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Validity of a Survey Question as a Measure of Visual Acuity Impairment

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Abstract: Survey questions are frequently used to collect data on the prevalence of vision difficulties. The 1971–1972 Health and Nutrition Examination Survey included both a question about "trouble with your vision even when wearing glasses or contact lenses," and clinical measurement of central distance visual acuity with usual corrective lenses. The question had low sensitivity for impairment of visual acuity, with variation by age and severity of impairment. Sensitivity analyses from other studies are reviewed. (*Am J Public Health* 1983; 72:93–96.)

A variety of questionnaire survey methods have been used to gather information on how well people see.[1,2] Advantages of these methods over clinical measurement of visual acuity are that they can be applied to general population groups, do not require attendance at a clinic, and are less time consuming and expensive. Their results, however, are difficult to interpret. This paper presents the results of a comparison of questionnaire response on "trouble seeing" and visual acuity measurement for the same individuals in one study, and reviews available data from other studies.

Material and Methods

The National Health and Nutrition Examination Survey (HANES) of the National Center for Health Statistics conducted eye examinations of about 10,000 persons in 35 geographic areas between April 1971 and October 1972. The data collected are from national samples of the civilian, noninstitutionalized population weighted more heavily toward low income groups, older groups (with upper limit 74 years), preschool children, and women of childbearing age.[3] The eye examinations were conducted by ophthalmologists at mobile examination centers. Visual acuity was measured with usual correction and recorded as the smallest complete line on the Snellen chart read with no more than one error in the line.[4–6]

Prior to the eye examinations, HANES representatives administered medical history questionnaires. The interview included the question: "Have you ever worn glasses or contact lenses?" If the response was "yes," the next question was "Do (did) you have trouble with your vision even when wearing glasses or contact lenses?"[3,4,6]

Our study population consisted of 3,997 persons, aged 25–74 years, who responded affirmatively to "ever worn glasses or contact lenses." Analyses of the data included calculation[7] of the sensitivity and the specificity of the response to the "trouble seeing" question using central distance visual acuity in the better eye, measured with usual correction as the criterion for validity. Three levels of visual acuity impairment were used (Table 1) in order to show the effect of severity on the sensitivity and specificity rates. The moderate level, 20/50 or worse, is used in 39 states in issuance of driver's licenses.[8] The significance of trends in age-specific proportions of persons with impaired vision was tested by the method presented by Armitage.[9]

Results

About 15 per cent of adults aged 25–74 years responded positively to the question "Do (did) you have trouble with your vision even when wearing glasses or contact lenses?" The percentage increased with age from 11.2 for ages 25–44 to 15.1 for ages 45–64, and to 18.6 for ages 65–74 (Table 1).

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TABLE 1—Per Cent with Impaired Vision among Persons Who Wore Glasses (or Contact Lenses), HANES, 1971–1972

Age	Number of Persons	A Positive Response to the "Trouble Seeing with Glasses" Question	Per Cent with Specified Visual Acuity in Better Eye		
			20/25 or worse	20/50 or worse	20/100 or worse
25–44	1,316	11.2	20.4	2.4	0.3
45–64	1,215	15.1	38.3	4.9	0.9
65–74	1,466	18.6	69.0	14.7	3.0

The trend in proportions having poor visual acuity with increasing age was more marked ($p < 0.0001$) for each level of severity of visual acuity impairment. It should be noted that the vast majority of persons with visual acuity impairment had only minimal impairment (20/25 to 20/40).

Table 2 evaluates the screening value of the "trouble seeing" question. The age-specific sensitivity, i.e, the per cent of cases with impaired visual acuity correctly identified by the question, was low and ranged from 15.6 per cent to 47.7 per cent, depending on age group and severity of visual acuity impairment. The specificity, on the other hand, was over 80 per cent regardless of age or severity of impairment, indicating that the question successfully identified subjects without visual acuity impairment.

Age-adjusted data reinforced the age-specific findings (Table 3). When we restricted our study group to the 3,597 persons who wore glasses or contact lenses at the time of the visual acuity examination, these percentages remained essentially unchanged, i.e., 19.9 per cent and 31.7 per cent, respectively, for the two visual acuity impairment levels (not shown). The age-adjusted specificity was about 90 per cent for each level of visual acuity impairment in both the total and the restricted study groups. The sensitivity of the "trouble seeing" question was significantly different for sex groups, but not for race or educational groupings.

