A critical dialogue: communicating with type 2 diabetes patients about cardiovascular risk

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Abstract: Patients with type 2 diabetes mellitus (DM) are at increased risk for cardiovascular disease (CVD), and many patients are inadequately treated for risk factors such as hyperglycemia, hyperlipidemia, hypertension, and smoking. Providing individualized risk information in a clear and engaging manner may serve to encourage both patients and their physicians to intensify risk-reducing behaviors and therapies. This review outlines simple and effective methods for making CVD risk infomation understandable to persons of all levels of literacy and mathematical ability. To allow the patient to understand *what* might happen and *how*, personal risk factors should be clearly communicated and the potential consequences of a CVD event should be presented in a graphic but factual manner. Risk calculation software can provide CVD risk estimates, and the resulting information can be made understandable by assigning risk severity (eg, "high") by comparing clinical parameters with accepted treatment targets and by comparing the individual's risk with that of the "average" person. Patients must also be informed about how they might reduce their CVD risk and be supported in these efforts. Thoughtful risk communication using these techniques can improve access to health information for individuals of low literacy, especially when interactive computer technology is employed. Research is needed to find the best methods for communicating risk in daily clinical practice.

Keywords: cardiovascular disease, type 2 diabetes, cardiovascular risk, risk communication

Introduction

Cardiovascular disease (CVD), broadly defined as stroke, coronary artery disease, and peripheral vascular disease is the major cause of morbidity and mortality in persons with type 2 diabetes mellitus (DM). Up to 80% of persons with diabetes will develop CVD, and half to two-thirds of all deaths associated with DM are due to CVD, primarily ischemic heart disease (Meigs et al 1997; Mooradian et al 2003). Nearly 80% of hospitalizations in the US for chronic complications of diabetes are attributable to CVD, and the costs associated with macrovascular disease are ten times greater than those for microvascular disease (Mooradian et al 2003; Vijan et al 2004). While hyperglycemia is the most prominent abnormality in DM, hypertension and hyperlipidemia are more common and have a greater impact on CVD risk in people with DM than in nondiabetic individuals (Sowers and Haffner 2002). Despite the magnitude of this problem and the fact that safe and effective therapies are widely available, most patients are inadequately treated for CVD risk factors (Phillips et al 2001). While the factors leading to this undertreatment are many and complex, several commonly encountered physician and patient factors may be amenable to intervention.

From the physician's perspective, hypertension, hyperlipidemia, cigarette smoking, and aspirin therapy are often given less attention than hyperglycemia in patients with diabetes, but may be of equal or greater importance with respect to reducing CVD

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risk (Meigs et al 1997; ADA 2004a, 2004b). Addressing these multiple comorbidities is challenging for providers faced with large caseloads and limited time during the outpatient encounter. In addition, "clinical inertia" among physicians, ie, recognition of a problem but failure to act, is well described (Phillips et al 2001; O'Connor 2003; Grant et al 2004).

From the patient's perspective, many with DM are unaware that diabetes itself is a CVD risk factor. A recent survey found that almost 70% of people with diabetes do not realize that they are at increased risk of CVD and stroke (Bairey-Merz et al 2002), and patients often underestimate their CVD risk (Rothman et al 1999; Strecher et al 1999). Patients often do not receive sufficient information from their physicians to allow them to understand their personal health risk and to participate in their own healthcare (Heisler et al 2002; Kinnersley et al 2004), and most patients remember and understand as little as half of what they are told by their physicians (Rost and Roter 1987; Crane 1997; Roter 2000). Patients are more likely to translate advice from their providers into appropriate behavioral changes if they are made aware of their health status and participate in treatment decisions (Greenfield et al 1988; Anderson 1995; Anderson et al 1995).

Even when information is conveyed, many patients have limited ability to understand risk and risk-reducing therapies due to low health literacy, defined as the degree to which individuals have the capacity to obtain, process, and understand basic health information needed to make appropriate health decisions. Persons with low health literacy are unable to fully participate in decisions about their own health, adhere poorly to prescribed therapies, and are more likely to have poor glycemic control compared with those with adequate health literacy (Schillinger et al 2002; Nielsen-Bohlman et al 2004).

While multifaceted disease management programs have improved the dissemination of health information to patients, most primary care physicians work in practice settings without such programs. Clearly, methods that facilitate patients' understanding of their risk, regardless of their literacy status, and that increase physicians' ability to impart health risk information in a busy clinical environment are urgently needed. This effort should in turn lead to shared decision making, a process in which the patient's preferences and their physician's knowledge are incorporated into the therapeutic planning process. Shared decision making has been shown to improve glycemic control and quality of life in patients with diabetes (Greenfield et al 1988; Kinnersley et al 2004).

