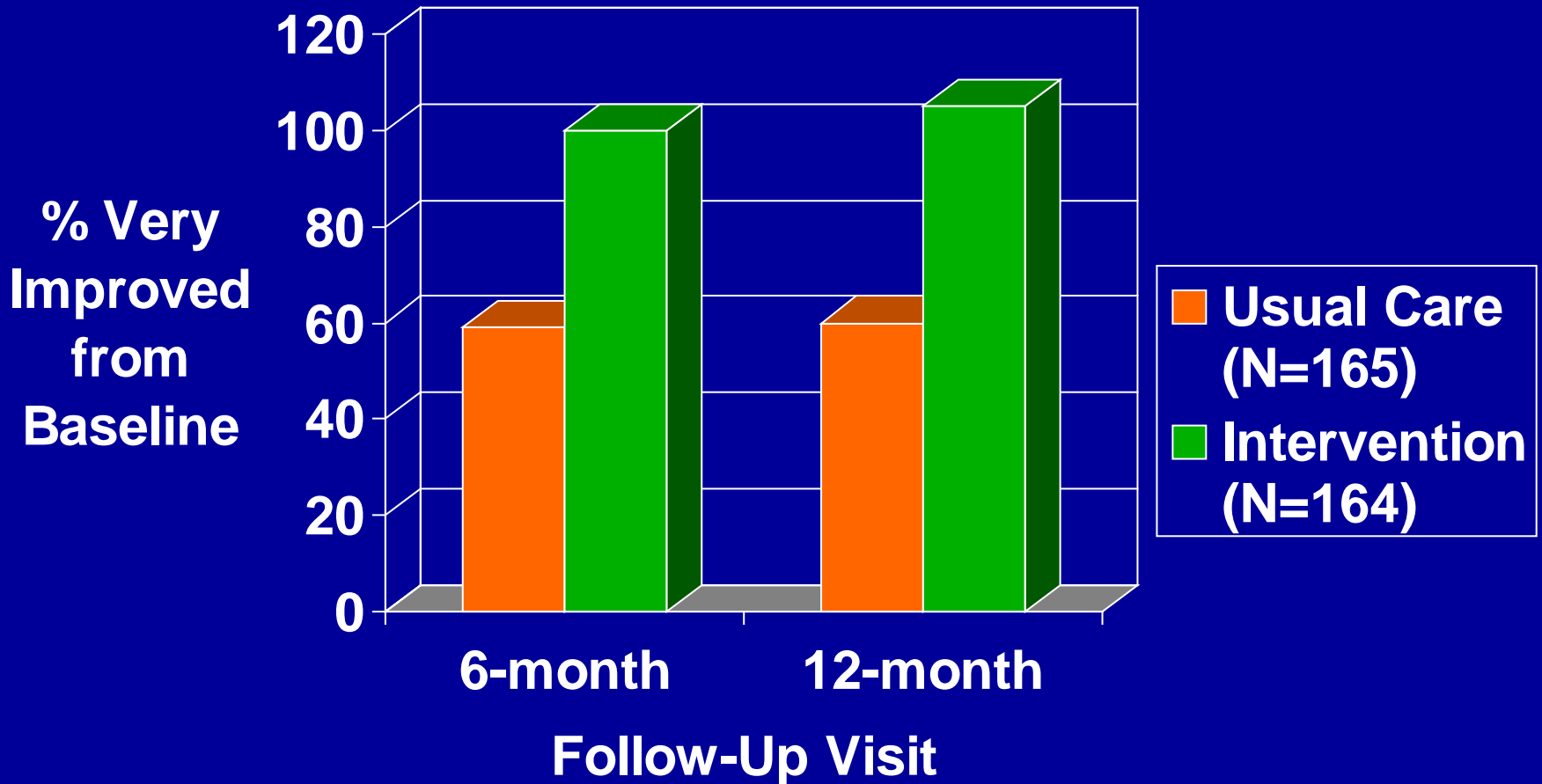
Intervention vs Control Differences on Mean SCL-20 Depression Scores (Range 0 – 4)



