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Patient-Physicians' Information Exchange in Outpatient Cardiac Care: Time for a Heart to Heart?

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Abstract

Objective—Agreement between patients and physicians is an indicator of successful communication. Concordance in domains of communication among patients with heart disease and communication barriers has not been studied.

Methods—English, Spanish, or Cantonese-speaking patients seen at a public hospital cardiology clinic were assessed with pre-visit questionnaires. Surveys of patients and their physicians immediately after the visit asked each about: (1) cardiac functional status, (2) barriers to self-management, (3) cardiac diagnoses, and (4) treatment. We assessed patient-physician concordance in these domains.

Results—179 patients and 56 physicians completed the study. Patients had low educational attainment, limited literacy and limited English proficiency. Physicians underestimated patients' cardiac functioning status (NYHA Classes 2–4), by 1 class or more in 50% of visits. Physicians were frequently unaware of medication (38/57, 67%) and psychosocial (61/88, 69%) barriers. Patients were unable to describe even 1 matching diagnosis (72/170, 42% concordant) among 5 categories. Physicians' reported medication changes in 106/179 (59%) but patients failed to report these changes in 55% (58/106). Multivariate logistic regression analyses showed no significant association between patient characteristics and concordance.

Conclusion—Patients and physicians often fail to communicate effectively and determinants of concordance in CVD care require further investigation.

Practice Implications—Developing strategies to improve communication within the medical encounter are critical to improving ambulatory chronic disease management.

1. Introduction

Over 80 million Americans have cardiac disease, making it a leading cause of morbidity and mortality in the U.S.[1]. Moreover, addressing cardiovascular disease (CVD) disparities is a major public health focus [2]. Managing chronic cardiac conditions requires extensive use of

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ambulatory health care services[3]. In turn, patients with chronic cardiac conditions must perform complex self-management in order to avoid complications [4]. While enabling and supporting this self-management requires clear communication between patient and physician, little is known about patient- physician communication in ambulatory CVD care. The Institute of Medicine has concluded that high quality of care is the product of good *interpersonal processes of care*, including communication, combined with good *technical processes of care* [5,6]

Similar to other chronic disease conditions, information exchange is necessary for effective ambulatory cardiac disease care. Schillinger developed a conceptual framework for communication needed for effective chronic disease management, and how health literacy affects distinct domains of communication [7]. We adapted this framework to describe communication processes in ambulatory health visits (see Figure 1, adapted from [7].). In a typical ambulatory encounter, the physician needs to elicit the patient's current symptom severity as well as barriers to treatment adherence, including psychosocial factors. For a heart failure patient, for example, this may include the information that the patient has become more short of breath and/or has recently run out of medication at home. This *elicitation-type communication* provides information needed for decision-making. Knowing the patient's clinical status and behaviors, the physician can make informed clinical recommendations to the patient about the treatment plan and engage in shared decision-making. The next phase of the ambulatory encounter requires adequate *explanatory-type communication*. Here, the physician must clearly convey diagnostic information to the patient, and her recommendations to the patient so as arrive at a shared decision regarding the treatment plan. The Institute of Medicine has defined patient-centered care as providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions [8]. Clearly, achieving patient-centered care requires active elucidative as well as explanatory communication [9]. In the case of the heart failure patient, the physician might explain heart failure and its cardinal symptoms, provide a medication prescription or alter a dose, and advise close follow-up if symptoms worsen. Adequate explanatory communication is needed so that the patient can self-manage his condition, adhere to treatment, and thereby avoid a poor health outcome. For a patient who does not recognize worsening symptoms, or does not take medications correctly due to lack of understanding, his heart failure could worsen and require acute care.

We applied this model to investigate communication within the ambulatory cardiology encounter in an ethnically and linguistically diverse population. We report the extent of concordance, or agreement, between patient and physician for (a) elicitation of patient's health state, medication barriers and psychosocial barriers; and (b) explanation of treatment plan, including medications, diagnoses, and clinical options. In addition, we explored whether patient characteristics were associated with concordance in each of these domains while prior studies in cardiac care have measured concordance in one domain [10,11]. To our knowledge none has simultaneously measured the 4 domains of health state, medication and psychosocial barriers, medications prescribed, and diagnoses, and few focus on populations known to experience disparities in outpatient cardiac care [12].

2. Methods

2.1 Setting

We performed this study in the cardiology clinic at Alameda County Medical Center (ACMC), a safety net setting which predominantly serves uninsured and publicly insured ethnic minorities. The clinic met on Mondays and Thursdays, and was staffed by two attending cardiologists. Resident physicians training in internal medicine rotate through the clinic and see patients under the supervision of the cardiologists. All visits carried out by

residents were presented to attending physicians in real time, and the attending also generated a chart note. Language interpretation for visits involving non-English speakers and language discordant physicians includes in-person, telephone, and real-time videoconferencing. This communication study was nested within a larger observational study of language interpretation methods.

