

Nomograms for the Risk of Disability For Persons with Diabetes Mellitus

GOAL

To help providers identify diabetes patients at increased risk for physical disability.

STUDY BACKGROUND

- 13 medical groups participated in the two-year study sponsored by the American Medical Group Association with funding from Parke Davis (Now Pfizer, Inc).
- Each medical group identified a random sample of 411 patients with diabetes mellitus (with one group selecting an additional random sample of 411 African-American patients).
- Patient selection criteria: 1) aged 31 years or older on the day of recruitment; and 2) had two or more outpatient visits (or one acute inpatient or ER visit) coded as diabetes mellitus (ICD-9-CM Code 250.xx) in calendar years 1998-99.
- Study participants were administered a baseline survey in spring 2000 and a follow-up survey in spring 2001.
- Retrospective lab and utilization data were collected on each patient for calendar years 1999 and 2000.
- 45% of the study participants completed both the baseline and follow-up surveys.
- Disability was assessed using the physical functioning scale items from the Medical Outcomes Study¹ (conducted by Rand) and specifically defined as a standard normal Physical Functioning Scale score of less than 35.3 points.
- To be included in the predictive model, the person had to be classified as physically independent in the baseline survey (283 respondents were considered disabled at baseline and dropped from the study).
- At the 12-month follow-up, 143 were categorized as disabled based on their responses to the follow-up survey.

MODEL DEVELOPMENT

The covariates of age and gender were forced into the model used to develop the nomograms. Demographic characteristics were introduced first and tested, followed by health status, diabetes severity, individual health behaviors, prior use of services, laboratory data for 1999, and steps taken to manage diabetes. As each group of factors was introduced, only those independently associated with the outcome were retained. With the exclusion of factors forced into the model during step 1, the model includes the fewest factors independently associated (p value < 0.05) with the outcome. This parsimonious model was used in the development of the nomograms.

USING THE DISABILITY NOMOGRAMS

Because the risk factors for patients over age 65 are different from the risk factors for younger patients, we have developed models for each cohort: 1) patients aged 31-64; and 2) patients aged 65 and older.

- 1 Have patients complete a self-administered questionnaire that contains physical functioning questions and a three-item depression screener prior to meeting with the provider. You may also consider collecting additional survey data, including the demographic and health status data required to complete the nomogram.

¹ Stewart, A. L., Hays, R. D., & Ware, J. E. (1992b). Methods of validating health measures. In A. L. Stewart & J. E. Ware (eds.), *Measuring Functioning and Well-Being: The Medical Outcomes Study Approach* (pp. 309-324). Durham, NC: Duke University Press.

- 2 Select the age-appropriate nomogram (“31-64” or “65+”) and work with the patient to complete the required information (unless you already have already collected the data on the survey).
- 3 If the patient is 65 or older, you will need to review their chart to determine if the patient has had a microalbuminuria screening in the past 12 months.
- 4 Score each item as indicated on the nomogram and transfer the scores to the left-hand margin of the nomogram.
- 5 Sum the scores in the left-hand margin.
- 6 Plot the total score on the “total points line” at the bottom of the nomogram.
- 7 Draw a vertical line connecting the “total points line” with the line showing the risk of physical disability. This should give you the estimated probability of the patient being disabled one year later.

SCORING THE PHYSICAL FUNCTIONING ITEMS

Patients are asked to indicate how limited they are in any of the following activities. The higher their score, the better their physical functioning. Compute the Physical Functioning Scale score by adding the values associated with each response. Final scores range from 0 to 100. The nomograms are only applicable for patients with physical functioning scores of 20 or higher.