Satisfaction with Treatment for Depression

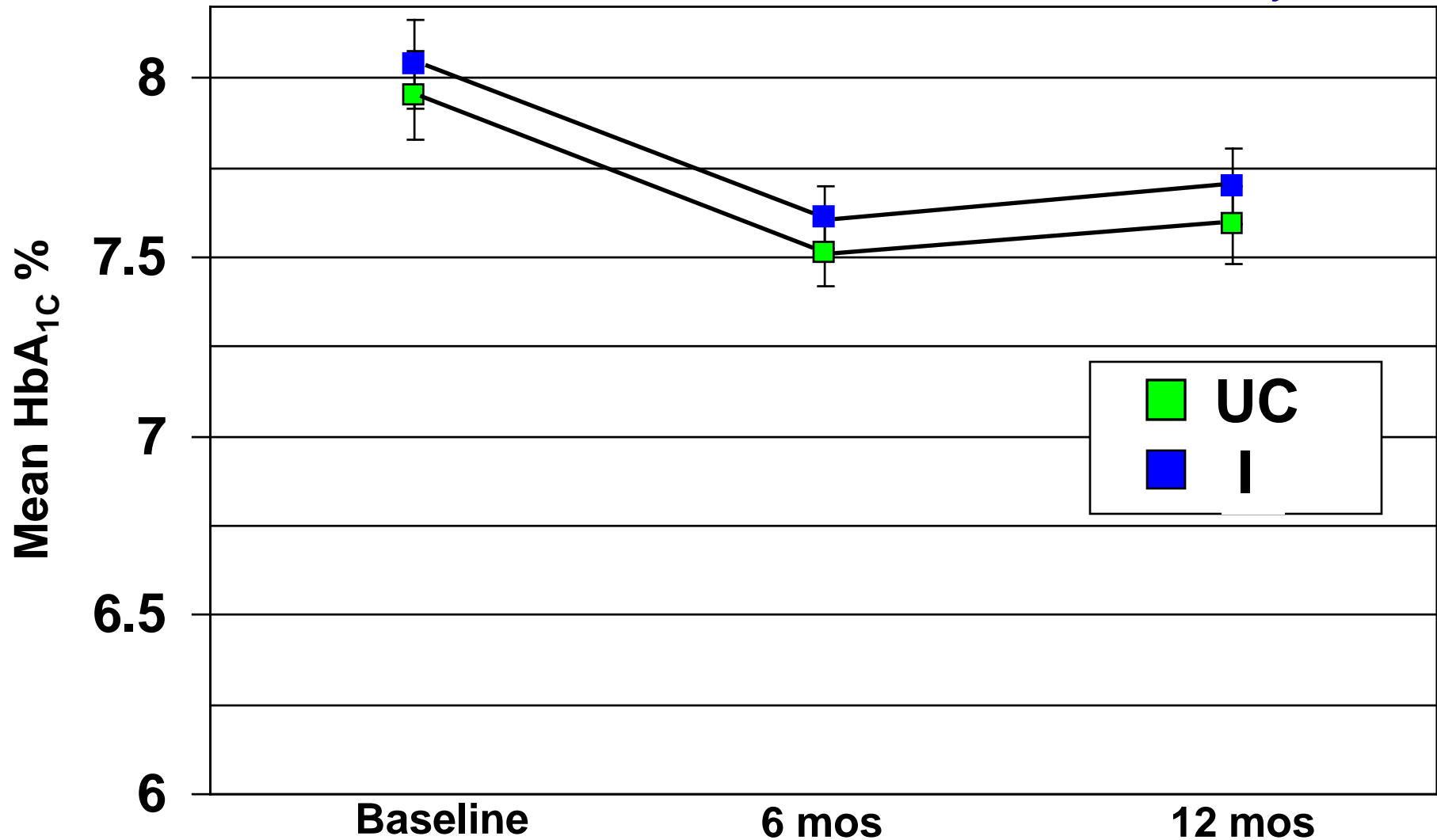


Patient Global Improvement