2.2 Population and sampling

We approached all English, Spanish, and Cantonese-speaking patients 18 years and older who were being seen at the cardiology clinic of ACMC in Oakland, CA between March 2004 and January 2005. Because we were interested in exploring the effects of limited English proficiency, we aimed to maximize inclusion of non-English speaking patients. Therefore, all Spanish and Cantonese speaking patients were approached for potential recruitment, and a similar number of English-speaking patients were recruited in parallel. All patients answered standardized questions assessing comprehension of the informed consent, and those who could not correctly answer the 4 post-consent questions were provided an additional round of explanations, and if the 4 post-consent questions were not correctly answered, these potential participants were excluded on the basis of presumed cognitive impairment or significant communication barrier. We invited all clinic physicians to participate in the study. The study was approved by the Committee for Human Research at the University of California, San Francisco and the Institutional Review Board at ACMC.

2.3 Study Procedures and Measures

We conducted a brief, in-person, interviewer-administered baseline assessment for all participants at the time of enrollment, just prior to their visit. All measures were translated into Spanish and Cantonese from English versions and back-translation was performed to confirm accuracy. The baseline assessment included a demographic and health status survey which included age, gender, educational attainment, and race/ethnicity (White, African American, Latino, Chinese). We used the general health question of the SF-12 version 2 [13], “In general, would you say your health is” (excellent, very good, good, fair, poor)” to assess health status. Patients also reported whether they usually had an interpreter at cardiology visits. English and Spanish speakers underwent the short-form Test of Functional Health Literacy Assessment (s-TOFHLA)[14].

Following the visit with the physician, research assistants administered a post-visit questionnaire to patients and treating physicians completed a written, self-administered post-visit survey with parallel items. The physician who saw the patient completed the survey. For visits in which the resident and the attending physician both examined the patient, the resident completed the survey, as the resident generally spent more time with the patient than the supervising attending physician. First, we measured how heart disease affected the patient’s functioning, as follows: “Which one of the following statements best describes how your heart problem affects you today?” The four response options corresponded to the New York Heart Association Class I (no cardiac symptoms even with activity); Class II (cardiac symptoms lead to some difficulties with usual activity); Class III (cardiac symptoms make patient unable to perform usual physical activity); or Class IV (cardiac symptoms present even at rest) [15]. This classification scheme has been used to identify differing functional status among populations with cardiac conditions, even beyond those with heart failure [16,17]. Second, we asked about specific barriers to medication adherence over the prior 4 weeks: running out of medication, inability to pay, concern about side effects and effectiveness, and lack of understanding of medication instructions. Third, we inquired about several psychosocial barriers to self-care over the prior 4 weeks, including problems with finances, family, housing, or pain [18]. Fourth, we asked patients to tell us whether any medication changes were made during the visit. We simply asked patients to report whether

and how many medications were started, stopped, increased, and/or decreased. We did not ask patients for names or doses of medications. Physicians were asked to write down the name and dose for each medication initiated or discontinued, any changes to the standing medication doses during the encounter. Fifth, patients were asked to report, in their own words, up to 3 heart problems or diagnoses related to the visit. Physicians were asked to report up to three cardiac diagnoses for each patient. In order to obtain the most complete data, for encounters with a missing physician post-visit survey, two study investigators (KBD, DS) also performed chart abstraction to obtain medication changes and diagnosis information.

2.4 Communication Outcomes

In assessing for concordance, we distinguished between elicitation and explanatory communication domains. In this framework, patients' reports of their own cardiac functioning and barriers to self-management (*elicitation-type communication*) were considered complete and accurate (i.e. the gold standard), and so we deemed physician responses as either concordant or not. In contrast, we considered physician reports (or, for those visits that lacked a physician report, we abstracted the information from the written clinical record) as accurate (i.e. the gold standard) for explanations of cardiac diagnoses and medication changes (*explanatory-type communication*), and examined whether patient reports matched with their physician's reports.

Because patients' descriptions of diagnoses rarely used medical terminology, we employed a coding scheme used in prior research [19] that listed medical concepts with their equivalent lay terms for application of systematic coding categories across visits. As an example, if a physician reported that the patient had congestive heart failure and the patient reported that their "heart doesn't pump well", we considered these to be concordant (a list of concordant and discordant diagnoses is available from the authors upon request). We pre-defined medication change concordance such that if patients reported the same count for each type of medication change as their physicians, they were considered concordant (i.e., if the physician reported stopping warfarin and the patient reported stopping 1 medication, they would be concordant on medication stops).

We defined several specific concordance measures to employ in exploratory multivariate analysis of correlates of concordance. For symptom concordance, we considered a difference of 2 or more NYHA Classes to be discordant, because this difference is clinically significant [20]. For medication barriers, we selected the most common medication barrier--concern about side effects --- as a representative item. Similarly, we chose one psychosocial barrier --problems with pain --- to test in the multivariate model. For medication changes, if the patient reported a different number of medications started, stopped, increased, and decreased than did the physician, we considered that type of medication change to be discordant. Finally, we considered diagnoses concordant if the patient matched on at least 1 of the physician diagnoses, even if they did not match on others.

