Comparisons of Self-Reported and Chart Identified Chronic Diseases Among Inner-City Seniors

John Leikauf, B.A.[1] and **Alex D. Federman, M.D., M.P.H.**[2]

[1]Mount Sinai School of Medicine, One Gustave Levy Place, New York, NY

[2]Division of General Internal Medicine, Mount Sinai School of Medicine, New York, NY

Abstract

Objectives—Survey studies often rely on disease self-reports. However, self-reports may not be reliable for all conditions. This study examines agreement of chronic disease self-reports and their sensitivity and specificity compared with medical record data from inner-city seniors, as well as the association of patient characteristics with accuracy of self-reports.

Design—Cross-sectional analysis.

Setting—Two hospital-based primary care practices serving a low-income inner-city population.

Participants—Adults ages 65 years and older (n=323).

Measures—Data on self-reported asthma, depression, diabetes, and hypertension were collected through interviewer administered surveys (in English and Spanish) and chart abstraction. Chart-based disease was defined in two ways: physician documentation, or physician documentation + use of a medication to treat that condition. Sensitivity, specificity and agreement (kappa,κ) were calculated. Univariate and multivariable regression analyses were used to determine the associations between patient characteristics and patient-chart agreement.

Results—Agreement between self-report and chart data was high for diabetes (κ = 0.94) intermediate for asthma (0.66) and hypertension (0.54), and low for depression (0.4). Sensitivity and specificity were high for diabetes (0.99 and 0.96, respectively) and low for depression (0.74 and 0.72, respectively). Specificity for hypertension was lowest (0.67). Age, education, health literacy, and other patient characteristics did not have clear associations across conditions.

Conclusion—Self-reports of diabetes may be most reliable and depression least reliable for surveys involving older, inner-city adults. Survey research with older adults should include confirmatory data when assessing presence of depression, hypertension and asthma.

Keywords

chronic disease; self-reportl; sensitivity; specificity; agreement

INTRODUCTION

Investigators often rely on self-reports to determine the chronic disease status of study participants. Although this is a convenient method for obtaining health status data, the reliability of such reports has come under question in several studies. For example, past studies have documented agreement between self-reports and chart-abstracted data or other reference standards for hypertension, with kappa values ranging from 0.13 to 0.75, sensitivities from 32% to 82%, and specificities from 86% to 97% (1-5). To a lesser degree, the accuracy of self-reported diabetes also varies, with kappa values ranging from 0.70 to 0.96, sensitivities from 51% to 100%, and specificities from 94% to 100% (1-5). Even fewer studies have examined the accuracy of self-reported asthma and depression. One study reported kappa values of 0.7 for self-reported asthma vs. chart, and 0.2 for depressed mood (6). A Dutch study, in contrast, reported low agreement between self-reported and chart identified asthma in older adults, but was unable to distinguish between asthma and COPD (7).

The reliability of self-reported chronic diseases is an important research and clinical issue. Inaccurate self-reports threaten the validity of research findings that depend on this type of data. Previous research has aimed to identify patient characteristics that correlate with the accuracy of self-reported chronic diseases, but these results are also inconclusive. For instance, older age was associated with greater accuracy of self-reported hypertension in one study (8) and decreased accuracy for hypertension and diabetes in others (1,2). Similarly, studies have shown that education is sometimes positively associated with the accuracy of self-reported chronic diseases (2,5), sometimes negatively associated, or not at all associated (3). Furthermore, comparison of studies that document the accuracy of self-reports is made difficult by the heterogeneity across patient samples. One population that has received relatively little attention is older adults, especially those in whom language, literacy, and culture may impact perception of illness and therefore the correlation between self-reported disease and chart documented illness. Further, adults living in socioeconomically deprived areas report poorer health (9), highlighting the importance of examining self-reported chronic disease among older, inner-city adults.

