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Medical Jargon in the Communication between Physicians and their Patients with
Low Functional Health Literacy and Type II Diabetes

by

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INTRODUCTION

Results from the National Adult Literacy Survey's (NALS) reveal that nearly half of Americans read at lower grade levels-- a quarter of the US population with marginal abilities and another quarter with more severe difficulties. Interestingly, about two-thirds of individuals classified as inadequately literate by the NALS described themselves as being able to read 'well' or 'very well'.^[5] In aggregate, 80% are White, native-born Americans.^[2] However, a disproportionate number are members of specific subgroups such as inner-city dwellers, ethnic minority groups, and rural area inhabitants. Education proponents cite that rudimentary reading skills preclude full participation in society's economic and social processes.^[3] The adult literacy literature ascribes the enhancement of voice, the change in perception of self and self to others, and the initiation of both individual and collective social actions to reading abilities.^[4] Moreover, language and literacy enhance critical analysis of information and facilitate construction of meaning. This may foster a sense of control and empowerment that enables people to find their voice, make it audible, and consequently enact change around them.^[4]

Chronic disease has supplanted infectious disease as the major cause of sickness and death and has consequently compelled health maintenance organizations to maintain a healthy clientele via health education and prevention strategies. Moreover, cost-conscious measures have shifted the burden of chronic disease management to the outpatient setting. This places increasing demands on the patient who must first be within the stream of sound medical information, be able to comprehend the information, act on the information, self-assess health behavior, and then modify such behavior in

order to satisfactorily manage his or her chronic disease(s).[7] Requisites for proper reading skills include adequate vision, concentration, word recognition, working memory, and information processing.[6] Professionals in the field of diabetes and nutrition cite cognitive skills involving interpretation and problem solving as the most difficult for diabetic patients to master.[8] In the example of insulin dose adjustments, successful patients make decisions based on earlier information (previous doses of insulin injected), current information (blood glucose results), and anticipated factors (exertion / food intake).[8] The successful chronic disease sufferer thus incorporates treatment variables into three time frames (past, present, and future) and applies them to their reasoning. Poor literacy skills may thwart adequate descriptions of one's health thus possibly complicating history taking. [77] Medical jargon may also cloud communication between physicians and their patients.

THE ABC's of FUNCTIONAL HEALTH LITERACY

FUNCTIONAL HEALTH LITERACY

Functional health literacy (FHL) indicates the ability to apply literacy skills to health-related materials such as prescription labels, appointment slips, discharge instructions, and informed consent forms.[9] It reflects one's capacity to successfully function as a patient and adequately navigate the medical system. Impairments in FHL suggest deficits in written and verbal comprehension and even an impaired ability to conceptualize risk. In non-industrialized countries, improved population literacy independently correlates with better health status, increased participation in screening

efforts, and an increased willingness to adopt health prevention behaviors.[10] Recent U.S. studies, while fewer in number, note a similar trend between health status and literacy. Whether there is direct or indirect causality is not known. Before delving into these studies and the implications of low FHL for both patients and doctors, screening instruments currently in use will be briefly reviewed.

SCREENING FOR LITERACY

Adequate identification of low literate patients facilitates the acquisition of accurate prevalence rates and identifies vulnerable individuals who can benefit from an increased attention to their needs. This necessitates screening with feasible and valid instruments. Their use in the medical setting might be novel but they are commonplace in education and in the employment sector.[11] Two general approaches include aggregate and individual screening. Aggregate testing of patients yields an overall profile of a clinic's population literacy levels. This information may prove informative when devising patient education materials and/or clinical interventions.[11] Individual testing might guide physicians towards alternative communication approaches if the patient fares poorly because such patients would not benefit from the common educational strategies employed by clinics.

Ethically, aggregate testing is favored over individual testing unless a health education intervention is in place. Moreover, not unlike genetic screening, health care workers should ideally refrain from recording literacy scores in patients' charts for fear of negative repercussions from employers.[11] Confidentiality issues thus remain salient, particularly in situations where no remedy is available. Screening is limited by its ability

to detect the presence of a reading impairment but not its type or etiology.[11, 12] Despite not yielding a comprehensive depiction of one's reading impairment, screening instruments rapidly offer a practical "score". The Test of Functional Health Literacy in Adults (TOFHLA) consists of a 50-item reading comprehension and 17-item numerical ability test, taking up to 22 minutes to administer.[9] It requires test takers to read and fill in missing words on selected passages (a Cloze-type test) covering an upper GI series, Medicaid application, and informed consent. It is available in English and Spanish. A recently abbreviated version of it, the S-TOFHLA, retains the Cloze-type style with 4 numeracy items and 2 prose passages.[13] It takes up to 12 minutes to administer and a Spanish version is similarly available. The S-TOFHLA has proven feasible to administer to a large number of bilingual patients within an urban public hospital.[14] Both the TOFHLA and the S-TOFHLA subsume individuals under three categories: adequate, marginal, and inadequate.

