

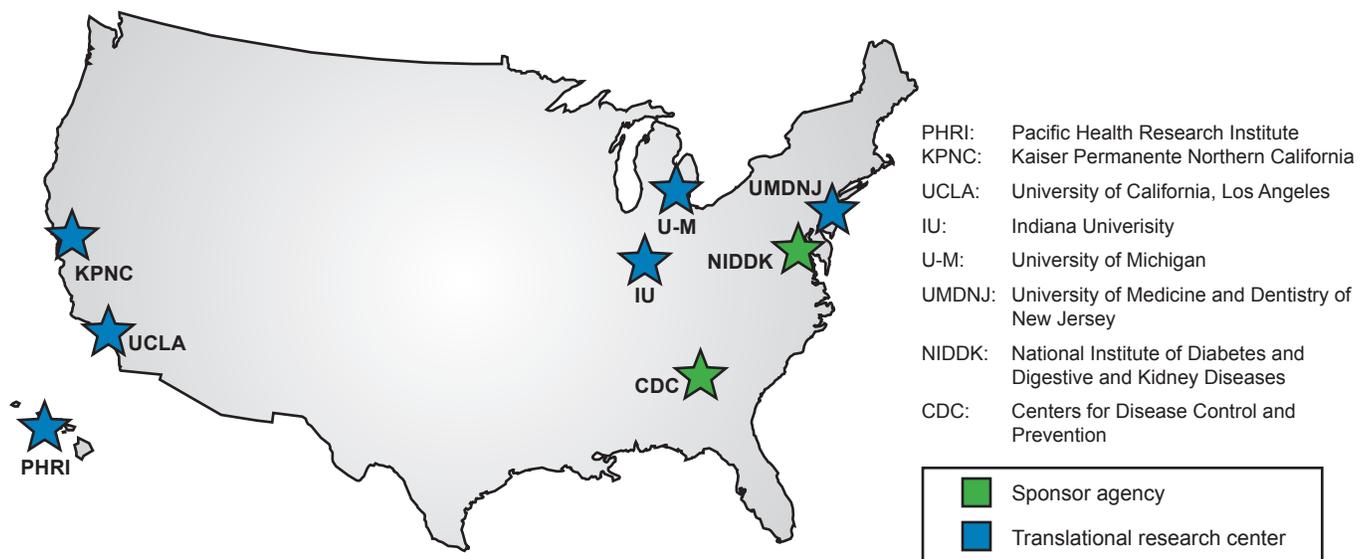
# Translating Research Into Action for Diabetes (TRIAD) Fact Sheet, 2009

## What is TRIAD?

TRIAD is a national, multicenter prospective study that provides useful information about effective treatments and better care for people with diabetes in managed care settings. TRIAD was launched in 1998 to evaluate whether managed care organizations' structures and strategies affect the processes and outcomes of diabetes care among adults, and to identify the barriers to and facilitators of high-quality care and optimal health outcomes. At that time, there was interest in whether disease management programs would improve diabetes care and outcomes. Numerous TRIAD study publications contribute to an evidence-based body of knowledge that allows managed care organizations and health care policy makers to make informed decisions on ways to improve care for people with diabetes.

The TRIAD study group comprises 6 translational research centers (Figure 1) and their 10 health plan partners. When TRIAD began, these health plans contracted with 68 provider groups to deliver primary and specialty care to more than 180,000 adult enrollees age 18 years and older with diabetes. TRIAD is funded by a cooperative agreement from the Centers for Disease Control and Prevention (CDC) and the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). A list of the investigators at each of the six research centers is available at the TRIAD Web site [www.triadstudy.org](http://www.triadstudy.org).

**Figure 1. TRIAD translational research centers and sponsor agencies**



TRIAD has assembled one of the largest cohorts of patients with diabetes ever studied. TRIAD collected and linked data from patients, providers, provider groups, and health plans. The diversity of patient data — obtained through surveys, medical record reviews, and administrative records — makes TRIAD unique.

