How Our Current Medical Care System Fails People With Diabetes

Lack of timely, appropriate clinical decisions

Many randomized controlled intervention trials have demonstrated that lowering glycemia (1,2), LDL cholesterol (3), and blood pressure (4) will markedly benefit the complications from diabetes. Based on these data, the American Diabetes Association has recommended the following targets for glycemic, lipid, and blood pressure outcome measures, A1C <7.0%, LDL cholesterol <100 mg/dl, and blood pressure <130/80 mmHg, respectively (5).

Most diabetic patients do not meet these recommended goals. Approximately half of the National Health and Nutrition Examination Survey cohort met the glycemic goal (6). In other larger reported populations, 21–43% of patients had A1C levels >9.5%, only 22–46% of diabetic patients met the LDL cholesterol goal, and 29–33% met the blood pressure goal (7). Far fewer, 2–10%, met the combined American Diabetes Association goals for glycemia, lipids, and blood pressure (7).

Many approaches have been tried to improve diabetes care but, with one exception, have been mostly ineffective. These include simply reminding patients about appointments; providing laboratory information on the patient to the physician, even when specific treatment recommendations for the individual patient were included; case management when the case manager could not make independent treatment decisions; education of physicians; and multifaceted quality improvement interventions in the practice setting (7).

The small amount of time a physician has to spend with a patient is an important limiting factor. This was amply illustrated in a study (8) in which eight process measures agreed upon by the physician group and whether the patient was due to receive them were displayed in a study (8) in which eight process measures agreed upon by the physician group and whether the patient was due to receive them were displayed on the physicians’ computer screens at the time of the patient visit. The measures due were performed or ordered only one-third of the time. Physicians pinpointed lack of time and other problems that needed attention as primary obstacles to carrying out the agreed-upon recommendations.

The one approach that has proven to be effective is using specially trained nurses or pharmacists, under appropriate supervision, with authority to make medication changes without consulting the physician as long as the changes fell within approved treatment algorithms. In randomized clinical trials, A1C levels fell threefold more in 1,969 patients followed by nurses and pharmacists compared with 1,573 patients under usual care (7). Several nonglycemic outcome measures also significantly improved with nurse- or pharmacist-directed diabetes care compared with usual care. These included LDL cholesterol, triglycerides, and systolic and diastolic blood pressure (7). These impressive results stand in contrast to case management in which nurses do not have prescriptive authority (7).

Perhaps the best evidence for the importance of the nurse or pharmacist to have authority to make independent clinical decisions comes from a direct comparison of programs in the same institution. A diabetes case management program in which medication changes by nurse practitioners required approval by the primary care physician was initially established and compared with usual care. Baseline A1C levels averaging >9.0% did not change over 18 months in either the control or intervention group (9). Subsequently, in the same medical care setting, a clinical pharmacist was allowed to make independent clinical decisions based on an approved protocol. Baseline A1C levels averaging >10% fell by 0.9% in the control group and 2.1% in the intervention group over 12–24 months (10). The results of these two studies within the same institution treating the same population were supported by a recent metaregression analysis on the effects of quality improvement strategies to improve glycemia in type 2 diabetes (11). Interventions in which case managers could adjust medications without awaiting physician approval achieved the best results, whereas other approaches had minimal effect.

The critical factor that underlies the success of specially trained nurses or pharmacists to improve the outcomes of diabetes care is that timely and appropriate clinical decisions are made. The decisions are appropriate because they are based on approved treatment algorithms. However, timeliness of these decisions is also very important. The fact that more time can be spent with the patient, not only in the office dealing specifically with diabetes but also outside of the office via other means of communication, is critical for improved outcomes. For the most part, except for the minority of patients who have polyuria and polydipsia secondary to severe hyperglycemia or those who have diabetes complications, diabetes care is preventive care, i.e., controlling glycemia, lipids, and blood pressure in asymptomatic people. These issues often receive short shrift in the 10 min or so that most patients spend with primary care physicians, who often have other more immediate concerns. Moreover, patients are often seen only every 3 months or so, thus ensuring that glycemia, lipids, and blood pressure could remain out of control for long periods of time. This schedule wastes opportunities to bring these patients under control much more quickly because the maximal responses to changes in medication doses or introduction of new classes of drugs for treating glycemia (except for thiazolidinediones), lipids, and blood pressure all occur within a month.

Most treatment decisions involving control of glycemia, lipids, and blood pressure do not require a face-to-face meeting with a provider. Titration of most oral medications for glycemia can be made based on fasting plasma glucose concentrations measured by a laboratory or by a glucose meter at home, with subsequent dose adjustments based on A1C levels (online appendix of ref. 12, available at http://dx.doi.org/10.2337/dc08-
trolled. Their glycemia remains inadequately con-

When a start-up company tried to com-

betic patients fell by 0.7% by 20 weeks.