The Rapid Estimate of Adult Literacy in Medicine (REALM) is a commonly employed word recognition test. It measures the ability to read and pronounce common medical words or layman's terms for body parts and illness.[11, 12] Unlike the TOFHLA, it does not assess reading comprehension. The rationale behind the REALM lies in the belief that difficulty with pronunciation is predictive of difficulty with comprehension, a higher order skill.[11] The advantage of the REALM lies in its two to three minute administration time. The disadvantages include English-only availability and its validation solely in adults. The Wide Range Achievement Test (WRAT-3) is another word recognition test with a target audience between the ages of 5 – 74 and a three to five minute administration time.[15] The effectiveness of the exam is blemished

by its widely recognized difficulty level for populations of lower socioeconomic status and its English-only availability.[11] Spanish possesses regular phoneme-grapheme correspondence (usual representation of one sound with one letter) unlike English, making it amenable to pronunciation. Therefore, a Spanish language word recognition test would lead to scores higher than actual abilities and thus present as missed opportunities for identification were they to be employed. Current inquiries about health literacy tend to employ the TOFHLA, S-TOFHLA, or REALM as screening instruments. Equipped with these tools, researchers continue to investigate the effects which low literacy generates for patients and practitioners.

IMPLICATIONS FOR PATIENTS

An individual's health literacy might actually be worse than one's general literacy for reasons to be explained later. Educational and reading levels are not fully congruent. An equal number of schooling years amongst people does not necessarily reflect equal educational attainment—only education attempted. In general and across socioeconomic groups, one's reading level is about four grades below their years of schooling.[16] Even among those with a high school degree or its equivalent, wide variation in functional health literacy exists.[17] Inquiries about the prevalence of illiteracy in the medical setting provide the impetus for current and future observational and interventional studies. In a cross-sectional survey of about 3200 Medicare enrollees, 34% of English-speakers and 54% of Spanish-speakers had inadequate or marginal health literacy as assessed by the S-TOFHLA.[18] In a study of 2659 English and Spanish speaking from two public hospitals, 42% struggled with directions for taking medications

on an empty stomach, 26% had difficulties with an appointment slip, and 60% had problems with an informed consent document.[17] A third of English speakers and nearly two-thirds of Spanish speakers scored low on the TOFHLA. Among the elderly (≥ 60 years), both groups had an 80% low FHL prevalence rate. In another cross-sectional survey, the administration of the REALM to a convenience sample of 483 patients with asthma revealed that 40% read at the sixth grade or below.[19] In a group of patients with hypertension or diabetes presenting to two outpatient clinics, 60% of hypertensives and 55% of diabetics exhibited marginal to low FHL as determined by the TOFHLA.[20] Of 237 patients attending an anticoagulation clinic, the inadequate FHL prevalence reached 46%.[21] In a municipal hospital setting, screening for FHL in 63 African-American outpatients revealed that 53% of new patients and 75% of established patients were marginally or inadequately literate.[22] The small 'n' of this study and its use of minority diabetics pose issues of external validity. The study data reveal that alternative patient education strategies are needed at least for that hospital's minority diabetic population. Such information may potentially augment care and kindle screening in other hospitals and patient subgroups.

Following the unmasking of widespread impaired literacy, investigation of patient-oriented materials in the health care setting found them to be written at levels that surpass the capabilities of the average individual. Such materials include educational brochures, discharge instructions, and informed consent forms. They are written at the 10th grade level and beyond whereas the mean reading level of US adults is at grade 8 and the mean reading level of Medicaid enrollees is at grade 5.[23] Most recently, a study examining health information on the internet found that English-language web sites had

an average collegiate reading level while Spanish-language sites required a lower yet unacceptable 10th grade level ($p < 0.003$). [24] Emergency Department (ED) discharge instructions have a mean reading level of 10th grade. [25, 26] Davis et al. concluded that patient education materials in their clinic sites required a reading level of 11th to 14th grade while standard institutional forms necessitated collegiate level skills. That exceeded the capacity of their 6th grade level patients. [27] The Journal of the American Medical Association's Patient Page demands that readers possess an 11th to 12th grade reading ability. [23] A collegiate or graduate school reading ability will enable a patient to comprehend consent forms for research projects, cancer trials, and invasive procedures. [10] The vast divide between the demands of written information and actual abilities of the target audience raises the specter of adverse health effects from inadequate comprehension lending further currency to the notion that impaired health literacy itself connotes poorer health.