The aim of this study was to compare self-reported chronic disease status with chart-documented chronic disease status among older adults receiving care in a hospital-based, primary care clinic that serves a socioeconomically disadvantaged community. The agreement (kappa), sensitivity, and specificity of self-reports compared with chart-abstracted data for diabetes, hypertension, asthma and depression were calculated. Additionally, multivariate regression analysis was used to test the hypothesis that patient characteristics that might influence exchange and retention of information about a patient's health would be associated with decreased accuracy of self-reports among older adults. Age was specifically examined because it is associated with cognition, as were factors that may influence the quality of information exchange, specifically education, English proficiency, and health literacy.

METHODS

Setting and Subjects

Subjects were recruited between July 2005 and August 2006 in the primary care and geriatrics outpatient practices of a 1,100-bed, tertiary care academic medical center located in the East Harlem neighborhood of New York City, NY. A random selection of eligible subjects was identified by review of electronic billing records and these persons were recruited by bilingual (Spanish/English) research assistants in the clinic waiting areas. The study included men and women ages 65 years and older with Medicare who spoke English or Spanish, and excluded those with a dementia diagnosis documented in their clinic record. Of 725 eligible patients identified by review of electronic billing records, 323 consented to participate (response rate, 44.5%). There were no significant differences between respondents and non-respondents by age or gender. However, a significantly smaller proportion of African-Americans participated in the study than declined (16% vs. 33%, p<0.0001). All subjects provided informed consent, and the study was approved by the Mount Sinai School of Medicine Institutional Review Board.

Data Collection and Outcome Measures

All subjects participated in a 1-hour interview in English or Spanish depending on their preference for language of survey administration. During the interview they were asked to indicate whether they had 1 or more of the 13 conditions in a list of chronic health problems that was read to them. The format and content of the questions are identical to that of the measures of chronic disease used in the Medicare Current Beneficiary Survey, which have not been specifically validated in sensitivity and specificity or other analyses (10). The main outcomes were presence of self-reported asthma, depression and/or panic attacks, diabetes (type I or II), and hypertension. Patients were asked, "Has a doctor ever told you that you have…asthma; depression and or panic attacks; diabetes or high sugar; hypertension or high blood pressure."

Disease self-reports were compared to chart documented chronic diseases using two definitions: documentation of the condition in the outpatient clinical record (chart-mention-only); and a more stringent definition, chart documentation plus use of a medication associated with the treatment of that condition (chart + medication). Chart documentation of a disease or medication use was defined as one or more mention in the summary or face sheet of the patient's clinical record, or in a physician's clinical encounter note. When dysthymia was mentioned in the chart it was coded as depression. The mentions had to occur within the twelve-month period prior to the patients' study interview date. The classes of medications used to establish the more stringent reference standard are listed in Appendix Table 1. Individuals with a chronic disease identified by the chart + medication definition represented a subgroup of individuals with the chart-mention-only definition of disease.

Other Variables

The analyses specifically focused on education, English proficiency, and health literacy since each influences understanding and self-management of chronic illness (11-13), and age because of its association with cognitive functioning and hence ability to retain or exchange information (14). English proficiency was assessed using a question that asks "How would you describe your ability to speak and understand English?" The 6 response options range from very poor to excellent. Health literacy was measured with the Short Test of Functional Health Literacy in Adults (S-TOFHLA) (15). Scores on the S-TOFHLA correspond to 3 levels of health literacy: adequate, marginal, and inadequate. Individuals with inadequate health literacy struggle with basic medical information, such as reading prescription bottles (15). Other variables previously been shown to have associations with

accuracy of self-reports, or might be proxies for such variables were also included: self-reported race and ethnicity which were categorized as white non-Hispanic, black non-Hispanic, Hispanic, and other (1); income; number of chronic diseases (2,5,8); self-rated general health; and whether the patient had a regular doctor.