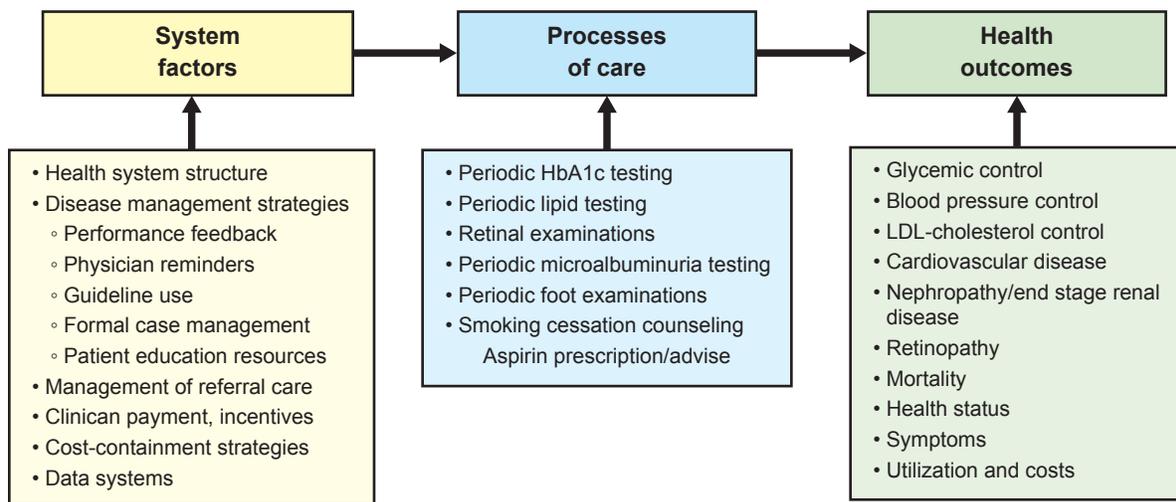
This fact sheet synthesizes 10 years of TRIAD research and analyses and focuses on the following areas:

- How health system factors are associated with processes of care.
- How patient factors determine clinical outcomes, for better or worse, and the effectiveness of diabetes disease management strategies.

## Health system factors

By using Donabedian's paradigm (Figure 2), TRIAD characterized and examined both managed care structural characteristics and disease management strategies. In Donabedian's paradigm, system factors are hypothesized to influence patient care processes, which, in turn, influence patient outcomes.

**Figure 2. TRIAD conceptual model of relationships among system-level factors, processes, and outcomes of care**



## Processes of care

- Improvements in processes of care are not necessarily associated with improvements in intermediate outcomes (e.g., hemoglobin A1c [HbA1c] value, LDL-cholesterol level, systolic blood pressure).
- Greater use of performance feedback measures, physician reminders, and structured care management were strongly associated with better process of care performance. Structured care management included the use and dissemination of clinical guidelines, patient reminders, formal care management and case management by nonphysician providers, and provision of health education resources.
- Accurate clinical data are essential for high-quality chronic disease care. They are needed at both the point of care and in disease registries. However, some health care systems participating in the TRIAD study failed to accurately record simple process measures. One study showed poor concordance between patients' self-report of recent retinal examinations and medical records of such examinations. The discordance was primarily due to medical records failing to capture patient reported eye examinations.