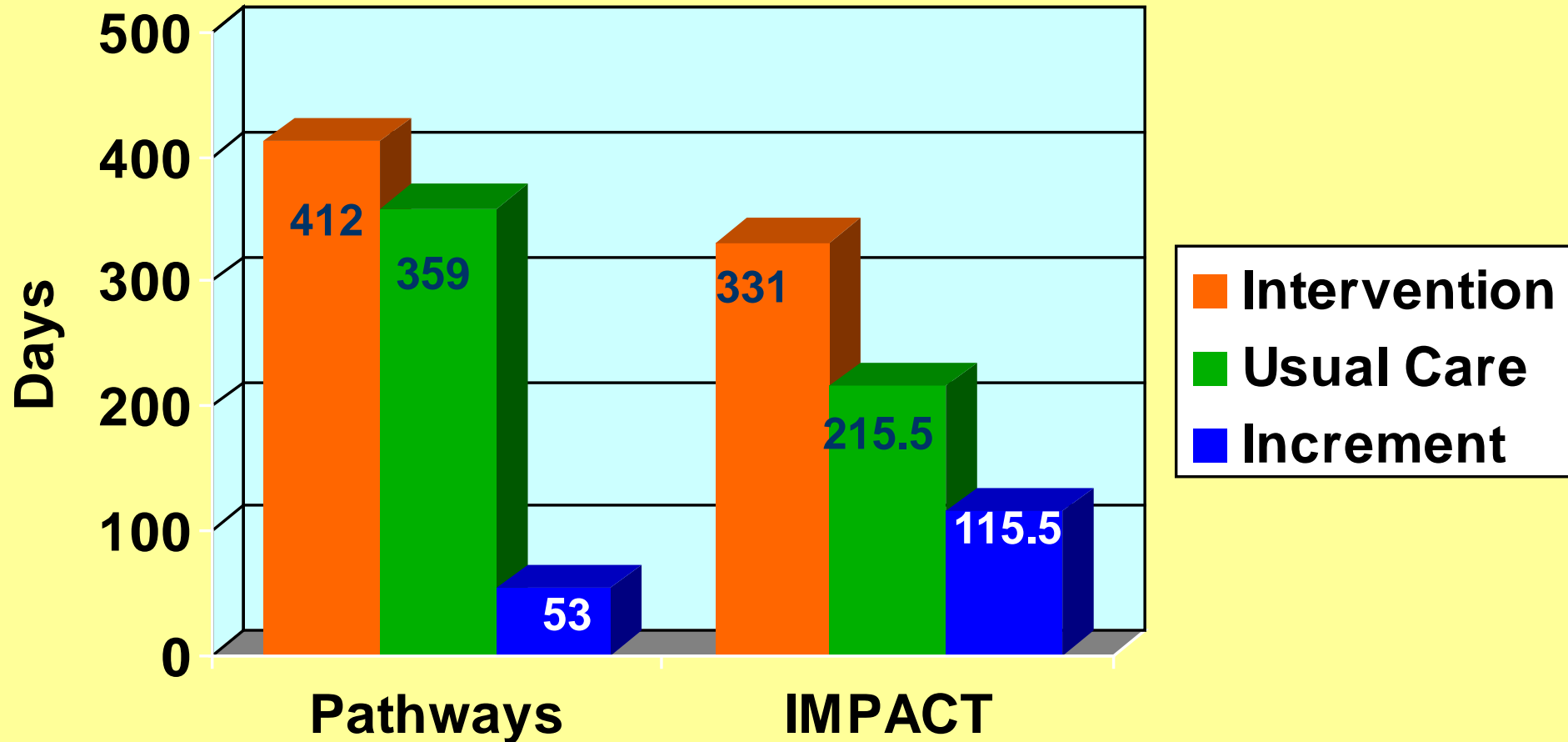
Intervention vs Control Differences on Mean HbA_{1c}