Discussion

The estimates of the sensitivity and the specificity of the question "Do (did) you have trouble with your vision even when wearing glasses or contact lenses?" are based on unweighted data from HANES because it is not appropriate to use weighted data for only a subset of the population, such as those who wear glasses. The age-adjusted sensitivity rates are almost certainly overestimates because oversampling was high among the elderly, for whom the estimated sensitivity rates were highest.

For each age group, we found the sensitivity to be low, indicating that this question failed to identify most adults who have impaired visual acuity. The specificity, however, was high, suggesting that the question successfully identified subjects without visual acuity impairment. The ability of the question to identify people with impaired visual acuities was better in the "moderate" than in the "minimal" impairment group (age-adjusted sensitivity 28.8 per cent and 19.4 per cent, respectively). Haase and Bryant[10] found among clinic patients that the sensitivity of the question "(when wearing glasses) Can you see well enough to recognize a friend across a street?" increased with more stringent visual acuity criteria (i.e., 48 per cent, 65 per cent, 86 per cent for visual acuities 20/40 to better than 20/70, 20/70 to better than 20/200, and 20/200 or worse, respectively).

Cullinan's 1976/1977 survey of 15,000 households in England and Wales found that, among adults who responded affirmatively to the question, "Do you have any difficulty at all in seeing to read or get about?", less than half had a visual acuity of less than 20/60 (6/18) when measured at home.[2] Stone and Shannon,[11] in a southeast London screening survey of subjects aged 40–64 years, found that the more restricted question: "Do you have difficulty seeing distant objects (with spectacles if you have them)?" had a low sensitivity (28.4 per cent) and a high specificity (92.9 per cent) against the same visual acuity criterion.

Visual acuity with best possible correction may differ substantially from visual acuity with usual correction. Cullinan's survey in England showed that the visually disabled were not able to remember with accuracy when last their lenses were checked; opticians' records showed that less than 20 per cent had been seen within four years.[2] In HANES, among those who had claimed "ever having trouble seeing," over 90 per cent visited a doctor about it.[4] However, the time interval from the last visit was not ascertained. We found that, among persons whose visual

TABLE 2—Estimated Sensitivity and Specificity of the "Trouble Seeing" Question in Assessing Visual Acuity Impairment, by Age, HANES, 1971–1972

Age	"Trouble seeing" by questionnaire	Minimal Visual Acuity Impairment (20/25 or Worse in Better Eye)				Moderate Visual Acuity Impairment (20/50 or Worse in Better Eye)				Severe Visual Acuity Impairment (20/100 or Worse in Better Eye)			
		Yes	No.	Sens. (%)	Spec. (%)	Yes	No.	Sens. (%)	Spec. (%)	Yes	No.	Sens. (%)	Spec. (%)
25–44	Yes	42	106	15.6	89.9	6	142	19.4	88.9	0	148	—	88.7
	No	227	941	—	—	25	1143	—	—	4	1164	—	—
45–64	Yes	95	89	20.4	88.1	19	165	32.2	85.7	5	179	45.5	85.1
	No	370	661	—	—	40	991	—	—	6	1025	—	—
65–74	Yes	224	49	22.1	89.2	74	199	34.3	84.1	21	252	47.7	82.3
	No	788	405	—	—	142	1051	—	—	23	1170	—	—

TABLE 3—Age Adjusted Sensitivity and Specificity of the "Trouble Seeing" Question in Assessing Visual Acuity Impairment by Selected Demographic Variables, HANES 1971–1972

Demographics	Number	Minimal Visual Acuity Impairment		Moderate Visual Acuity Impairment	
		Age adjusted*		Age adjusted*	
		Sens. (%)	Spec. (%)	Sens. (%)	Spec. (%)
All persons	3,997	19.4	89.1	28.8	86.2
Sex					
Men	1,564	16.6	91.6	23.5	88.6
Women	2,433	21.2	87.2	32.5	84.4
Race					
White	3,175	20.5	89.1	30.2	85.9
Non-White	822	16.8	89.2	26.3	87.5
Education‡					
Less than 12 grades	1,892	21.2	87.0	31.2	84.1
12 or more grades	2,061	17.0	90.8	23.9	88.0

*Adjusted, by the direct method, to the age distribution of the study population.
‡Excludes 44 persons with education coded as unknown.