## The effects of cost-shifting

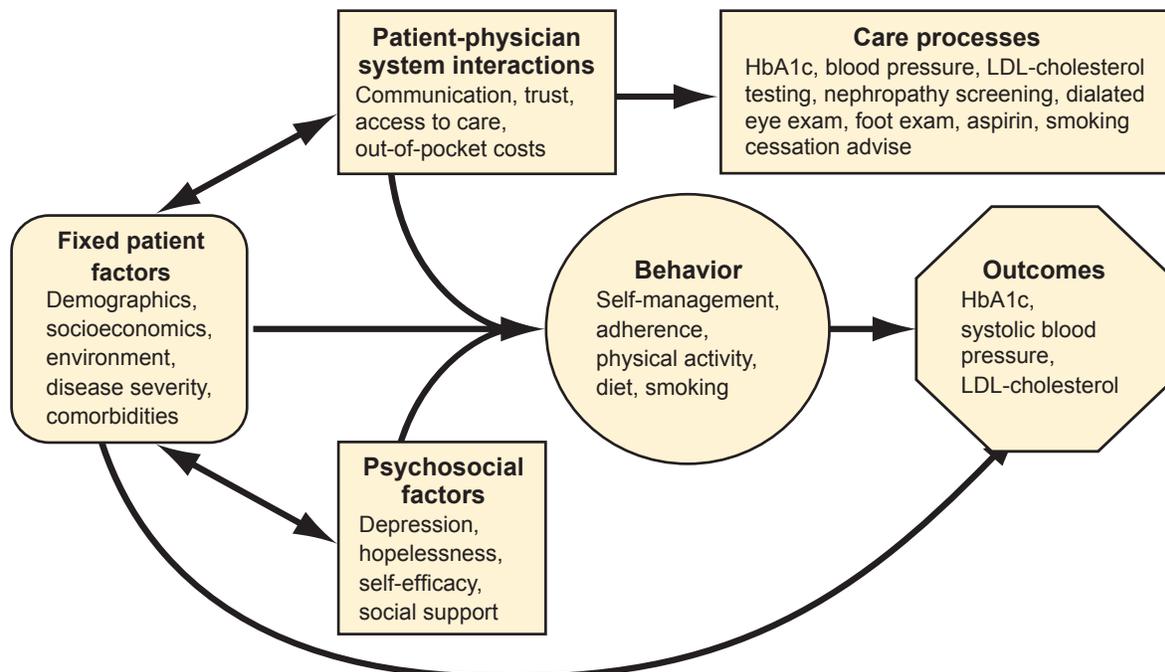
TRIAD found consistent negative effects of cost-shifting to patients. Cost-shifting, whether as copayments or coverage gaps, was associated with reduced recommended medication use and reduced preventive care. Lower income patients appeared to be more sensitive to the effects of cost; however, the effects were present across all income levels.

- Among the 2005 cohort survey respondents, 14% reported using less than the recommended dose of medicine because of cost, and patients with greater out-of-pocket costs were less likely to take the full dose of provider-recommended medicine.
- Compared with those without coverage for selected diabetes services and supplies, participants with full coverage (no out-of-pocket copayments) were more likely to have —
  - A retinal exam (78.4% vs. 69.8%).
  - Attended a diabetes education session within the prior 12 months (28.8% vs. 18.8%).
  - Practiced daily self-monitoring of blood glucose (74.8% vs. 58.6% among insulin users).
- Compared with patients in good control for three vascular disease risk factors, those patients not in control for at least two factors were more likely to report that out-of-pocket costs were a barrier to self-management.

## Patient factors

TRIAD findings (Figure 3) indicated that health system interventions only modestly affected patient outcomes. Accordingly, the study's focus shifted to examine the links between (1) patients' sociodemographic and clinical characteristics and outcomes and (2) outcomes and system factors.

**Figure 3. TRIAD conceptual model of relationships among patient factors, patient-system interactions, processes, and outcomes of care**



TRIAD study findings showed differences by patient subgroups, which could be used to tailor information and interventions and influence positive health outcomes.



## Age

Expressing health risks in terms of more immediate adverse outcomes (e.g., work fatigue and absences, bodily pain, diminished concentration, depressed mood, poor sleep) was more effective in motivating younger than older patients to engage in diabetes self-care than providing information about potential, but not immediate, complications of the disease.

- Younger adult patients with diabetes generally received fewer recommended processes of care and were more likely to have persistent lapses in processes of care compared with older adults. Persistent lapses were defined as missing any of five recommended exams over a 3-year period, including HbA1c, cholesterol, microalbuminuria, retinal, and foot.
- Younger patients with diabetes were more likely to have worse intermediate outcomes and less likely to have good risk factor control. Intermediate outcomes were defined as a combined measure of HbA1c, LDL cholesterol, and systolic blood pressure control.
- Younger adult patients were more likely to have had a recent microalbuminuria screening test, even though older patients were at higher risk for chronic kidney disease.
- Among patients 25–44 years of age with less than a high school education, 50% were current smokers compared with only 7% of college-educated persons aged 65 years and older.
- Walking for at least 20 minutes each day was slightly less likely in patients older than 65 than for younger patients (64% vs. 70%), and older patients were less likely to report sustained walking between the second and third TRIAD surveys (63% vs. 71%).

## Gender

Although modest, differences were found between men and women in processes and outcomes for cardiovascular disease risk factors (Tables 1 and 2). Compared with men, women in the TRIAD study —

- Used less medicine, regardless of their cardiovascular disease (CVD) status.
- Were less likely (among patients without CVD) to be advised to take aspirin or have lipid profile testing.
- Were less likely to control their blood pressure and LDL-cholesterol (among patients in a TRIAD plan with known CVD). However, these women had slightly lower HbA1c levels.
- Had a slightly better HbA1c and LDL-cholesterol control if they had a female physician.