2.5 Data Analysis

We first report summary statistics showing the extent of concordance for current functioning, barriers to self-management (individual medication-use and psychosocial barriers), medication changes, and diagnoses. Not all physicians and patients answered all questions in the survey, leading to some missing values for concordance outcomes. Item non-response is a common problem in surveys, and was a particular concern for us with physician surveys. Analysis restricted to complete cases can introduce bias if the data are not missing at random, and also reduce precision [21]. Using standard methodology, we imputed all cases in which we had patient baseline data [21]. Therefore, we used multiple imputation,

as implemented in SAS Proc MI [22]. This procedure uses the distribution of existing co-variables to estimate a distribution of values for missing variables, in multiple iterations, to generate 20 completed datasets. Imputed values for binary and categorical variables were rounded and truncated to the nearest category [23]. Final parameter estimates, confidence intervals, and significance tests were calculated using standard methods for combining results across the 20 imputed data sets [23,24] as implemented in Proc MIANALYZE.

To explore whether any measured patient factors were associated with concordance in the pre-specified indicators across communication domains (functioning; 1 selected medication barrier- concern about side effects; 1 selected psychosocial barrier-problems with pain; medication changes; diagnoses), we created separate multivariate logistic regression models, using the imputed datasets as above. We pre-specified the co-variables for all multivariate models as follows: age, language (English, Spanish, or Cantonese), race, use of language interpreter, educational attainment, and number of cardiac diagnoses as determined by the physician. For each model, we only included the participants with a positive response for that communication domain. For instance, the medication changes model included only the participants for whom medication changes were made at their visit. We chose this approach because we felt that concordance on the *absence* of an action or barrier would differ significantly from concordance on the *presence* of an action or barrier. We expect clinician's lack of awareness of barriers to be more likely to interfere with appropriate treatment strategies than agreement about a lack of barriers.

3. Results

Of 269 patients approached, we enrolled 179 patients (67%) treated by 56 physicians, including both resident and attending physicians. Eighty-five patients (31%) refused, and 5 (2%) could not demonstrate understanding of the informed consent. For 107 (60%) of the encounters of enrolled patients, physicians completed a post-visit survey; abstracted chart data regarding diagnoses and medication changes were obtained for 58 (80%) of the remaining encounters. For every case, there was a patient baseline survey. However, in 15 cases physician responses were completely imputed, and in 2 cases the patient post-visit responses were imputed.

The patient population was ethnically diverse, with overall low educational attainment and a high prevalence of limited health literacy (Table 1). Forty-two percent were English speakers, 43% Spanish speakers, and 15% Cantonese speakers. The population had a significant illness burden, with 124 (69%) reporting either fair or poor health status.

First, with respect to cardiac functional status, physicians significantly underestimated patients' NYHA class (Figure 2). For example, among the 19 participants with cardiac symptoms even at rest (NYHA Class IV), physicians were discordant in 16 of 19 cases (82%); the magnitude of this difference was at least 2 NYHA Classes in 14 of 19 (74%) cases. Second, physicians were commonly unaware of patients' medication barriers (Table 2). The most common medication barrier for patients was concern about side effects, but their physicians were concordant in identifying this as a patient barrier only 23% of the time. Third, patients' psychosocial barriers almost always went unrecognized, with concordance ranging from only 7–18% of cases (Table 2).

Discordance was also present in explanatory-type communication domains. First, we found that patients' ability to report diagnoses varied, ranging from 22% for hypertension to 63% for valvular heart disease (Table 3). In addition, patients reported the correct number of medication changes 52–67% of the time, depending on the type of change (Table 3).

Overall, for 59% of patients, physicians reported medication changes. Of these, only 46% of patients reported complete concordance with physician reports.

In our exploratory multivariate analyses, we did not find consistent or significant associations between concordance in any communication domain and age, language, race/ethnicity, use of language interpreter, educational attainment, or number of cardiac diagnoses (Table 4). Among English and Spanish speakers, we did not find an association between health literacy level and concordance, when adjusted as above for age, language interpretation, race/ethnicity, and number of cardiac diagnoses (data not shown).

4. Discussion and Conclusion

4.1 Discussion

In a diverse, largely uninsured population with chronic cardiac disease cared for in a public hospital cardiology clinic, we found a marked lack of concordance across multiple communication domains, especially in physician elicitation of patient concerns. Concordance, or agreement between patient and physician about the patient's diagnosis, patient's health status and treatment plan and treatment/self-care barriers, is a crucial indicator and outcome of high-quality communication [10,25,26]. Poor concordance between patient and physician regarding the standing medication regimen has been reported in a number of studies conducted in a variety of ambulatory settings, but mainly in primary care [10,27–32]. This suggests that poor communication is common and widespread – a problem that can be greatly exacerbated when there are frequent medication changes and cultural and language differences between patients and physicians [33]. Recent studies suggest that limited health literacy and limited English proficiency jeopardize many domains of patient-physician communication, even in the presence of language interpretation or language-concordant physicians [34,35]. Perhaps because communication difficulties were so widespread, our exploratory analyses did not identify patient characteristics that were independently associated with worse concordance.

Poor concordance has been linked to unfavorable outcomes, including decreased patient satisfaction [36–38], worse adherence to future appointments [36–40], and some health outcomes [41–44]. As an example, one recent study in anticoagulant care demonstrated that concordance for medication regimen was associated with fewer medication errors and better disease control[11].