People with lower health literacy tend to experience greater illness severity than people with higher health literacy. [28] Extremely low literate subjects from an adult literacy training program had poorer physical health as assessed by the Sickness Impact Profile. The significant association held after adjusting for confounding variables. [29] In a study of nearly 2700 urban public hospital patients, those with inadequate FHL were more apt to self-report their health as poor. [17] This association holds more strongly for the English-speaking patients, however, because the confidence intervals for the adjusted odds ratio of the marginally literate Spanish-speaking subjects (0.67, 1.66) suggests that some deemed themselves healthier in comparison to their adequately literate counterparts. Or it may intimate an underlying sociocultural bias by Latinos towards

optimism or feigning strength. In a prospective cohort investigation of 979 patients, those with inadequate literacy, as assessed by the TOFHLA, were more likely than their adequately literate counterparts to be hospitalized (adjusted odds ratio 1.69), have poorer health and incur higher health care costs.[30] These findings are supported by another study of 400 randomly selected Medicaid patients where individuals who read at the lowest grade level incurred an average health care cost of \$12,974 compared to \$2,969 for their more literate counterparts. Concerns for potential confounding were partially allayed because Medicaid status served as inherent controls for income and employment status.[10] HIV-infected individuals with low FHL have been found to have lower CD4 cell counts, higher viral loads, greater number of hospitalizations, and poorer health than HIV-infected individuals with higher FHL.[28, 31] In a study aiming to ascertain whether low literacy was an independent predictor of depressive symptomatology in the elderly, low FHL patients had 2.7 times the odds of manifesting depression. After controlling for health status, however, the odds ratio dropped to 1.2 thus implicating health status as the stronger predictor.[32] Inadequate access to care may appear as a plausible explanation for the poorer health of low FHL individuals. After all, the perception of poor access to medical care in communities is associated with higher rates of hospitalization for chronic diseases.[33] Williams et al., however, found that access to care is not impeded by poor reading skills and consequently, underuse of health care services fails to fully explain the relationship between literacy and health.[17]

Indirect mechanisms such as poorer knowledge, adherence, and attitudes have been posited as reasons for why low FHL individuals tend to fare worse. Someone with impaired literacy may read so slowly that incorrect conclusions are reached as a result of

missed context.[34] In one study, HIV-infected individuals with lower FHL, as assessed by the TOFHLA, were somewhat less likely to know their CD4 count and viral load. Those actually cognizant of the information, however, were less likely to understand their meaning. Lower FHL patients also harbored perceptions that anti-retrovirals minimize risks for transmission and allow for less stringent safer-sex practices.[31] In a convenience sample of 483 patients with asthma, patient reading level (assessed via REALM) was the strongest predictor of asthma knowledge score. Improper metered dose inhaler use was found in nearly 90% of patients with less than a third grade reading level versus 50% of those with a high-school level.[19] In another study, patients with hypertension or diabetes were assessed for knowledge of their hypertension or diabetes, respectively. Patients with inadequate FHL exhibited less knowledge of their chronic disease (e.g. defining high blood pressure or stating symptoms of hypoglycemia).[20] In a convenience sample of 600 pregnant women in an obstetrics clinic, lower reading levels (assessed via the REALM) were associated with less knowledge of smoking-related health effects. However, reading levels did not correlate with smoking prevalence.[35] Inadequate understanding of mammography and more negative attitudes towards breast cancer screening were found in women with inadequate health literacy.[2]

Patients with difficulties understanding their diagnosis and treatment plans tend to display poor adherence. Such patients may “tune out” while receiving advice because of delayed processing of what had been said earlier.[34] In a community sample of 182 HIV-infected individuals taking triple-drug therapy, those with low literacy (assessed via TOFHLA) were more likely to be non-adherent because of confusion, side effects, depression, and a desire to cleanse their bodies. These results held after controlling for

confounding variables such as age, ethnicity, income, and social support.[36] In a large HMO cross-sectional study of 44,181 pharmacologically treated diabetics, reduced self-monitoring of blood glucose (SMBG) was associated with lower education levels.[37] As enrollees of an HMO, it is presumed they possess some ability to navigate the medical system. Therefore, SMBG practices might actually be worse for vulnerable populations with lower FHL. Analysis of the Medical Outcomes Study revealed that among 1751 patients with diabetes mellitus, hypertension, and cardiac disease, a majority failed to fully recall their doctors' recommendations and they did not always adhere to those that were recalled. Their self-reported adherence correlated with clinical measures of disease activity and control.[38] These findings describe a population of mixed literacy levels. Adherence to and recall of recommendations for self-management of chronic disease tend to be poorer in populations with low FHL -- a factor not screened for by the original study. Studies have demonstrated that adherence to medications and maintaining appointments are boosted in the presence of a language concordant health care provider. Moreover, concordance correlates with a better understanding and an increased number of inquiries by Spanish monolingual patients compared to those monolingual patients seen by non-Spanish speaking providers.[39] Arguably, a vast divide in literacy levels between physician and patient that is not bridged by the former equates to a form of language discordance. Its repercussions should afflict low literate patients similarly. Patients not content with their medical services have been shown to disenroll from health plans, engage in doctor shopping, initiate formal complaints, and become non-adherent with medical recommendations.[7] Based on these factors, vulnerable populations with lower FHL would have little recourse but to discontinue their medications perhaps due to