The elements of CVD risk communication

"What is a heart attack?"

Effective individualized CVD risk communication can be constructed around several general principles. Patients want practical, concise information focused on the identification of the problem, what specifically they need to do, why it is in their best interest, and what outcomes they can expect (Davis et al 2001; Davis, Fredrickson, et al 2002; Davis, Williams, et al 2002). With respect to CVD risk, patients want to know: (1) What is CVD? Or what is a heart attack? (2) Am I at risk of having a heart attack? (3) What can I do to lower my risk? (Table 1).

Because myocardial infarction (MI) is the most common and potentially fatal cardiovascular event experienced by persons with diabetes, it seems appropriate to structure the discussion of CVD risk around the "risk of having a heart attack". However, for many patients, the term "heart attack" may have little meaning or may be associated with misperceptions. In order to fully understand the implications of having an MI, patients must be provided with explicit information about *what exactly might happen* and *how it might occur* (Avis et al 1989; Gerrard et al 1999; Lipkus and Hollands 1999; Rothman et al 1999). In this context,

Table 1 Components of comprehensive cardiovascular disease (CVD) risk communication

1. *"What is a heart attack?"*
- Graphic illlustration of the atherosclerotic process using simple language, diagrams, and analogies
- Graphic description of the consequences of a CVD event, eg, pain, disability, and death as possible consequences of a myocardial infarction
- Patient testimonials

2. *"What is my risk of having a heart attack?"*
- Calculation of individual CVD risk (UKPDS Risk Engine)
- Assign risk severity: eg, "high"
- Compare individual risk with "average" risk
- Compare hemoglobin A1c, blood pressure, and cholesterol with recommended targets

3. *"How can I reduce my risk?"*
- Overview of therapeutic options
- Shared decision making to develop a treatment plan
- Regular follow-up and feedback regarding the status of CVD risk factors

NOTE: UKPDS, United Kingdom Prospective Diabetes Study; UKPDS Risk Engine is available at www.dtu.ox.ac.uk/index.html?maindoc=/ukpds.

risk perception is affected by the beliefs people have regarding the *causes* of the event under discussion (eg, what causes a heart attack and is it preventable?) and the *consequences* of the event (eg, is it potentially fatal?).

To illustrate the causes of increased CVD risk, the link between CVD risk and specific behavioral or personal characteristics must be made in clear and easily understandable terms. This approach has been successful in rendering overly optimistic perceptions of CVD risk more accurately (Avis et al 1989; Rothman et al 1999). If a patient has uncontrolled blood glucose and blood pressure and smokes, a statement as simple as "smoking, high blood sugar, and high blood pressure all act together to cause damage to blood vessels that supply the heart, and this can cause a heart attack" describes the patient's characteristics and associates those characteristics with increased CVD risk. Many patients simply have not heard or have not understood this message. The use of widely recognized images and simple pictures can help to make the disease process easy to understand, regardless of the literacy level of the patient. For example, a plumbing pipe becoming progressively occluded with rust and mineral deposits alongside a diagram of a narrowed blood vessel provides a relevant, familiar, and easily understood analogy to describe the process that leads to heart attack and stroke. These images graphically reinforce the message about the causes of coronary disease and MI, and incorporate graphic and allegorical modes of communication in illustrating how the patient's personal characteristics increase their CVD risk.

To illustrate the *consequences* of a myocardial infarction, two approaches have been shown to be effective: (1) highlight the similarities between the patient under consideration and persons who have experienced an MI; and (2) graphically illustrate the severity of the consequences associated with the event (Rothman et al 1999). Both of these goals might be accomplished by providing patients with a brief written or audio- or videotaped testimonial from a hypothetical patient with DM from a similar age and ethnic background who has experienced an MI. Testimonials have been shown to be more persuasive than similar information presented as statistics or straight facts, and the quality of exemplars has been shown to have a strong effect on one's view of the importance of a problem (Rothman et al 1999; Strecher et al 1999). Testimonials should include a description of the experience surrounding the acute event and its long-term effects on the individual's daily activities. The serious and potentially fatal nature of an MI should be clearly communicated to insure that patients are adequately informed and are appropriately motivated to adopt lifestyle and therapeutic interventions.

"What is my risk of having a heart attack?"