**Table 1.**

Processes of care	With CVD		Without CVD	
	Women (%)	Men (%)	Women (%)	Men (%)
Aspirin used	33.2	39	14	16.4
Lipid medications used	51.5	57.6	34.8	35.9
Aspirin advised in those not taking aspirin	55.2	58.1	27	32.5
Lipid profile tested in those not using lipid medications	53.2	54.8	54.4	58.3



**Table 2.**

Outcomes	Female patients		Male patients	
	Female MD (%)	Male MD (%)	Female MD (%)	Male MD (%)
A1c < 8	70	68	66	66
LDL-c < 100	47	46	54	55
SBP < 130	53	52	60	60

## Race and ethnicity

Whites, African Americans, Latinos, and Asians or Pacific Islanders were well represented in the TRIAD cohort. Although all patients in TRIAD had comparable health coverage, striking disparities in health behaviors and outcomes were found among whites and African Americans. African American patients consistently had poorer control of blood pressure, LDL-cholesterol, and HbA1c.

Surprisingly, processes of diabetes care did not differ greatly among the four principal racial or ethnic groups. Compared to whites, African Americans had lower LDL-cholesterol testing (61% vs. 68%) and influenza vaccination rates (59% vs. 68%), but significantly higher foot exam rates (89% vs. 83%). Latino patients had higher dilated eye exam rates (83% vs. 76%) than whites.

However, there were notable racial and ethnic differences in control of all three intermediate outcomes. In 2000, African American patients had the poorest blood pressure control — 45% had blood pressure less than 140/90 mmHg vs. 56% of white patients. For LDL-cholesterol, mean levels were significantly higher for African Americans than white patients (118 vs. 111 mg/dL), but neither Asian/Pacific Islanders nor Latinos differed significantly from whites. All three minority populations had slightly, but significantly higher HbA1c levels than whites.

The TRIAD study findings suggest several possible explanations of the disparities in health behaviors. Compared with white patients with diabetes, African American patients had —

- More sensitivity to out-of-pocket costs.
- Poorer quality of patient-provider relationships.
- Higher prevalence of undiagnosed or untreated depression.
- Fewer resources and greater stress as a result of living in socioeconomically deprived neighborhoods.

## Patient-physician interaction

The quality of physician communication and patients' trust in their physicians were generally associated with better clinical management and outcomes.

- Among patients with persistent poor glycemic control on oral agents, those reporting better physician communication and those with fewer misconceptions about insulin were more likely to begin insulin therapy.
- Better patient-reported provider communication (i.e., physicians who listen, explain, show respect, spend time) did not appear to attenuate observed educational disparities in health behaviors (i.e., smoking cessation, increased physical activity, diabetes-related health-seeking activity).



## TRIAD key findings, 1998–2008

### Implications for health system policies and best practices

Managed care systems should emphasize the development and reporting of care processes known to be closely linked to improved outcomes. Increased system-level attention to monitoring and improving treatment intensification rates may help improve intermediate outcomes. Specific areas for research and possible interventions that may improve the health of people with diabetes include the following:

- Redesigning benefits to lessen the cost burden of medicine on patients will ensure more people with diabetes take the prescribed medications.
- Increase cardio-metabolic control and behavioral and medical interventions to treat depression.
- Improve efforts to encourage provider communication and increase patient trust.

Tailoring programs to the needs of people with diabetes will improve outcomes. Programs need to —

- Consider the special needs created by family and work obligations.
- Avoid one size fits all and design programs to eliminate disparate outcomes among populations. For example, greater promotion of mail-order pharmacies could be very useful for patients with problems accessing pharmacies.
- Redesign programs to include sociodemographic and clinical subgroup patient differences in health-related behaviors and control of major cardio-metabolic risk factors.

## Acknowledgements

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## For public inquiries and TRIAD publications

Please visit the TRIAD Web site [www.triadstudy.org](http://www.triadstudy.org) or call 1-877-648-5119.

## For other information

For public inquiries and more information about diabetes, please visit the Centers for Disease Control and Prevention Web site [www.cdc.gov/diabetes/](http://www.cdc.gov/diabetes/) or call 1-800-CDC-INFO (232-4636).