Statistical Analysis

Kappa statistics (16) and their 95% confidence intervals (CI) were calculated to determine agreement between self-reported and chart-mention-only or chart + medication documented chronic conditions. Scores of 0-0.4 represent low agreement; 0.4-0.6, intermediate agreement; 0.6-0.8, substantial agreement; and 0.8-1.0, near perfect to perfect agreement (16). Using the chart documented conditions as a reference standard, sensitivity and specificity and their 95% confidence intervals for the self-reported chronic conditions were calculated as well. A measure of accuracy was created, defined as whether the patient's self-report for a given chronic condition was consistent with data from the chart. The association of patient characteristics with accuracy of self-reports was tested in univariate analyses with the chi-square and in multivariate analyses with multivariable logistic regression. Four distinct multivariable models were created, one each for accuracy of self-reported asthma, depression, diabetes, and hypertension. All models included the following primary independent variables: age, education, English proficiency, health literacy, gender, race/ethnicity, income, general health, and the total number of self-reported chronic diseases. Because asthma in the elderly is often misdiagnosed as chronic obstructive pulmonary disease (COPD) (17-20), all univariate and multivariate analyses of self-reported asthma were reanalyzed in a subgroup of individuals who lacked a chart-based diagnosis of COPD. All analyses were conducted using SAS version 9.1 statistical software (SAS Institute, Cary, NC).

RESULTS

The mean age of participants was 73.1 (SD = 6.9), and 74.5% were women (Table 1). Reflecting the neighboring communities, the study sample was predominantly Latino (55.6%) and among Latinos, the majority (78.0%) was Puerto Rican (the remainder originated from the Dominican Republic, Mexico, and other Latin American nations). Half of the sample reported speaking English poorly (49.7%), had inadequate health literacy (51.6%), low-income (49.7% had monthly income below $750), and one-third had less than a high school education (30.7%).

The four chronic diseases were self-reported at the following rates: asthma, 23.9%; depression, 35.0%; diabetes, 37.3%; hypertension, 83.7% (Table 2). With the exception of hypertension, chronic disease rates as determined by chart-mention-only data were similar: asthma, 19.6%; depression, 26.8%; diabetes, 37.9%; and hypertension, 86.3%. The rate of depression was 11 percentage points lower when the more stringent definition of chart + medication use was applied, whereas the more stringent definition had only a modest effect on the rates of the other conditions.

Agreement, Sensitivity, and Specificity Analyses

Patterns of agreement were similar when disease self-reports were compared with the chart-mention-only or chart + medication reference standards (Table 2). Overall, agreement between self-reports and medical records varied widely. For example, self-reported diabetes had nearly perfect agreement with the stringent reference standard (kappa 0.94, 95% CI 0.90 - 0.98), self-reported hypertension and asthma had intermediate-to-substantial agreement (kappa 0.59, 95% CI 0.46 - 0.71, and kappa 0.66, 95% CI 0.55 - 0.76, respectively), and self-reported depression had poor to intermediate agreement (0.31, 95% CI 0.20 - 0.41).

Patterns of sensitivities and specificities were also similar (Table 3), though as expected, self-reports had moderately lower sensitivity and higher specificity when compared with more stringent (chart + medication) reference standards. Overall, self-reports of diabetes and asthma were both highly sensitive and specific. Self-reports of depression were considerably less sensitive and specific, whereas hypertension self-reports were highly sensitive but non-specific.

In the subgroup of patients without COPD (n=300), the sensitivity of self-reported asthma was lower and the specificity higher than for the whole sample. Compared against the chart-mention-only standard, the sensitivity of self-reported asthma in the subgroup was 0.67 (95% CI 0.53 - 0.78) and specificity was 0.95 (95% CI 0.93 - 0.98). Against the chart + medication definition, the sensitivity was 0.61 (0.50 - 0.73) and the specificity was 0.97 (95% CI 0.95 - 0.99).

Associations of Patient Characteristics with Self-Report and Chart Data Agreement

Because the chart-mention-only and chart + medication data were similar with regards to kappa and sensitivity and specificity analyses, only the agreement data using the more stringent reference standard are reported here. The multivariate diabetes model could not be fit because of the very high rate of agreement between self-reports and chart-based data. In univariate analyses, no characteristics had a consistent association with the accuracy of disease self-reports across the four conditions studied (see Appendix Table 2). In multivariable analyses individuals with poor general health were less likely to report asthma when chart + medication data indicated they had the condition, adjusted odds ratio (AOR) 0.11, 95% confidence interval (CI) 0.01 to 0.87; adults over the age of 75 years were less likely to report hypertension (AOR 0.31, 95% CI 0.13 - 0.74) (see Appendix Table 3). Older age was only associated with low accuracy for hypertension self-reports, and neither education nor inadequate health literacy were associated with accuracy of self-reports for any of the four conditions.