The most intuitive way to begin the risk discussion is to describe the patient's statistical risk for CVD, eg, "You have a 30% risk of experiencing a heart attack in the next 10 years". A variety of risk calculation tools can be accessed via the Internet, downloaded to PCs or PDAs, and used in the clinical setting to quickly generate individualized CVD risk estimates for patients with DM. Although risk calculators based on the Framingham Heart Study are most commonly recommended for CVD risk calculation in the US, diabetes is underrepresented in the Framingham cohort, making the equations imprecise in estimating CVD risk in persons with diabetes (Sheridan et al 2003). The UKPDS Risk Engine (available at www.dtu.ox.ac.uk/index.html?maindoc=/ukpds) is a validated CVD risk calculator that appears to be better suited to risk estimation for individuals with DM (UKPDS Group 2001; Lee et al 2004). The data upon which the calculator is based are derived from long-term follow-up of 4050 patients with DM in patients in the United Kingdom Prospective Diabetes Study (UKPDS), a 20-year trial in which patients of Caucasian, Asian, and Afro-Caribbean descent were studied to determine the effect of tight blood glucose and blood pressure control on the risk of diabetic complications (UKPDS Group 1998). The Risk Engine will estimate the probability that a cardiovascular event (fatal or nonfatal MI or sudden death) will happen to a given patient within a specified time frame, usually 10 years, based on age, gender, race, duration of diabetes, hemoglobin A1c (A1c), systolic blood pressure (SBP), total and high-density lipoprotein (HDL) cholesterol, and smoking status. Although the generalizability of the model to DM populations other than the UKPDS cohort has not yet been tested, the Risk Engine provides reasonable evidence-based CVD risk estimates that can be used to inform risk communication.

The UKPDS Risk Engine can also be used to demonstrate the reduction in CVD risk that is possible through reductions in blood glucose, blood pressure, and cholesterol levels and through smoking cessation. In a similar fashion, the Risk Engine can be used to provide updated CVD risk estimates for patients at each office visit to demonstrate the reduction in CVD risk that has been

achieved over time through successful therapeutic interventions.

Putting risk information in context

While probability-based information regarding personal CVD risk is a fundamental component of the overall CVD risk message, many patients do not reliably understand and interpret numerical probability statistics (probabilities, percent risk, risk ratios, etc). The understanding of numerical probability of risk is greatly facilitated when the information is presented in a context that makes it relevant to the individual patient (Rothman et al 1999). Several approaches have been successful in providing this all-important context.

Assigning a specific level of risk to an event (eg, high, intermediate, low) imparts a meaning to the stated probability that is readily understandable regardless of mathematical ability (Rothman et al 1999). For example, an individual with a 10-year risk of a CVD event of greater than 20% is considered to be at high risk for the event (NCEP 2001). While "20%" could be variably interpreted by patients to reflect different degrees of risk, when they are informed that this represents "high risk", a clear message is sent regarding the seriousness of the risk and the need to act accordingly.

Comparing the patient's personal risk to "average" risk has been shown to be effective in communicating quantitative risk information (Rothman et al 1999). In the case of CVD risk, individual risk could be compared with that of an age- and gender-matched individual without diabetes or other CVD risk factors. For example, a 56 year-old white man with a 10-year history of DM, a systolic blood pressure of 163 mmHg, a total cholesterol of 205, and an HDL cholesterol of 35 has a 35% 10-year risk of having a CVD event according to the UKPDS Risk Engine. Using the Framingham-based risk-calculator available at http://rover2.nhlbi.nih.gov/guidelines/cholesterol/, a man of the same age without diabetes, hypertension, or hyperlipidemia has a 10-year CVD risk of 10%, less than one-third the risk of the individual with diabetes. This clearly sends the message that the individual is at greatly increased risk compared with a similar person without risk factors.

Finally, *the provision of an "action standard"*, ie, the level at which action is required or recommended by health experts, has also been shown to facilitate the communication of risk information (Avis et al 1989; Gerrard et al 1999; Lipkus and Hollands 1999; Rothman et al 1999). When the individual's blood glucose, blood pressure, and lipid levels are placed alongside recommended treatment targets, this serves to illustrate "how abnormal" his or her clinical parameters are compared with those associated with minimal risk.

These aspects of the risk message can be most effectively presented using simple and colorful graphical presentations designed to make the information easily understood. Bar charts are well suited for depicting percentages and proportions, eg, comparing the patient's risk with average risk and for depicting the patient's clinical parameters in comparison to recommended target ranges as described above (Lipkus and Hollands 1999). Bar-chart presentations can be created on pre-printed forms that contain a grid onto which patients' clinical information and risk status can be depicted alongside normal ranges, treatment goals, and risk estimates for similar healthy persons.