Our study was set in an ambulatory sub-specialty clinic, in which communication has not been well characterized. Similarities to the primary care setting include care of chronic illness, the structure of the short office visit every few months, and the emphasis on medication use. However, the cardiology encounter does not have to address the breadth of issues that a primary care visit does; thus, one would expect a narrower focus of the communication in the cardiology setting than in primary care. We would expect the focus on a single body system to result in greater concordance.

We found significant impairment in elicitation-type communication. As expected in a setting that provides care to vulnerable populations, a significant proportion of patients reported psychosocial barriers, and physicians were often unaware of these factors. Similar findings have been demonstrated in other clinical settings, including those that care for insured patients [45–47]. Insofar as patients may not report medication and/or psychosocial barriers to their physicians because of social desirability, social distance and/or concerns related to stigma, our findings suggest that physicians need to ask and be aware of the social factors that affect their patients' self-management. This is particularly critical when working with patients that have multiple barriers to self-management. Communication techniques that can

help uncover such sensitive topics have been shown to be effective [48,49], and may be useful in ambulatory cardiology practice. Similarly, communication training that enables patients to be more active participants in visits can improve communication and even health outcomes [50]. Importantly, this study included resident physicians, and their lack of clinical experience may have contributed to poor elicitation-type communication. Elicitation-type communication is critical to patient-centeredness, which in turn is fundamental to quality medical care [8].

Similarly, explanatory communication was also sub-optimal. For instance, we find it alarming that only 15% of those with hypertension could report having it as a diagnosis, since those who do not recognize themselves as having a condition may be less likely to adhere to medications and lifestyle recommendations. Those patients with valvular heart disease were most likely to report it, which may reflect either the long duration or severity of the condition, or the relative ease with which valvular disease can be explained.

While we asked physicians and patients about medication changes immediately following the encounter, patients nevertheless, often could not correctly report medication changes. While poor recall of medication changes has been previously demonstrated [51], this is exacerbated by the ever-expanding number of medications used in ambulatory cardiology practice.

Our study has notable strengths, including its inclusion of multiple communication domains, the very diverse patient population, and its setting in an ambulatory cardiology practice. However, it has a number of limitations. First, while communication is particularly important in the context of limited health literacy and English proficiency, our results may not generalize to more affluent and educated populations cared for in non-teaching environments. However, a study among congestive heart failure patients found significant medication discordance even in an English-speaking, community-based, insured sample[10]. Second, the modest sample size limited our ability to construct complex multivariate models with large numbers of potential predictors and adjust for within-provider clustering. Third, not all physicians completed the post-visit survey. We addressed this at the time of data collection by abstracting as much information as possible from the chart; we acknowledge that providers may have had verbal communication about medication use, barriers, and psychosocial barriers that they did not include in chart documentation. To address missing data in the analysis stage, we used multiple imputation techniques, a preferred technique to address non-response bias [24]. Fourth, we do not have information about the proportion of physician-respondents who were trainees. Fifth, we did not ask patients to report the names and doses of their new medications, but instead the count. We chose this approach because prior studies have shown that physicians do not always tell the patient the name and dose of a new medication when it is prescribed [31,32], but even with a simple count, concordance was no better than 50%.

4.2 Conclusion

Overall, patient-physician concordance in both elicitation and explanatory domains of communication was sub-optimal in this study of socially vulnerable adults with CVD. Even in a setting with consistent professional language interpretation, physicians were frequently unaware of patients' functioning status and barriers, while patients frequently did not come away with a clear understanding of their diagnosis or treatment plan.

This pervasive medication regimen discordance underscores the importance of real-time ambulatory medication reconciliation, using visual as well as written display [52–55]. Moreover, regimen discordance has the potential to cause adverse drug events, and may

partly explain the high prevalence of CVD medications as causes of adverse drug events leading to emergency department visits [56].

4.3 Practice Implications

As in prior studies [17,57], we found that physicians underestimated patient cardiac functional status, and this effect was most pronounced among those with the most functional limitation. This under-recognition is particularly concerning, because patients' NYHA class typically guides cardiologists' treatment [58]. Moreover, physicians were frequently unaware of patients' barriers to medication use. Some of these barriers, including concern for side effects and effectiveness, as well as limited understanding of regimen, might directly be addressed in the ambulatory visit were the physicians to have elicited them. Prior studies have shown that medication counseling can improve patient regimen understanding and adherence [10,59,60].

These findings underscore the need to improve communication in ambulatory specialty settings, particularly for those with limited health literacy and limited English proficiency. Standards and certification for non-English language fluency [61], and medical interpretation may be useful and certainly merit further study. Moreover, previous research with limited health literacy populations has demonstrated several effective communication techniques, which may be useful in improving concordance [62]. For example, the "teach-back" method, in which providers ask patients to re-state key information, has been associated with better metabolic control among patients with diabetes [59], improvements in self management among asthma patients [63], and increased comprehension of informed consent information [64], regardless of health literacy. In addition, communication aids such as visual medication schedules have been shown to improve patients' understanding, reduced medication errors, and, in the case of oral anticoagulation, improve outcomes [52–55]. Evidence-based communication strategies such as these should become part of routine clinical care for ambulatory cardiac patients, especially in safety-net settings.