Katon et al. *Arch Gen Psych* 2004



Depression: Diabetes

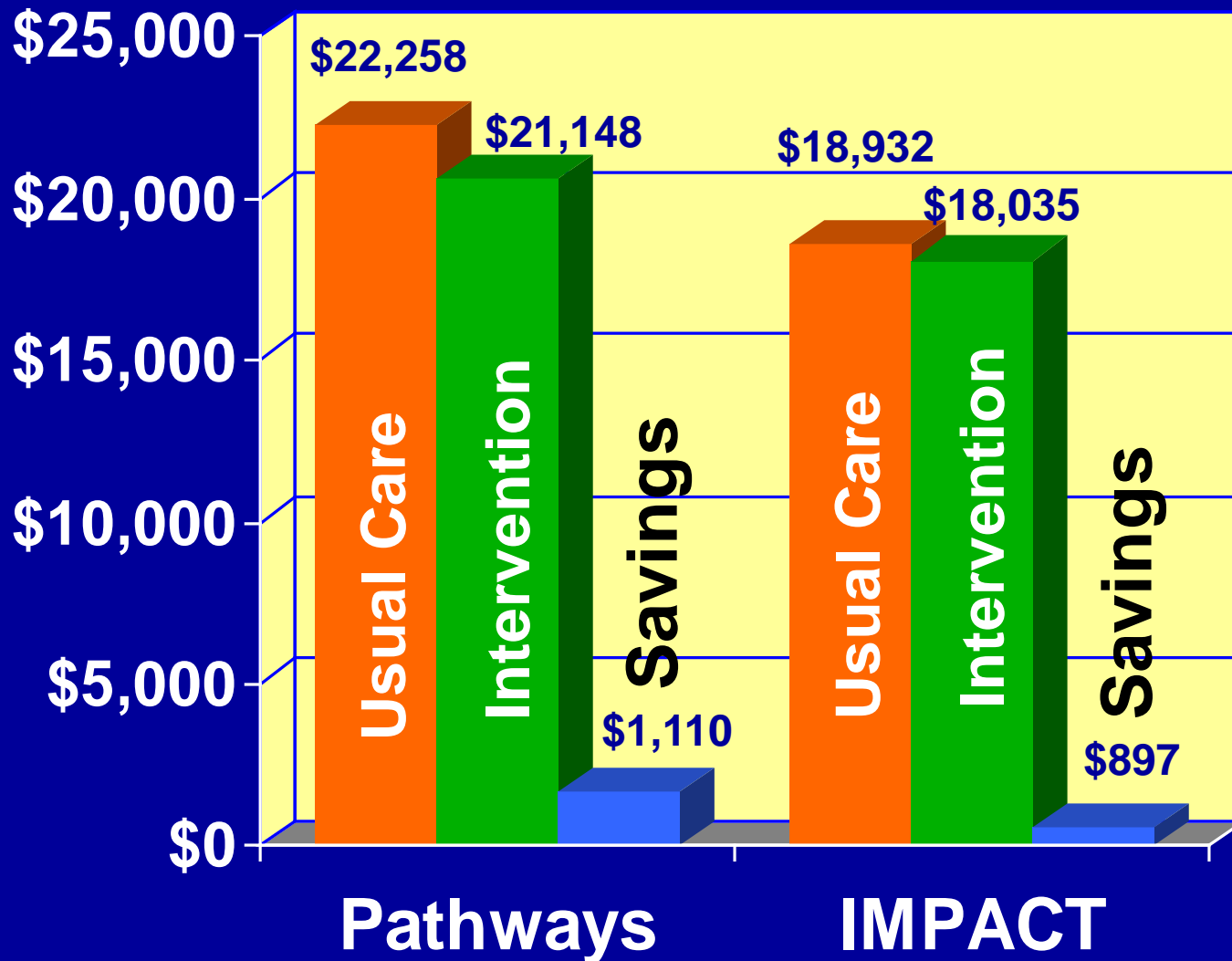
More Depression Free Days Over 2 Years



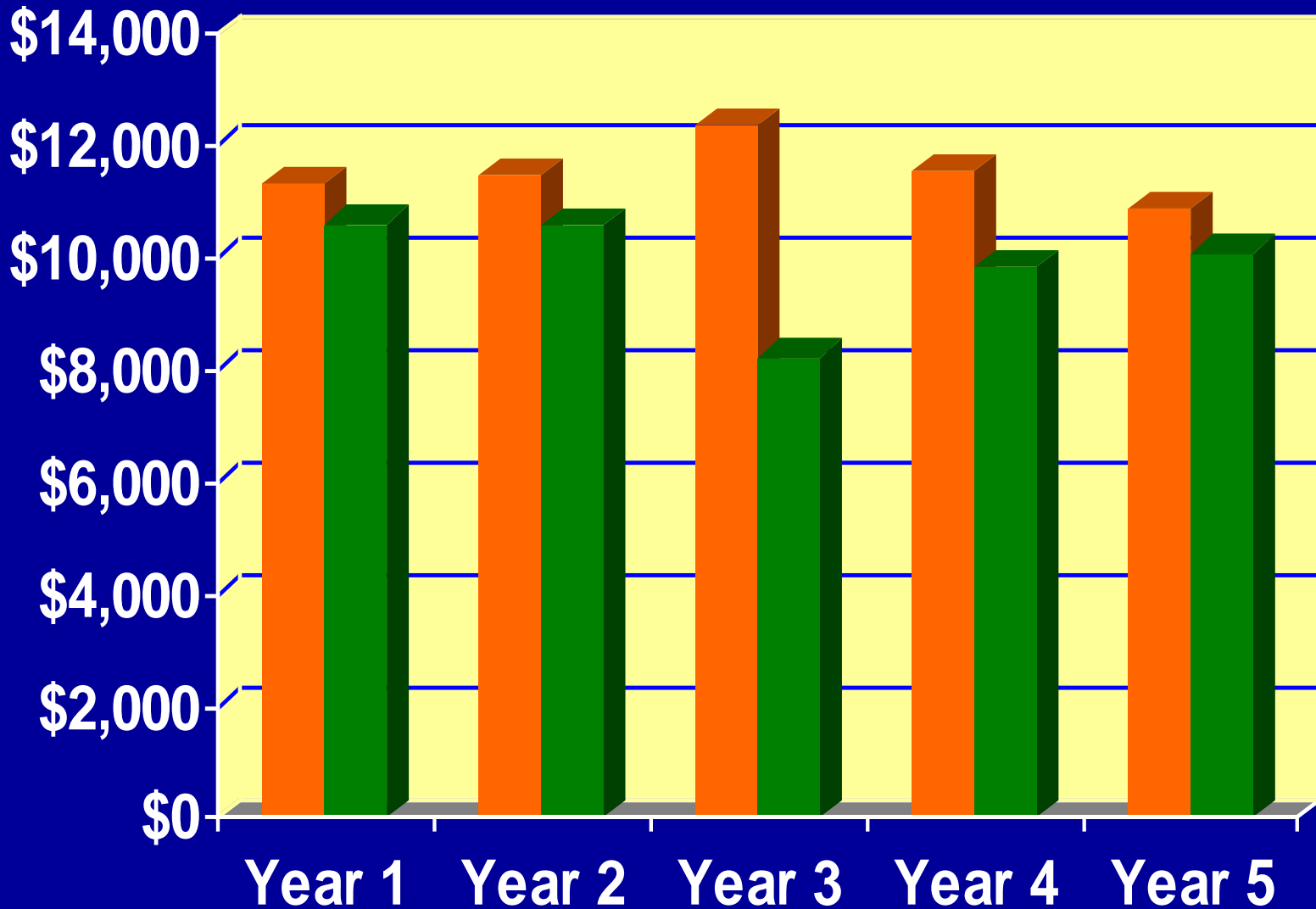
Simon et al. *Arch Gen Psych* 2007

Katon et al. *Diabetes Care* 2006

Depression: Diabetes Lower Total Health Care Costs Over 2 Years



Total Costs per Year over 5 Years: CM vs. UC Cost Differences



■ Usual Care ■ Care Management

Conclusion: Depression in Patients with Diabetes

- Depression is associated with higher symptom burden, additive functional impairment, poor self care (diet, exercise, adherence to medication), increased medical costs and increased mortality
- Enhanced treatment of depression is associated with improved depressive outcomes, improved physical functioning (in one of two trials) and a high probability of medical cost savings

New Research Directions

Pathways 2: Prospective study of >4000 patients with diabetes examining the association of depression on 5-year all-cause mortality, macrovascular mortality (MI and CVA), macrovascular and microvascular complications, poor clinical control (glycemic, blood pressure, lipid) and deterioration of activities of daily living.

TEAMCARE: An RCT that will test a nurse collaborative care intervention aimed at improving quality of medical and depression care in 300 patients with diabetes and/or CAD with evidence of poor disease control (i.e. 1 HbA_{1c} \geq 8.5, blood pressure >140/90, LDL > 130) and comorbid major depression/dysthymia.