These were then phoned to the patients,

phone wires to a central server where the 

A1C levels fell significantly more in the 

A1C levels in the intervention group fell 

unadjusted A1C levels in the intervention 

The authors stated that they were unable to disting-

the results of several other Web-based 

In a study by the Korean Diabetes As-

From Charles Drew University, Los Angeles, Cali-

MAYER B. DAVIDSON, MD

change management from primary care 

physicians. Finally, a very intense educa-

ation and support group program deliv-

ery—via the Web—which included access 

articles and other Web sites concerning 

diabetes, support group interactions led 

by a nurse, and self-management feed-

back from a nurse after the nurse had re-

ceived home glucose monitored values,

meal intake, medication administration,

weight, and blood pressure information 

from the patient—resulted in significant 

improvements in adjusted A1C 

(−0.62%), HDL cholesterol (+6.4 mg/ 

dl), total cholesterol (−11.4 mg/dl), weight (−4.5 lbs), systolic blood pressure 

(−6.8 mmHg), and diastolic blood pressure 

(−5.2 mmHg) over 6 months, with 

no significant changes in these parameters 

in a control group (20).

All of these innovative approaches to 

deliver diabetes care were supported by 

either research or institutional funds. Un-

less payment mechanisms can be estab-

lished to reimburse providers for the time 

and effort these effective interactions re-

quire, these new promising care models 

will remain just that—(unkept) promises.

Until a magic medication comes along 

to stabilize β-cell function or, better 

yet, to reverse β-cell dysfunction, it will 

remain difficult to improve diabetes out-

comes very much unless the current med-

ical care system can change to facilitate 

more frequent interactions with knowl-

dedgeable providers. This might also in-

clude specially trained, appropriately 

supervised nurses and pharmacists with 

prescription authority based on approved 

treatment algorithms. Timely and appro-

priate clinical decisions for people with 

diabetes are not being made in most pa-

tients under our current medical care sys-

tem. This leads to increased morbidity 

and mortality from diabetes complica-

tions that could be either considerably 

delayed or potentially prevented.

In the last decade, much easier Web-

based communication with patients has 

become possible. In this issue of Diabetes 

Care, Ralston et al. (14) have described a 

randomized small trial in which one 

group received usual care and the other 

usual care plus Web-based care manage-

ment for 1 year. The latter group’s pro-

gram consisted of patient access to 

electronic medical records, secure e-mail 

access to providers (including a nurse 

care manager who adjusted hypoglycemic 

medications and conferred with the pri-

mary care provider only as needed), an 

educational Web site, and an interactive 

online diary for entering exercise, diet, 

and medication. After 1 year, unadjusted 

A1C levels in the intervention group fell 

from a baseline value of 8.2 to 7.3%, 

whereas in the control group they 

increased from 7.9 to 8.1%. The authors 

stated that they were unable to disting-

uish which components of Web-based 

management were most important for the 

success of the intervention. I strongly 

suspect it was the nurse care manager mak-

ing treatment decisions in real time, based 

on published literature showing the effec-

tiveness of that approach and the ineffec-

tiveness of interventions that did not 

include that component (7,9–11) as well 

as the results of several other Web-based 

interventions described below.

In a study by the Korean Diabetes As-

sociation, physicians receiving informa-

tion (including results of home glucose 

monitoring) over the Internet from pa-

tients utilized the Staged Diabetes Man-

agement Guidelines for Korea (15) for 

management. During the first 3 months, 

A1C levels fell by 0.6% in the Internet 

group and rose by 0.3% in a control group 

receiving usual care (16). Over the subse-

quent 27 months, mean A1C levels were 

0.6% lower in the Internet group than in 

the control group (17). All differences 

between the two groups were significant. 