Future research should examine both predictors of poor concordance in ambulatory CVD care, to determine which patients are at highest risk for poor communication. Moreover, possible adverse health outcomes associated with discordant communication should be studied, particularly in ambulatory CVD.

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References

1. American Heart Association. Heart Disease and Stroke Statistics Update. 2009.
2. Office of Minority Health and Disparities, Centers for Disease Control and Prevention. Cardiovascular Health Disparities Factsheet. 2009.
3. Trogon JG, Finkelstein EA, Nwaise IA, Tangka FK, Orenstein D. The economic burden of chronic cardiovascular disease for major insurers. *Health Promot Pract.* 2007; 8(3):234–42. [PubMed: 17606951]

4. Riegel B, Moser DK, Anker SD, Appel LJ, Dunbar SB, Grady KL, et al. State of the science: promoting self-care in persons with heart failure: a scientific statement from the American Heart Association. *Circulation*. 2009; 120(12):1141–63. [PubMed: 19720935]
5. Institute of Medicine. Crossing the quality chasm: A new health system for the 21st century. Washington, DC: National Academy Press, Institute of Medicine Committee on Quality of Health Care in America; 2001.
6. Stewart AL, Napoles-Springer AM, Gregorich SE, Santoyo-Olsson J. Interpersonal processes of care survey: patient-reported measures for diverse groups. *Health Serv Res*. 2007; 42(3 Pt 1):1235–56. [PubMed: 17489912]
7. Schillinger D. Literacy and health communication: reversing the ‘inverse care law’. *Am J Bioeth*. 2007; 7(11):15–8. discussion W1–2. [PubMed: 18027291]
8. Institute of Medicine Committee on Quality Health Care in America. Crossing the Quality Chasm: A New Health System for the 21st Century. Washington, D.C: National Academy Press; 2001. Improving the 21st-Century Health Care System; p. 39-60.
9. Anderson EB. Patient-centeredness: a new approach. *Nephrol News Issues*. 2002; 16(12):80–2. [PubMed: 12452113]
10. Hulka BS, Cassel JC, Kupper LL, Burdette JA. Communication, compliance, and concordance between physicians and patients with prescribed medications. *Am J Public Health*. 1976; 66(9): 847–53. [PubMed: 961952]
11. Schillinger D, Wang F, Rodriguez M, Bindman A, Machtinger EL. The importance of establishing regimen concordance in preventing medication errors in anticoagulant care. *J Health Commun*. 2006; 11(6):555–67. [PubMed: 16950728]
12. Cene CW, Roter D, Carson KA, Miller ER 3rd, Cooper LA. The effect of patient race and blood pressure control on patient-physician communication. *J Gen Intern Med*. 2009; 24(9):1057–64. [PubMed: 19575270]
13. Gilbert DA, Hayes E. Communication and outcomes of visits between older patients and nurse practitioners. *Nurs Res*. 2009; 58(4):283–93. [PubMed: 19609180]
14. Baker DW, Williams MV, Parker RM, Gazmararian JA, Nurss J. Development of a brief test to measure functional health literacy. *Patient Educ Couns*. 1999; 38(1):33–42. [PubMed: 14528569]
15. Bennett JA, Riegel B, Bittner V, Nichols J. Validity and reliability of the NYHA classes for measuring research outcomes in patients with cardiac disease. *Heart Lung*. 2002; 31(4):262–70. [PubMed: 12122390]
16. Schlant RC, Forman S, Stamler J, Canner PL. The natural history of coronary heart disease: prognostic factors after recovery from myocardial infarction in 2789 men. The 5-year findings of the coronary drug project. *Circulation*. 1982; 66(2):401–14. [PubMed: 7094247]
17. Goldman L, Hashimoto B, Cook EF, Loscalzo A. Comparative reproducibility and validity of systems for assessing cardiovascular functional class: advantages of a new specific activity scale. *Circulation*. 1981; 64(6):1227–34. [PubMed: 7296795]
18. Zaza C, Baine N. Cancer pain and psychosocial factors: a critical review of the literature. *J Pain Symptom Manage*. 2002; 24(5):526–42. [PubMed: 12547052]
19. Fang MC, Panguluri P, Machtinger EL, Schillinger D. Language, literacy, and characterization of stroke among patients taking warfarin for stroke prevention: Implications for health communication. *Patient Educ Couns*. 2009; 75(3):403–10. [PubMed: 19171448]
20. Braunwald’s Heart Disease: A Textbook of Cardiovascular Medicine. Philadelphia: Saunders/Elsevier; 2008.
21. Slymen DJ, Drew JA, Wright BL, Elder JP, Williams SJ. Item non-response to lifestyle assessment in an elderly cohort. *Int J Epidemiol*. 1994; 23(3):583–91. [PubMed: 7960386]
22. Schafer J, Graham J. Missing data: Our view of the state of the art. *Psychological Methods*. 2002; 7(2):147–177. [PubMed: 12090408]
23. Allison, P. Missing Data. Thousand Oaks: Sage Publications; 2002.
24. Rubin, D. Multiple imputation for nonresponse in surveys. New York: Wiley; 1987.
25. Bedell SE, Jabbour S, Goldberg R, Glaser H, Gobble S, Young-Xu Y, et al. Discrepancies in the use of medications: their extent and predictors in an outpatient practice. *Arch Intern Med*. 2000; 160(14):2129–34. [PubMed: 10904455]