The illustration of absolute risk has been accomplished using figures that display probabilities in familiar terms (Lipkus and Hollands 1999). For example, the patient with a 10-year CVD risk of 35% might be shown a picture of a chart showing 35 Xs and 65 dots, in which the Xs represent the proportion of individuals with the same level of CVD risk. Pre-printed illustrations of 15% risk, 20% risk, etc can be prepared and patient's can be provided with the graphic that most closely reflects their level of risk.

"How can I reduce my risk?"

The final critical element in the risk communication sequence is to provide patients with information about how they can work with their healthcare providers to reduce their risk (Gerrard et al 1999). The understanding of individual risk and what can be done to decrease risk may present a unique "teachable moment" in the therapeutic relationship in which the patient is receptive to the adoption of behavioral and therapeutic interventions. As suggested by the "stages of change" model (Ruggiero and Prochaska 1993), providers should act on the patient's willingness to accept some therapeutic changes while respecting decisions not to adopt others. For example, if the patient is willing to begin treatment with a cholesterol-lowering medication to address hyperlipidemia, but is still contemplating the initiation of insulin therapy, the patient should not be pressured to make both changes simultaneously. If patients are given the opportunity to participate in decisions that affect their healthcare, including the asking of questions and the expression of concerns, they may be more likely to remain compliant with prescribed therapies and to report side effects before discontinuing medications.

Providing written information to patients about the risk-reducing benefits of prescribed medications and directing them to reliable sources of information may facilitate shared decision making and increase adherence to prescribed therapies. However, medication nonadherence remains a very difficult problem to address (Haynes et al 2005). The most important single effort in this regard may be to maintain regularly scheduled follow-up, including contacting patients who miss appointments.

While providing individualized risk information can promote health, the perception of increased personal risk may also cause anxiety, especially if: (1) the magnitude of the risk is very high; (2) uncertainty regarding the risk is not reduced; (3) no preventive course of action is offered; (4) people feel unable to adhere to advice for preventive actions; or (5) if patients lack social support and coping skills (Pierce et al 2000). These factors should be taken into account before discussing CVD risk with high-risk patients. Options for reducing risk should be clearly presented in a supportive environment that provides continuity of care and ongoing assistance in attaining treatment goals.

Evidence for the efficacy of risk communication

Personalized risk communication has been associated with risk-reducing behavior. Compared with the presentation of probabilistic information alone (risk expressed in percentages or proportions), the odds of entering cancer and cholesterol screening programs was higher when persons were presented with their categorical risk (ie, high, medium, or low) and when their own personal risk factors were outlined (Edwards et al 2004). The efficacy of communicating individualized CVD risk was demonstrated in the Coronary Health Assessment Study (Lowensteyn et al 1998). Participants included 253 community-based physicians randomized into intervention and control groups and 958 of their patients. The intervention group received computer-generated individualized CVD risk profiles and options for risk reduction within 10 days of an initial visit, whereas control patients received this information only if they returned for a 3-month follow-up visit. The intervention group had a significantly higher ratio of high-risk/low-risk patients who returned for a follow-up visit and significantly greater mean reductions in total and LDL-cholesterol and predicted 8-year coronary risk. Another study showed reductions in CHD risk, body mass index, and cholesterol levels at the 5-year follow-up in intervention groups that received CHD risk appraisal with or without physician consultation (Engberg et al 2002).

Knowledge of patients' CVD risk status has also been shown to affect physician behavior. When the cardiovascular risk scores of patients with DM were provided to their physicians and were categorized as "low" (< 10%), "moderate" (10%–20%), or "high" (> 20%), physicians were significantly more likely to prescribe blood pressure and lipid-lowering drugs than physicians in a control group who were not provided with risk scores (Hall et al 2003).

Using technology to facilitate risk communication

The availability of interactive technology presents an incredibly rich opportunity to create individualized CVD risk communications for patients with diabetes. Interactive multimedia presentations can be made mentally and emotionally engaging through the use of video, graphics, animation, sound, and text. The presentation of risk information in this manner has been shown to correct overly optimistic perceptions of personal risk and is likely to promote more involvement in the process of learning when compared with traditional materials (Rothman et al 1999; Strecher et al 1999).