In a Veterans Affairs study comparing usual 

care with Web-based nursing care man-

agement based on treatment algorithms, 

A1C levels fell significantly more in the 

intervention group over a year (0.4% 

more at 12 months but a greater differ-

ence at 3, 6, and 9 months) (18). A com-

parison of telemedicine case management 

by nurses following algorithms with usual 

care in older, medically underserved pa-

tients showed a small (0.2%), but signifi-

antly greater, drop of A1C levels in the 

intervention group (19). These nurses, 

however, had to receive authority to
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References

1. The Diabetes Control and Complications Trial Research Group: The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. N Engl J Med 329:977–986, 1993
2. UK Prospective Diabetes Study Group: Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). Lancet 352:837–853, 1998
3. Baigent C, Keech A, Kearney PM, Blackwell L, Buck G, Pollicino C, Kirby A, Sourjina T, Peto R, Collins R, Simes R, Cholesterol Treatment Trialists’ Collaborators: Efficacy and safety of cholesterol-lowering treatment: prospective meta-analysis of data from 90,056 participants in 14 randomized trials of statins. Lancet 366:1267–1278, 2005
4. Fuller J, Stevens LK, Chaturvedi N, Holoway JF: Antihypertensive therapy for preventing cardiovascular complications in people with diabetes mellitus. Cochrane Database Syst Rev (2):CD002188 [PMID: 10796872], 2000
5. American Diabetes Association: Standards of medical care in diabetes—2008. Diabetes Care 31 (Suppl. 1):S12–S54, 2008
6. Hoerger TJ, Segel JE, Gregg EW, Saadine JB: Is glycemic control improving in U.S. adults? Diabetes Care 31:81–86, 2008
7. Davidson MB: The effectiveness of nurse- and pharmacist-directed care in diabetes disease management: a narrative review. Curr Diabetes Rev 3:280–286, 2007
8. Lobach DF, Hammond WE: Computerized decision support based on a clinical practice guideline improves compliance with care standards. Am J Med 102:89–98, 1997
9. Krein SL, Klamerus ML, Vijan S, Lee JL, Fitzgerald JT, Pawlow A, Reeves P, Hayward RA: Case management for patients with poorly controlled diabetes: a randomized trial. Am J Med 116:732–739, 2004
10. Choe HM, Mitrovich S, Duhay D, Hayward RA, Krein SL, Vijan S: Proactive case management of high-risk patients with type 2 diabetes by a clinical pharmacist: a randomized controlled trial. Am J Manag Care 11:253–260, 2005
11. Shojania KG, Ranji SR, McDonald KM, Grimshaw JM, Sundaram V, Rushakoff RJ, Owens DK: Effects of quality improvement strategies for type 2 diabetes on glycemic control: a meta-regression analysis. JAMA 296:427–440, 2006
12. Davidson MB, Ansari A, Karlan VJ: Effect of a nurse-directed diabetes disease management program on urgent care/emergency room visits and hospitalizations in a minority population. Diabetes Care 30:224–227, 2007
13. Davidson MB, Lewis G: Effect of data management on a central server on HbA1c levels in insulin-requiring patients. Diabetes Care 23:706–707, 2000
14. Ralston JD, Hirsch IB, Hoath J, Mullen M, Cheadle A, Goldberg HI. Web-based collaborative care for type 2 diabetes: a pilot randomized trial. Diabetes Care 32:234–239, 2009
15. Korean Diabetes Association: Staged Diabetes Management. Seoul, Korea, Korean Diabetes Association, 1999 [in Korean]
16. Kwon H-S, Cho J-H, Kim H-S, Song B-R, Ko S-H, Lee J-M, Kim S-R, Chang S-A, Kim H-S, Cha B-Y, Lee K-W, Son H-Y, Lee J-H, Lee W-C, Yoon K-H: Establishment of blood glucose monitoring system using the Internet. Diabetes Care 27:478–483, 2004
17. Cho J-H, Chang S-A, Kwon H-S, Choi Y-H, Ko S-H, Moon S-D, Yoo S-J, Song K-H, Son H-S, Kim H-S, Lee W-C, Cha B-Y, Son H-Y, Yoon K-H: Long-term effect of the Internet-based glucose monitoring system on HbA1c reduction and glucose stability: a 30-month follow-up study for diabetes management with a ubiquitous medical care system. Diabetes Care 29:2625–2631, 2006
18. McMahon GT, Goomes HE, Hohne SH, Hu TM-J, Levine BA, Conlin PR: Web-based care management in patients with poorly controlled diabetes. Diabetes Care 28:1624–1629, 2005
19. Shea S, Weinstock RS, Starren J, Teresi J, Palmas W, Field L, Morin P, Goland R, Izquierdo RE, Wolff LT, Ashraf M, Hilliman C, Silver S, Meyer S, Holmes D, Petkova E, Capps L, Lantigua RA: A randomized trial comparing telemedicine case management with usual care in older, ethnicity diverse, medically underserved patients with diabetes mellitus. J Am Med Inform Assoc 13:40–51, 2006
20. Bond GE, Burr R, Wolf FM, Price M, McCurly SM, Teri L: The effects of a web-based intervention on the physical outcomes associated with diabetes among adults age 60 and older: a randomized trial. Diabetes Tech Ther 9:52–59, 2007