26. Hulka BS, Kupper LL, Cassel JC, Efird RL. Medication use and misuse: physician-patient discrepancies. *J Chronic Dis.* 1975; 28(1):7–21. [PubMed: 1110265]
27. Lesar TS, Briceland L, Stein DS. Factors related to errors in medication prescribing. *JAMA.* 1997; 277(4):312–7. [PubMed: 9002494]
28. Field K, Ziebland S, McPherson A, Lehman R. ‘Can I come off the tablets now?’ A qualitative analysis of heart failure patients’ understanding of their medication. *Fam Pract.* 2006; 23(6):624–30. [PubMed: 16837480]
29. Liaw ST, Young D, Farish S. Improving patient-doctor concordance: an intervention study in general practice. *Fam Pract.* 1996; 13(5):427–31. [PubMed: 8902510]
30. Richard C, Lussier MT. Nature and frequency of exchanges on medications during primary care encounters. *Patient Educ Couns.* 2006; 64(1–3):207–16. [PubMed: 16781108]
31. Tarn DM, Heritage J, Paterniti DA, Hays RD, Kravitz RL, Wenger NS. Physician communication when prescribing new medications. *Arch Intern Med.* 2006; 166(17):1855–62. [PubMed: 17000942]
32. Tarn DM, Paterniti DA, Kravitz RL, Heritage J, Liu H, Kim S, et al. How much time does it take to prescribe a new medication? *Patient Educ Couns.* 2008; 72(2):311–9. [PubMed: 18406562]
33. Cooper LA, Beach MC, Johnson RL, Inui TS. Delving below the surface. Understanding how race and ethnicity influence relationships in health care. *J Gen Intern Med.* 2006; 21 (Suppl 1):S21–7. [PubMed: 16405705]
34. Schillinger D, Bindman A, Wang F, Stewart A, Piette J. Functional health literacy and the quality of physician-patient communication among diabetes patients. *Patient Educ Couns.* 2004; 52(3): 315–23. [PubMed: 14998602]
35. Sudore RL, Landefeld CS, Perez-Stable EJ, Bibbins-Domingo K, Williams BA, Schillinger D. Unraveling the relationship between literacy, language proficiency, and patient-physician communication. *Patient Educ Couns.* 2009; 75(3):398–402. [PubMed: 19442478]
36. Fagerberg CR, Kragstrup J, Stovring H, Rasmussen NK. How well do patient and general practitioner agree about the content of consultations? *Scand J Prim Health Care.* 1999; 17(3):149–52. [PubMed: 10555243]
37. Wartman SA, Morlock LL, Malitz FE, Palm E. Impact of divergent evaluations by physicians and patients of patients’ complaints. *Public Health Rep.* 1983; 98(2):141–5. [PubMed: 6602349]
38. Lieberman JR, Dorey F, Shekelle P, Schumacher L, Thomas BJ, Kilgus DJ, et al. Differences between patients’ and physicians’ evaluations of outcome after total hip arthroplasty. *J Bone Joint Surg Am.* 1996; 78(6):835–8. [PubMed: 8666600]
39. Chesney AP, Brown KA, Poe CW, Gary HE Jr. Physician-patient agreement on symptoms as a predictor of retention in outpatient care. *Hosp Community Psychiatry.* 1983; 34(8):737–9. [PubMed: 6618454]
40. Goldman L, Freidin R, Cook EF, Eigner J, Grich P. A multivariate approach to the prediction of no-show behavior in a primary care center. *Arch Intern Med.* 1982; 142(3):563–7. [PubMed: 7065791]
41. Stewart MA, McWhinney IR, Buck CW. The doctor/patient relationship and its effect upon outcome. *J R Coll Gen Pract.* 1979; 29(199):77–81. [PubMed: 480298]
42. Bass MJ, Buck C, Turner L, Dickie G, Pratt G, Robinson HC. The physician’s actions and the outcome of illness in family practice. *J Fam Pract.* 1986; 23(1):43–7. [PubMed: 3723083]
43. Berkanovic E, Hurwicz ML, Lachenbruch PA. Concordant and discrepant views of patients’ physical functioning. *Arthritis Care Res.* 1995; 8(2):94–101. [PubMed: 7794992]
44. Starfield B, Steinwachs D, Morris I, Bause G, Siebert S, Westin C. Patient-doctor agreement about problems needing follow-up visit. *JAMA.* 1979; 242(4):344–6. [PubMed: 556592]
45. Borus JF, Howes MJ, Devins NP, Rosenberg R, Livingston WW. Primary health care providers’ recognition and diagnosis of mental disorders in their patients. *Gen Hosp Psychiatry.* 1988; 10(5): 317–21. [PubMed: 3169532]
46. Kirmayer LJ, Robbins JM, Dworkind M, Yaffe MJ. Somatization and the recognition of depression and anxiety in primary care. *Am J Psychiatry.* 1993; 150(5):734–41. [PubMed: 8480818]