	Yes, limited a lot	Yes, limited a little	No, not limited at all
1. Vigorous activities, such as running, lifting heavy objects participating in strenuous sports	0	5	10
2. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	0	5	10
3. Lifting or carrying groceries	0	5	10
4. Climbing several flights of stairs	0	5	10
5. Climbing one flight of stairs	0	5	10
6. Bending, kneeling, or stooping	0	5	10
7. Walking more than a mile	0	5	10
8. Walking several blocks	0	5	10
9. Walking one block	0	5	10
10. Bathing and dressing yourself	0	5	10

SCORING THE DEPRESSION SCREENER QUESTIONS

Have patients answer the following three questions. If the response is ‘Yes’ to question number 1 OR ‘Yes’ to questions number 2 AND 3, then the depression disorder screener is positive.

1. In the past year, have you had two weeks or more during which you felt sad, blue or depressed; or when you lost all interest or pleasure in things that you normally cared about or enjoyed? **(Yes/No)**
2. Have you had two years or more in your life when you felt depressed or sad most days, even if you felt okay sometimes? **(Yes/No)**
3. Have you felt depressed or sad much of the time in the past year? **(Yes/No)**

INTERPRETING THE RESULTS

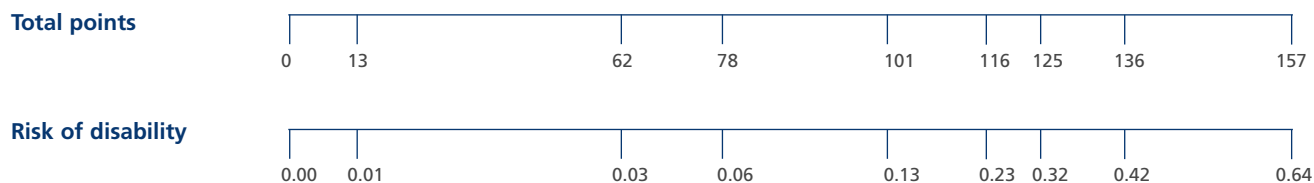
In the example below, we compare risk scores for two patients between age 31 and 64. Patients A and B were each administered a survey asking about their current physical function, age, gender, change in health in the past year, smoking status, and if they had any arthritis in their hand or wrist. Their responses were translated into point values.

The point values were then matched with the corresponding risk value (see below scale). If the total point value does not correspond to one of the numbers printed on the scale, you will have to estimate the location (as we had to do for Patient B). The point value of 144 falls between the markers for 136 and 157; 144 is roughly the midpoint of those two values. And the corresponding midpoint of the risk of disability is ~53%.

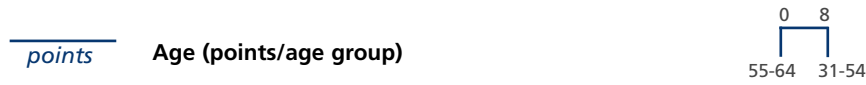
As you can see below, Patient B has a much greater risk of being disabled (53%) in 12 months than Patient A (less than 3%). Patient B would be a good candidate for more intensive diabetes management and smoking cessation counseling to help reduce his likelihood of being disabled in one year.

Risk Factor	Patient A		Patient B	
	Answer	Points	Answer	Points
Physical Function Score	90	13	30	88
Age	45	8	63	0
Gender	Female	2	Male	0
Change in Health	Same	0	Worse	18
Arthritis of Hand or Wrist	No	0	Yes	21
Smoker	No	0	Yes	17
Total Points	23		144	
Risk of Disability	<3%		~53%	

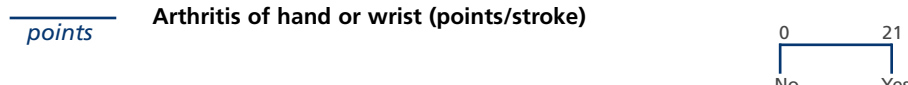
Nomogram Scale for the Risk of Disability for Persons with Diabetes Mellitus (31 to 64 Years of Age)



Nomogram Scale for the Risk of Disability For Persons with Diabetes Mellitus (31-64 Year Old)