DISCUSSION

Studies of different populations have at times found conflicting results regarding the accuracy of self-reports of chronic disease status, and such information had not been extensively studied for a low-income, inner-city population prior to this study. The study results suggest that self-reports of chronic disease inconsistently match clinical documentation of chronic diseases in this inner-city population. Self-reports of diabetes, in particular, are probably a reliable method for detecting diabetes in a similar survey population. However, investigators should be cautious about using self-reports to detect asthma, hypertension, and depression in similar populations, because the results indicate that these reports are of limited accuracy. Contrary to the posited hypotheses, level of education, English proficiency, and health literacy were not shown to have a clear association with the accuracy of patients' self-reports. Increased age was found only to be associated with decreased agreement between self-reported and chart-identified hypertension.

The kappa score and sensitivity and specificity values for diabetes are consistent with the high values found in the literature, but the kappa score for hypertension (0.59, 95% CI 0.46-0.71) is lower than previously published values (1-5,8). Familiarity with medical terms may play a role. For example, only 55% of a multi-racial study sample agreed that "high blood pressure and hypertension are the same medical condition" (21). Further, cultural beliefs about the characteristics of and definition of hypertension have been shown to vary from the medical definition in many ethnic and racial groups, so the influence of cultural definitions of the condition may have an effect on accuracy in a racially and ethnically diverse population (22,23). However, neither health literacy nor race, ethnicity, or language

variables had a significant association with the accuracy of self-reported chronic disease status.

Self-reports of asthma had generally high levels of agreement with chart documentation, and high sensitivity and specificity. However, the sensitivity of self-report decreased and its specificity increased when individuals with COPD were excluded. This may be a problem of disease identification among patients. For example, Halm et al reported that 53% of inner-city asthmatics do not believe they have asthma unless they are symptomatic (the no symptoms no asthma belief) (24) similar to findings reported elsewhere (25). Alternatively, it may also reflect the difficulty that physicians have with differentiating between COPD and asthma in older patients (19).

Some investigators have suggested that conditions that are easily diagnosed or have easily noticed symptoms generally have good agreement while complex conditions with nonspecific symptoms have comparatively poor agreement (2). The analysis included in this study to some extent supports this concept. Patients with diabetes had accurate self-reports. Diabetes is a condition necessitating daily lifestyle adjustments which may be reminders, with or without the overt symptoms that may also be present. Conversely, hypertension is frequently asymptomatic and often defined differently by providers than patients, as described earlier. Depression has many nonspecific symptoms, and can be difficult to diagnose. Similarly, asthma presents some problems of diagnosis in elderly patients and may be defined differently by providers and patients, as reported above.

Contrary to expectations, there were no consistent statistically significant associations between patient age, education, English proficiency, or health literacy and agreement between self-reports and medical records. Low household income was associated with lower accuracy of self-reports across both univariate and multivariate models for asthma only. These findings introduce the possibility that the reliability of self-reports may be largely consistent across groups of individuals with different sociodemographic backgrounds, but additional research is needed to draw firm conclusions.

Limitations

As with other observational cohort studies a number of limitations should be considered when interpreting the study findings. First, medical records are not the true "gold standard" for determining sensitivity and specificity. This is why some studies only report kappa statistics (to measure agreement) rather than report sensitivity and specificity. However, the use of chart-based diagnoses as a reference standard is valid when applying the findings of this study to other observational research studies, since such studies are often concerned with what conditions healthcare providers consider the patient to have. Further, since there is little consistency across published studies, including both analyses should facilitate comparisons between the current study and others. Second, interviewers asked about both "high blood pressure" and "hypertension." That the interviewer did not differentiate may have confounded the results for accuracy of hypertension self-reports. This factor may have contributed to the over-reporting that was observed; a patient may have accurately answered, "yes," to the question specifying "high blood pressure," if he or she had had a high blood pressure reading in the past year, with or without a hypertension diagnosis.