47. Ormel J, Koeter MW, van den Brink W, van de Willige G. Recognition, management, and course of anxiety and depression in general practice. *Arch Gen Psychiatry*. 1991; 48(8):700–6. [PubMed: 1883252]
48. Brown JD, Wissow LS. Discussion of sensitive health topics with youth during primary care visits: relationship to youth perceptions of care. *J Adolesc Health*. 2009; 44(1):48–54. [PubMed: 19101458]
49. Ford CA, Millstein SG, Halpern-Felsher BL, Irwin CE Jr. Influence of physician confidentiality assurances on adolescents' willingness to disclose information and seek future health care. A randomized controlled trial. *JAMA*. 1997; 278(12):1029–34. [PubMed: 9307357]
50. Kaplan SH, Greenfield S, Ware JE Jr. Assessing the effects of physician-patient interactions on the outcomes of chronic disease. *Med Care*. 1989; 27(3 Suppl):S110–27. [PubMed: 2646486]
51. Clark T, Sleath B, Rubin RH. Influence of ethnicity and language concordance on physician-patient agreement about recommended changes in patient health behavior. *Patient Educ Couns*. 2004; 53(1):87–93. [PubMed: 15062909]
52. Houts PS, Doak CC, Doak LG, Loscalzo MJ. The role of pictures in improving health communication: a review of research on attention, comprehension, recall, and adherence. *Patient Educ Couns*. 2006; 61(2):173–90. [PubMed: 16122896]
53. Houts PS, Witmer JT, Egeth HE, Loscalzo MJ, Zabora JR. Using pictographs to enhance recall of spoken medical instructions II. *Patient Educ Couns*. 2001; 43(3):231–42. [PubMed: 11384821]
54. Schillinger D, Machtinger EL, Wang F, Palacios J, Rodriguez M, Bindman A. Language, literacy, and communication regarding medication in an anticoagulation clinic: a comparison of verbal vs. visual assessment. *J Health Commun*. 2006; 11(7):651–64. [PubMed: 17074733]
55. Yin HS, Dreyer BP, van Schaick L, Foltin GL, Dinglas C, Mendelsohn AL. Randomized controlled trial of a pictogram-based intervention to reduce liquid medication dosing errors and improve adherence among caregivers of young children. *Arch Pediatr Adolesc Med*. 2008; 162(9):814–22. [PubMed: 18762597]
56. Budnitz DS, Pollock DA, Weidenbach KN, Mendelsohn AB, Schroeder TJ, Annest JL. National surveillance of emergency department visits for outpatient adverse drug events. *Jama*. 2006; 296(15):1858–66. [PubMed: 17047216]
57. Hobbs FD, Jones MI, Allan TF, Wilson S, Tobias R. European survey of primary care physician perceptions on heart failure diagnosis and management (Euro-HF). *Eur Heart J*. 2000; 21(22):1877–87. [PubMed: 11052861]
58. Hunt SA, Abraham WT, Chin MH, Feldman AM, Francis GS, Ganiats TG, et al. 2009 focused update incorporated into the ACC/AHA 2005 Guidelines for the Diagnosis and Management of Heart Failure in Adults: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines: developed in collaboration with the International Society for Heart and Lung Transplantation. *Circulation*. 2009; 119(14):e391–479. [PubMed: 19324966]
59. Schillinger D, Piette J, Grumbach K, Wang F, Wilson C, Daher C, et al. Closing the loop: physician communication with diabetic patients who have low health literacy. *Arch Intern Med*. 2003; 163(1):83–90. [PubMed: 12523921]
60. Piette JD, Schillinger D, Potter MB, Heisler M. Dimensions of patient-provider communication and diabetes self-care in an ethnically diverse population. *J Gen Intern Med*. 2003; 18(8):624–33. [PubMed: 12911644]
61. Diamond LC, Reuland DS. Describing physician language fluency: deconstructing medical Spanish. *JAMA*. 2009; 301(4):426–8. [PubMed: 19176445]
62. Sudore RL, Schillinger D. Interventions to Improve Care for Patients with Limited Health Literacy. *Journal of Clinical Outcomes Management: JCOM*. 2009; 16(1):20–29. [PubMed: 20046798]
63. Paasche-Orlow MK, Riekert KA, Bilderback A, Chanmugam A, Hill P, Rand CS, et al. Tailored education may reduce health literacy disparities in asthma self-management. *Am J Respir Crit Care Med*. 2005; 172(8):980–6. [PubMed: 16081544]
64. Sudore RL, Landefeld CS, Williams BA, Barnes DE, Lindquist K, Schillinger D. Use of a modified informed consent process among vulnerable patients: a descriptive study. *J Gen Intern Med*. 2006; 21(8):867–73. [PubMed: 16881949]

Figure 1.
Conceptual Model of Patient-Provider Communication in the Ambulatory Encounter

Figure 2.
Patient-physician concordance on degree of cardiac symptoms, N=179

Table 1

Characteristics of 179 Patients, Cardiology Clinic, Alameda County Medical Center, 2004–2005.