TABLE 4—Persons Whose Visual Acuity with Usual Correction is 20/50 or Worse: Effect of Pinhole Correction, by Age, HANES, 1971–1972

Age	Visual Acuity with Pinhole Correction Better than 20/50		
	Total	Number	% of Total
25–44	31	22	71.0
45–64	59	35	59.3
65–74	216	101	46.8

acuity with present correction was 20/50 or worse, over half improved by pinhole correction (Table 4), indicating that many people in the HANES survey would benefit by better corrective lenses.

A person's perception of how well he or she sees may be related to the tasks to be performed.[12–16] The single questions used in surveys to date have been inadequate for many purposes. Perhaps a series of task-related questions of the type to be used in a proposed US Visual Acuity Impairment Survey* will yield a higher sensitivity as well as a more accurate reflection of the marked increase in impairment with increasing age.

*Ederer F: Visual Acuity Impairment Survey (VAIS) Pilot Study. Presented at the National Eye Institute Symposium on Eye Disease Epidemiology, Bethesda, MD, June 1982. Questions available on request to author.

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Physicians' Opinions of Expanded Clinical Pharmacy Services

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Abstract: A statistical interaction model explaining 27 per cent of the variation in physicians' attitudes toward clinical pharmacy among 180 Alabama physicians is presented. Young primary care physicians who prescribe drugs with a low risk of adverse reactions are the most favorable toward pharmacists practicing clinical tasks. Older solo-practice physicians who lack exposure to clinical pharmacy are the least favorable. The implications for the wider acceptance of clinical pharmacy are discussed in terms of its resources of professional power. (*Am J Public Health* 1983; 73:96–101.)

Introduction

Clinical pharmacy (CP) is an expanding patient-oriented, hospital role with the potential for encroachment on the physician's role.[1,2] CP's success hinges on the attitude of physicians toward the use of pharmacists in a clinical capacity. Physicians' attitudes toward CP and characteristics associated with favorability have been surveyed by us[3,4] and others.[5–21] Physicians generally have been found to oppose pharmacists performing autonomous decision-making tasks, but to favor adjunct tasks such as patient counseling. The present study extends our research. A variable is added on physicians' prescribing habits and a larger survey sample allows for greater statistical control using multiple regression and Automatic Interaction Detection (AID).[22]

Materials and Methods

A 44-item questionnaire was mailed to 576 randomly selected members of the Jefferson County (Birmingham) Alabama Medical Society, all of whom were active, nonfederal physicians providing direct-patient care. To assure anonymity, recalls were not made. Seven mailouts were returned nondeliverable, three were returned unanswered, and 180 useable questionnaires were returned for a response rate of 31.3 per cent. This was not an unusual response rate for physician surveys on our topic.[8,9,23]

The sample was found representative of the Medical Society with respect to primary specialty, but reflected the biases of medical society membership. For example, the sample was older, predominantly male, and probably disproportionately politically conservative.[24] Further, comparisons of sample specialty proportions to corresponding data on Standard Metropolitan Statistical Areas revealed an overrepresentation of medical and surgical specialists.[25] This precluded making reliable estimates of physician population parameters, but allowed subgroup comparisons.

The dependent variable, physicians' favorability toward clinical pharmacists, was gauged with a Guttman scale having a coefficient of reproducability of 0.91 and a coefficient of scalability of 0.66.[26] This "Task Favorability" scale included the following items with the latter three being nontraditional pharmacy tasks which intersect the physicians' role: "Hospital staff pharmacists should": 1) maintain drug profiles on patients; 2) monitor prescribing patterns of physicians to preempt adverse drug reactions; 3) counsel patients at bedside; 4) decide on the frequency-of-use and dosage forms of physician-prescribed drugs; and 5) independently choose the drug to be prescribed based on the physician's diagnosis.

Five independent variables (see Table 2) were found to be related to the Task Favorability scale and were treated as interval level measures for the regression analysis and then dichotomized for AID. The *prescribing pattern-adverse reaction* variable involved giving a panel of six clinical pharmacists a list of 19 drug classes used in the American Hospital Formulary Service[27] and asking them to evaluate each class according to its "propensity for causing an adverse reaction."* Each drug class was ranked from one (very low) to five (very high) and the mean values for the six panelists were computed (Table 1). These values were used

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*An adverse reaction was defined as "any reaction that is unintended and/or undesirable at normal doses for prophylactic, treatment or diagnostic purposes."