Third, the diagnoses of depression and panic attacks were combined because the MCBS question format asked about both conditions and because they are both frequently treated with selective serotonin reuptake inhibitors. Therefore, differences between these conditions could not be determined for any of the analyses. Moreover, we did not include other mood disorders, such as seasonal mood disorder, in our definition of depression. Individuals who had a single mention of panic attack or anxiety disorder and thus isolated panic attacks were

credited with a depression diagnosis. The likely effect of this approach to defining depression is over-diagnosis of depression, although the effect is probably small since lone anxiety in the elderly is generally less common than depression (26,27). Fourth, although we included a more stringent definition of chart-based chronic disease, disease mention + related medication use, some patients and or physicians may have elected not to use medications in the treatment of the condition. The likely impact of such situations would bias results toward identifying more advanced conditions when using the stringent definition of chart-based chronic disease. Finally, with 323 individuals in our study sample, we had limited power to detect statistically significant differences in the accuracy of self-reports by different variables. Significant differences in agreement for individuals with different levels of age, education, English proficiency, health literacy, and other variables might have been observed with larger sample sizes.

In summary, these findings suggest that investigators may feel confident relying upon self-reports of diabetes in survey research conducted among older, inner-city adults. However, they should exercise caution when considering self-reports of hypertension, depression, and asthma. The accuracy of self-reports of these conditions may be insensitive to the age, education, and health literacy levels of the study population, although additional research is needed to confirm this.

Acknowledgments

Appendix

Appendix Table 1

Medications Determining Diagnosis for Kappa/Sensitivity/Specificity Calculations

Condition	Medications Used for Diagnosis from Chart
Depression	Bupropion, buspirone, selective serotonin reuptake inhibitors (SSRI), mixed SSRI/norepinephrine/dopamine reuptake inhibitors, tricyclic anti-depressants
Asthma	Inhaled beta-agonists, inhaled corticosteroids, leukotriene inhibitors, theophylline
Hypertension	Alpha-adrenergic agonists, angiotensin converting enzyme (ACE) inhibitors, angiotensin receptor antagonists, beta-blockers, calcium channel blockers, hydralazine, minoxidil, thiazide diuretics
Diabetes	Alpha-glucoside hydrolase inhibitors, exenatide, insulin, sulfonylureas, metformin, thiazolidinediones (TZD)

Appendix Table 2

Association Between Patient Factors and Agreement[†] Between Chronic Disease Self-Reports and Chart + Medication-Based Chronic Disease Determination

	Percent of Individuals Whose Self-Reported Chronic Disease Status Agreed with Chart Documentation							
	Asthma	**P**	**Depression**	**P**	**Diabetes**	**P**	**Hypertension**	**P**
Age (*years*)								
65-74	88.7	0.90	72.8	0.89	96.9	0.85	92.8	0.004
≥75	89.2		72.1		97.3		82.0	
Sex								
Male	92.3	0.82	80.8	0.06	97.4	0.82	83.3	0.07
Female	87.7		69.7		96.9		90.8	
Race and Ethnicity								
White, non-Hispanic	88.9	0.92	69.4	0.03	100	0.54	80.6	0.21
Black, non-Hispanic	87.2		83.7		96.5		89.5	
Hispanic	88.9		68.4		97.1		90.6	
English Proficiency								
Good to excellent	89.6	0.69	77.9	0.03	97.4	0.72	87.7	0.49
Very poor to fair	88.2		67.1		96.7		90.1	
Education								
Any high school	88.2	0.57	71.7	0.62	97.6	0.36	87.3	0.17
≤ 8th grade	90.4		74.5		95.7		92.6	
Household Income								
> $750/month	93.5	0.02	77.9	0.03	98.1	0.17	86.4	0.27
≤ $750/month	84.2		67.1		96.1		91.5	
Health Literacy								
Adequate or marginal	91.2	0.21	68.9	0.17	95.3	0.07	91.2	0.21
Inadequate	86.7		76.0		98.7		86.7	
General Health								

Percent of Individuals Whose Self-Reported Chronic Disease Status Agreed with Chart Documentation

	Asthma	P	Depression	P	Diabetes	P	Hypertension	P
Very good to excellent	98.4	0.009	80.3	0.13	98.4	0.50	91.8	0.42
Poor to good	86.5		70.6		96.7		88.2	
Chronic Diseases								
0-3	90.5	0.24	74.4	0.33	98.5	0.04	85.9	0.02
4 or more	86.0		69.2		94.4		94.4	
Has Regular Doctor								
No	93.2	0.24	79.7	0.17	94.9	0.28	86.4	0.50
Yes	87.9		70.9		97.6		89.5	

N = 323.