	Total	English	Spanish	Cantonese
	(N=179)	N=75	N=77	N=27
	N(%) or Mean (SD)	N(%) or Mean (SD)	N(%) or Mean (SD)	N(%) or Mean (SD)
Demographics				
Age 18–29	10 (6)	1 (1)	9 (5)	0
30–39	12 (7)	1 (1)	11 (6)	0
40–49	34 (19)	20 (11)	11 (6)	3 (2)
50–59	65 (36)	33 (18)	24 (13)	8 (4)
60–69	41 (23)	14 (8)	13 (7)	14 (8)
70–79	13 (7)	3 (2)	8 (4)	2 (1)
80+	4 (2)	3 (2)	1 (1)	0
Health Status				
Excellent	4 (2)	0	3 (2)	1 (1)
Very Good	14 (8)	9 (5)	4 (2)	1 (1)
Good	36 (20)	14 (8)	19 (11)	3 (2)
Fair/Poor	124 (69)	51 (28)	51 (28)	22 (13)
Race/ethnicity				
African American	34 (19)	34 (19)	0	0
Latino/a	85 (47)	9 (5)	76 (42)	0
Non-Hispanic White	14 (8)	14 (8)	0	0
Asian/Pacific Islander	42 (23)	15 (8)	0	27 (15)
Other/Decline to state	4 (2)	3 (2)	1 (1)	0
Educational attainment				
Less than high school	89 (50)	12 (7)	63 (35)	14 (8)
High school graduate	36 (20)	22 (12)	9 (5)	5 (3)
More than high school	54 (30)	41 (23)	5 (3)	8 (4)
Always Use Interpreter	52 (50)	NA	38 (37)	14 (13)
Health literacy*				
Limited	58 (40)	14 (10)	44 (30)	NA
Adequate	87 (60)	57 (40)	30 (20)	NA

* Health literacy measurement is available only in English and Spanish

Table 2

Elicitation-type communication domains about barriers to self-management in 179 patients, Cardiology Clinic, Alameda County Medical Center, 2004–2005

Domain	Frequency of Barrier	Frequency of Physician concordance
	N (% of total respondents)	N (% of total <i>with barrier</i>)
Medication Barriers		
- running out of pills	24 (13)	6 (25)
- inability to pay	7 (3.9)	0 (0)
- concern about side effects	32 (18)	7(23)
- concern about effectiveness	14 (7.8)	1 (9)
- limited understanding of instructions	5 (2.8)	1 (23)
Psychosocial Barriers		
-inadequate finances	55 (31)	6 (11)
-family concerns	35 (20)	5 (14)
-housing instabilty	18 (10)	1 (7)
-pain	60 (34)	11 (18)

* Responses are deemed concordant if the physician response matches the patient response, which is the gold standard for these domains.

Table 3

Explanatory-type communication domains in 179 patients, Cardiology Clinic, Alameda County Medical Center, 2004–2005

Domain	Frequency of diagnosis or medication change	Frequency of Patient concordance
	N (% of total respondents)	N (% of total <i>with diagnosis or medication change</i>)
Diagnosis		
coronary disease	78 (43)	38 (49)
heart failure	39 (22)	17 (45)
valvular heart disease	36 (20)	23 (63)
hypertension	72 (40)	9 (13)
arrhythmia	40 (22)	14 (34)
Medication Changes		
Meds initiated	75 (42)	43 (57)
Meds discontinued	34 (19)	23 (67)
Meds increased	36 (20)	24 (66)
Meds decreased	18 (10)	9 (52)
Overall Med Changes	106 (59)	48 (46)

* Responses are deemed concordant if the patient response matches the physician response, which is the gold standard for these domains.

Table 4

Adjusted associations of patient characteristics with concordance in selected domains in 179 patients, Cardiology Clinic, Alameda County Medical Center, 2004–2005

	Severe symptom discordance	Medication Barrier discordance	Psychosocial barrier discordance	Medication change concordance	Diagnosis concordance
Age	1.01 (.97–1.05)	1.2 (0.9–1.56)	1.2 (0.9–1.58)	0.98 (0.94–1.03)	
Language: Cantonese vs English	0.71 (0.13–4.05)	1.02 (0.06–16.18)	0.18 (0.003–11.36)	0.25 (0.05–1.2)	
Language: Spanish vs English	0.55 (0.12–2.5)	0.72 (0.01–35)	6.5 (0.04–999)	0.33 (0.08–1.3)	
Interpreter use: Often/always vs Never/rarely/some	*	**	***	1.1 (0.3–4.5)	
Race/Ethnicity	1.6 (0.39–6.4)	**	***	0.35 (0.10–1.2)	
Education: Less than HS Grad vs More than HS	1.4 (0.36–5.6)	10.6 (0.08–1343)	1.6 (0.12–22)	2.5 (0.69–9.1)	
Education: HS/GED vs More than HS	1.9 (0.51–6.8)	9.5 (0.12–779)	2.5 (0.15–41)	2.26 (0.68–7.4)	
Number of cardiac diagnoses	0.9 (0.42–2.03)	0.28 (0.03–2.8)	0.6 (0.09–4.2)	0.7 (0.36–1.3)	

* Severe symptom concordance for all participants – excluded interpreter use and just used language

** Medication barrier: concerned about side effects for patients that reported the barrier (n=32) – excluded interpreter use and race.

*** Psychosocial barrier: problems with pain for patients that reported this barrier (n=60) – excluded interpreter use and race.