Interactive technology may be effective in addressing issues of limited health literacy. Information can be presented in a manner that does not require literacy or mathematical ability for understanding, and an accompanying audio track can provide access to information for patients who are unable to read. Current technology permits full patient interaction with automated presentations with little or no understanding of computer operations.

The availability of an interactive computer-based risk communication program should improve access to health information for persons of lower socioeconomic status (SES). Persons of lower SES have limited access to health information, an increased prevalence of diabetes and are more likely to underestimate their health risk compared with persons of higher SES (Avis et al 1989; Kreuter et al 1995; Strecher et al 1999). Access to an individualized interactive risk presentation coupled with physician involvement in discussing its contents should help to bridge this "information gap".

Summary

The effective management of CVD risk factors in patients with DM is an extraordinarily complex process. Patients

must be motivated to implement appropriate lifestyle changes, appropriately self-manage a number of chronic conditions, and adhere to recommendations for therapy and follow-up. The successful attainment of treatment goals for modifiable CVD risk factors requires multidisciplinary intervention with consideration given to multiple patient, physician, phamacologic, and environmental factors. Effective CVD risk communication is merely one component of a comprehensive risk management effort, but it plays a central role in the counseling of patients with DM for whom primary prevention of CVD is the most favorable outcome. There is evidence that improved patient–physician communication about CVD risk and risk reduction strategies can activate both parties toward the intensification of therapies directed at CVD risk factors.

Individualized risk calculation can be readily perfomed during outpatient visits using risk calculation software, and the resulting information can be effectively commnicated to patients using the approaches outlined above. The risk message must be presented such that patients understand the potentially serious consequences of a CVD event and that they are personally at risk for such an event. Finally, patients must be given information about options to reduce their CVD risk. The risk message should be delivered in conjuction with a clinical encounter with the healthcare provider so that questions and concerns can be addressed, and shared decision making can begin. Physicians need not try to achieve this entire set of communication goals in a single visit. In fact, risk communication can and should build upon itself over time and become an integral part of the patient–physician interaction at each clinic visit.

The availability of interactive computer technology holds great promise for risk communication. Vivid and engaging risk messages can be created, and the presentation can be tailored to individuals of low health literacy. Computer-based programs may increase the effectiveness and efficiency of risk communication in that little effort is required of medical personnel, and patients enter the clinical encounter with basic information, obviating the need for the physician to create the entire risk discussion de novo. As technologies become more widely available and accessible to individuals across the socioeconomic spectrum, physicians may be able to provide patients with a portable, interactive individualized risk presentation in the form of a compact disc that can be viewed on the patient's own playback device, and patients may be able to access this information in their homes via the Internet. Even if physicians do not have access to computer-based resources, the risk communication principles outlined above can be applied to the creation of simple but vivid print materials that can be constructed in template form and that incorporate individual patient-based risk information to be used during the clinical encounter. While the construction of this risk communication "tool kit" will require time and effort, its availability should increase the efficiency of patient counseling for the reduction of CVD risk, especially if materials can be prepared and compiled by office personnel and viewed by the patient prior to the patient–physician encounter.

Further research is needed to optimize risk communication and to incorporate these methods into clinical practice. The strategies described above for communicating risk, while based in a theoretical background, are offered with some caution given the limited amount of data regarding the optimal methods for constructing the risk message and the paucity of data regarding the efficacy of risk communication in altering health-related behavior. A common and important limitation of studies to date is the omission of the contextual information necessary for individuals to fully understand, internalize, and act on risk information. In addition, studies of the specific effect of CVD risk communication to patients with diabetes have not been performed. Therefore, future research should focus on how to most effectively correct underestimates of risk on the part of patients and physicians, how to most effectively communicate probabilistic information to illustrate magnitude of risk, how to provide a meaningful context for risk information, and most importantly, how risk communication affects clinical outcomes, namely the incidence of cardiovascular events. The availability of modern interactive computer technology and the powerful effect of multimedia presentations demand that the efficacy and feasibility of this mode of risk communication be evaluated via translational research studies in real-world settings.

At present, providers of care to persons with diabetes should utilize all available resources including the principles of risk communication outlined above, the services of other health professionals including diabetes educators and dietitians, and reliable web-based material to facilitate the communication of health information to patients. Healthcare providers should use the clinical encounter as an opportunity to foster patient empowerment and shared decision making, employing risk communication as one of many critically important tools in this process. Through this effort, patients

with DM and their care providers can become partners in reducing the risk for cardiovascluar disease in this high-risk population.

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