[†] The self-reported presence or absence of the disease agreed with the stringent reference standard (chart + medication).

Appendix Table 3

Multivariable Analysis of Association Between Patient Factors and Agreement[†] Between Chronic Disease Self-Reports and Chart + Medication-Based Chronic Disease Determination

	Asthma AOR (95% CI)	Depression AOR (95% CI)	Hypertension AOR (95% CI)
Age (*years*)			
65-74	Ref.	Ref.	Ref.
≥75	1.07 (0.44 - 2.62)	0.73 (0.40 - 1.33)	0.31 (0.13 - 0.74)[**]
Sex			
Male	Ref.	Ref.	Ref.
Female	0.81 (0.30 - 2.16)	0.58 (0.29 - 1.13)	2.97 (1.27 - 6.96)[*]

	Asthma AOR (95% CI)	Depression AOR (95% CI)	Hypertension AOR (95% CI)
Race and Ethnicity			
White, non-Hispanic	Ref.	Ref.	Ref.
Black, non-Hispanic	0.58 (0.22 - 1.55)	1.55 (0.73 - 2.93)	0.81 (0.29 - 2.25)
Hispanic	2.02 (0.35 - 11.7)	1.10 (0.36 - 3.35)	1.48 (0.26 - 8.52)
English Proficiency			
Good to excellent	Ref.	Ref.	Ref.
Very poor to fair	0.63 (0.11 - 3.55)	0.52 (0.17 - 1.58)	0.46 (0.09 - 2.53)
Education			
Any high school	Ref.	Ref.	Ref.
≤ 8th grade	1.93 (0.69 - 5.35)	1.69 (0.82 - 3.48)	2.33 (0.80 - 6.75)
Household Income			
> $750/month	Ref.	Ref.	Ref.
≤ $750/month	0.41 (0.17 - 1.00) [*]	0.59 (0.33 - 1.08)	1.53 (0.64 - 3.65)
Health Literacy			
Adequate or marginal	Ref.	Ref.	Ref.
Inadequate	0.57 (0.24 - 1.39)	1.73 (0.93 - 3.23)	0.63 (0.26 - 1.53)
General Health			
Very good to excellent	Ref.	Ref.	Ref.
Poor to good	0.11 (0.01 - 0.87) [*]	0.64 (0.29 - 1.42)	0.33 (0.10 - 0.10)
Chronic Diseases			
0-3	Ref.	Ref.	Ref.
4 or more	1.00 (0.44 - 2.26)	0.88 (0.49 - 1.56)	2.58 (0.96 - 6.91) [*]
Has Regular Doctor			
No	Ref.	Ref.	Ref.
Yes	0.53 (0.16 - 1.69)	0.50 (0.23 - 1.12)	0.88 (0.33 - 2.38)

N = 323.

AOR indicates adjusted odds ratio; CI, confidence interval.

Model for diabetes agreement did not converge.

[†] The self-reported presence or absence of the disease agreed with the stringent reference standard (chart + medication).

[*] P<.05

[**] P<.01

[***] P<.001

[****] P<.0001.