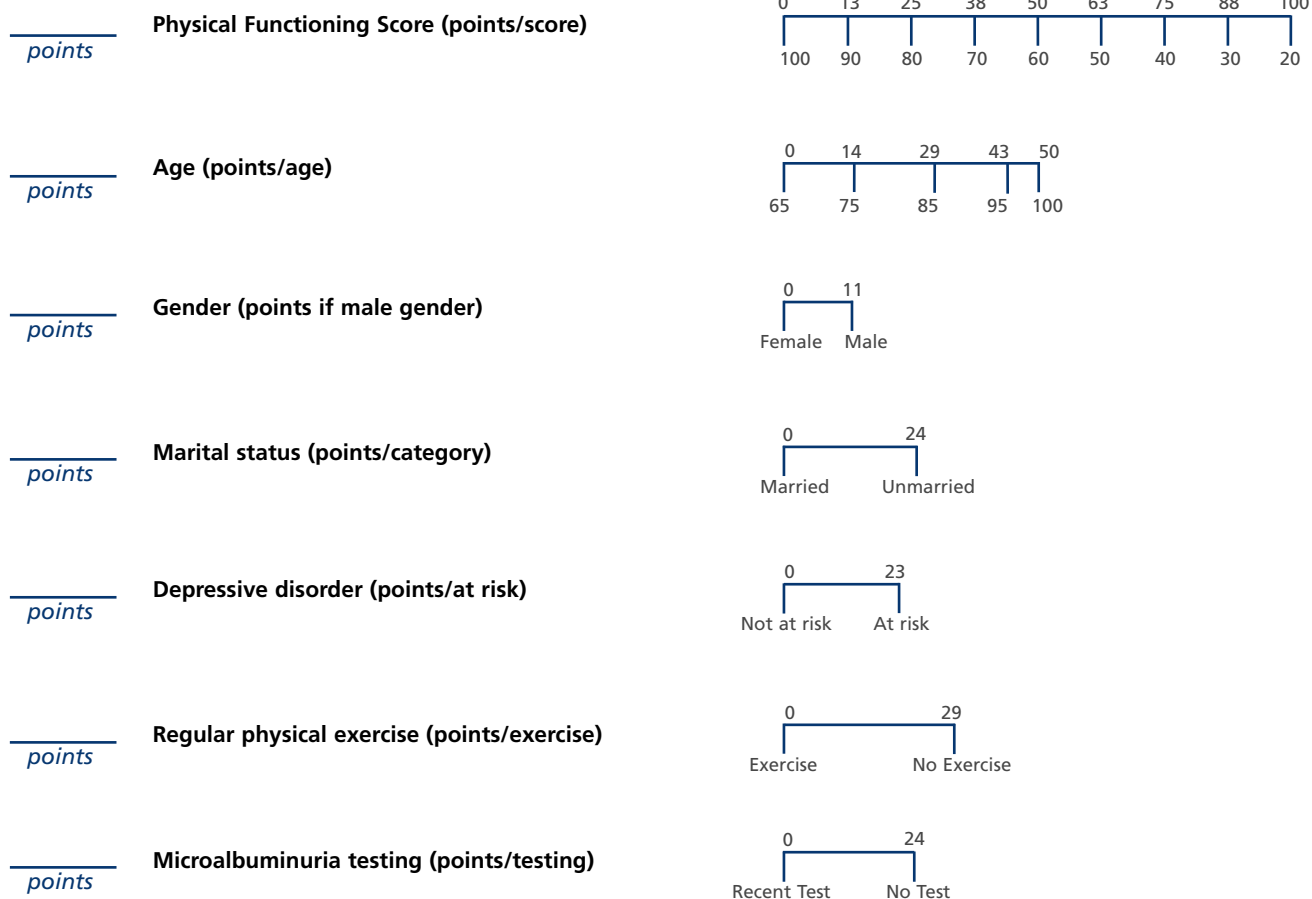
points **Gender (2 points if female gender)**



Total points



Nomogram Scale for the Risk of Disability For Persons with Diabetes Mellitus (65 Years of Age or Older)



Total points