REFERENCES

1. Kehoe R, Wu SY, Leske MC, et al. Comparing self-reported and physician-reported medical history. Am J Epidemiol. 1994; 139:813–818. [PubMed: 8178794]

2. Okura Y, Urban LH, Mahoney DW, et al. Agreement between self-report questionnaires and medical record data was substantial for diabetes, hypertension, myocardial infarction and stroke but not for heart failure. J Clin Epidemiol. 2004; 57:1096–1103. [PubMed: 15528061]

3. Merkin SS, Cavanaugh K, Longenecker JC, et al. Agreement of self-reported comorbid conditions with medical and physician reports varied by disease among end-stage renal disease patients. J Clin Epidemiol. 2007; 60:634–642. [PubMed: 17493523]

4. Bush TL, Miller SR, Golden AL, et al. Self-report and medical record report agreement of selected medical conditions in the elderly. Am J Public Health. 1989; 79:1554–1556. [PubMed: 2817172]

5. Goldman N, Lin IF, Weinstein M, et al. Evaluating the quality of self-reports of hypertension and diabetes. J Clin Epidemiol. 2003; 56:148–154. [PubMed: 12654409]

6. Tisnado DM, Adams JL, Liu H, et al. What is the concordance between the medical record and patient self-report as data sources for ambulatory care? Med Care. 2006; 44:132–140. [PubMed: 16434912]

7. Mohangoo AD, van der Linden MW, Schellevis FG, et al. Prevalence estimates of asthma or COPD from a health interview survey and from general practitioner registration: What's the difference? Eur J Public Health. 2006; 16:101–105. [PubMed: 16141304]

8. Molenaar EA, Van Ameijden EJ, Grobbee DE, et al. Comparison of routine care self-reported and biometrical data on hypertension and diabetes: Results of the Utrecht Health Project. Eur J Public Health. 2007; 17:199–205. [PubMed: 16887835]

9. Brown AF, Ang A, Pebley AR. The relationship between neighborhood characteristics and self-rated health for adults with chronic conditions. Am J Public Health. 2007; 97:926–932. [PubMed: 17395847]

10. Adler GS. A profile of the Medicare Current Beneficiary Survey. Health Care Financ Rev. 1994; 15:153–163. [PubMed: 10138483]

11. Wisnivesky JP, Kattan M, Evans D, et al. The impact of language barriers on self-managment and outcomes of inner-city asthmatics. Med Care. 2008 In press.

12. Wolf MS, Davis TC, Osborn CY, et al. Literacy, self-efficacy, and HIV medication adherence. Patient Educ Couns. 2007; 65:253–260. [PubMed: 17118617]

13. Schillinger D, Grumbach K, Piette J, et al. Association of health literacy with diabetes outcomes. JAMA. 2002; 288:475–482. [PubMed: 12132978]

14. Fisk JE, Sharp CA. Age-related impairment in executive functioning: updating, inhibition, shifting, and access. J Clin Exp Neuropsychol. 2004; 26:874–890. [PubMed: 15742539]

15. Baker DW, Williams MV, Parker RM, et al. Development of a brief test to measure functional health literacy. Patient Educ Couns. 1999; 38:33–42. [PubMed: 14528569]

16. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics. 1977; 33:159–174. [PubMed: 843571]

17. Enright PL, McClelland RL, Newman AB, et al. Underdiagnosis and undertreatment of asthma in the elderly. Cardiovascular Health Study Research Group. Chest. 1999; 116:603–613. [PubMed: 10492260]

18. Enright PL, Kronmal RA, Higgins MW, et al. Prevalence and correlates of respiratory symptoms and disease in the elderly. Cardiovascular Health Study. Chest. 1994; 106:827–834. [PubMed: 8082366]

19. Parameswaran K, Hildreth AJ, Chadha D, et al. Asthma in the elderly: Underperceived, underdiagnosed and undertreated; a community survey. Respir Med. 1998; 92:573–577. [PubMed: 9692125]

20. Bauer BA, Reed CE, Yunginger JW, et al. Incidence and outcomes of asthma in the elderly. A population-based study in Rochester, Minnesota. Chest. 1997; 111:303–310. [PubMed: 9041973]

21. Egan BM, Lackland DT, Cutler NE. Awareness, knowledge, and attitudes of older americans about high blood pressure: Implications for health care policy, education, and research. Arch Intern Med. 2003; 163:681–687. [PubMed: 12639200]

22. Higginbottom GM. 'Pressure of life': Ethnicity as a mediating factor in mid-life and older peoples' experience of high blood pressure. Sociol Health Illn. 2006; 28:583–610. [PubMed: 16910948]

23. Ontiveros JA, Black SA, Jakobi PL, et al. Ethnic variation in attitudes toward hypertension in adults ages 75 and older. Prev Med. 1999; 29(6 Pt 1):443–449. [PubMed: 10600422]

24. Halm EA, Mora P, Leventhal H. No symptoms, no asthma: The acute episodic disease belief is associated with poor self-management among inner-city adults with persistent asthma. Chest. 2006; 129:573–580. [PubMed: 16537854]

25. Zayas LE, Jaen CR, Kane M. Exploring lay definitions of asthma and interpersonal barriers to care in a predominantly Puerto Rican, inner-city community. J Asthma. 1999; 36:527–537. [PubMed: 10498048]

26. Cairney J, Corna LM, Veldhuizen S, et al. Comorbid depression and anxiety in later life: patterns of association, subjective well-being, and impairment. Am J Geriatr Psychiatry. 2008; 16:201–208. [PubMed: 18310551]

27. Gorman JM. Comorbid depression and anxiety spectrum disorders. Depress Anxiety. 1996; 4:160–168. [PubMed: 9166648]

Table 1

Patient Characteristics (n = 323)

Characteristic	Frequency (%)
Age ≥ 75 and older	36.3
Female	74.5
Race/Ethnicity	
Latino	55.6
Black, non-Hispanic	37.3
White, non-Hispanic/Other	7.1
English Proficiency, Very Poor/Poor/Fair	49.7
Education, 8th grade or less	30.7
Household Income ≤ $750/month	49.7
Health Literacy, inadequate	51.6
General Health, Poor/Fair/Good	80.1
Chronic Diseases, ≥ 4	35.0

Table 2

Rates and Agreement of Self-Reported and Chart Abstracted Chronic Diseases (n = 323)

Condition	Survey Rate (95% CI)	Chart Rate (95% CI)	Chart + Medication Rate (95% CI)	Self-Report vs. Chart Documentation Kappa (95% CI)	Self-Report vs. Chart + Medication Documentation Kappa (95% CI)
Asthma	23.9% (19.1% - 28.6%)	19.6% (15.2% - 24.1%)	16.7% (12.5% - 20.8%)	0.66 (0.56 - 0.77)	0.66 (0.55 - 0.76)
Depression	35.0% (29.6% - 40.3%)	26.8% (21.8% - 31.8%)	15.4% (11.3% - 9.4%)	0.40 (0.29 - 0.51)	0.31 (0.20 - 0.41)
Diabetes	37.3% (31.8% - 42.7%)	37.9% (32.5% - 43.3%)	35.0% (29.6% - 40.3%)	0.94 (0.91 - 0.98)	0.94 (0.90 - 0.98)
Hypertension	83.7% (79.5% - 87.8%)	86.3% (82.4% - 90.1%)	84.3% (80.2% - 88.4%)	0.54 (0.41 - 0.67)	0.59 (0.46 - 0.71)

CI indicates confidence interval.

Table 3

Sensitivity and Specificity of Self-Reported Chronic Diseases vs. Reference Standards

	Self-Report vs. Chart Documentation		Self-Report vs. Chart + Medication Documentation	
Condition	Sensitivity (95% CI)	Specificity (95% CI)	Sensitivity (95% CI)	Specificity (95% CI)
Asthma	0.88 (0.79 - 0.97)	0.89 (0.85 - 0.93)	0.81 (0.72 - 0.91)	0.90 (0.87 - 0.94)
Depression	0.74 (0.62 - 0.86)	0.72 (0.67 - 0.78)	0.67 (0.57 - 0.77)	0.77 (0.71 - 0.82)
Diabetes	0.99 (0.97 - 0.10)	0.96 (0.93 - 0.99)	0.96 (0.92 - 0.99)	0.98 (0.97 - 1.00)
Hypertension	0.93 (0.90 - 0.96)	0.67 (0.53 - 0.80)	0.92 (0.88 - 0.95)	0.67 (0.52 - 0.81)

CI indicates confidence interval.