decreased self-empowerment and assertiveness to successfully negotiate their way through a bureaucratic medical system.[10]

SHAME

The health care experiences of patients with low literacy are marred by shame. A leading expert of shame describes it as an emotion that “wounds” like no other with a “pain so searing”. The magnitude of the shame leads to feelings of inadequacy, fear, and low self-esteem couched in denial and secrecy.[5] In one study, sixty patients with impaired literacy from two urban public hospitals were interviewed in focus groups and individual sessions.[40] The catalysts to their shame included frustrated and hostile hospital staff, impairments in understanding signs and registration forms, and a lack of a fail-safe mechanism if given incorrect medications by the pharmacy. Shame may delay health care seeking behaviors.[5] Predictor variables of which groups tend to harbor crippling shame have not been elucidated as of yet. Findings from future studies on this sensitive topic should equip physicians with the tools to confront it with the hopes of enhancing the therapeutic relationship and yielding full disclosure.

It is tempting to attribute the surprising finding that two-thirds of low literate patients failed to perceive themselves as impaired to strong denial stemming from shame. Yet, an alternative explanation to this phenomenon subscribes to the notion that awareness only occurs when one’s functional reading capacity is challenged with novel stimuli.[40] The sentiment that functional health literacy is situation-specific implies that adequate reading skills in one setting may prove inadequate in another less familiar setting where context cannot be easily employed to compensate.[2, 40] In the health care

environment, misclassified terms (words employed in both medical and everyday settings but with different definitions) and medical jargon muddle the context.[41] Low FHL patients compensate for their deficits through a myriad of ways aside from context. Enlisting family members or friends as surrogate readers aids in the immediate run. In one study, nearly a quarter of low FHL patients usually employ a surrogate reader.[17] Involving that person in all discussions around management plans could prove instrumental.[40] Low FHL patients also rely on oral explanations and demonstrations of tasks although it has been suggested that even oral comprehension may be compromised.[34]

PHYSICIAN FACTORS AND COMMUNICATION SKILLS

Williams speculates that because of low literate patients' limited comprehension, more medical visits are needed to achieve the same therapeutic goal.[17] Yet a growing body of literature describes how the patient – doctor relationship may serve to activate, enhance understanding, and ultimately meet the unmet needs of vulnerable patients such as those with low FHL. Vulnerable patients experience a heightened reliance on their physicians to the extent that a large differential of power develops.[42] Doctor – patient communication influences patient behavior, satisfaction with care, adherence to treatment, recall and understanding of medical advice, coping strategies, quality of life, trust in physician, and state of health among other things.[43] Physicians may not be effectively transmitting their messages across, however, to their patients with impaired understanding. Adopting certain communication skills may prove more efficient and efficacious than merely increasing frequency of visits. Factors such as cultural beliefs,

socioeconomic class, intellectual ability, and language differences that impact the relationship, may appear as immutable for physicians. However, physicians do have the opportunity to influence comprehension.[34] Certain interventions undertaken by health care institutions for their low literate patients have already yielded positive results.

Patient empowerment through enhancement of knowledge, positive health beliefs, and self-efficacy has demonstrated effectiveness. The traditional biomedical model commonly overlooks relevant psychosocial elements that impact self- management of chronic disease. Certain empowerment programs target these elements by aiding patients in the development of problem-solving, stress management, coping, and motivational skills.[44] In a randomized study of diabetic patients, patient empowerment improved blood glucose control.[45] Health literacy was not addressed yet the results should extrapolate to low literate subjects with the tacit assumption that their inability to successfully function as patients contributes to lower sense of control. In a nested designed, randomized control study of 150 patients, those who were trained to seek, provide, and verify information from their physicians exhibited greater compliance with behavioral treatments, follow-up appointments, and referrals.[46] This suggests that an activated patient can become a better arbiter for his or her health. However, this study did not screen for FHL. In addition, there was a correlation between compliance and educational attainment. Given that the intervention involved a 14 page training booklet (written at a fifth grade level) provided 2 to 3 days prior to the appointment, perhaps alternative strategies such as an abridged low-literacy version or multimedia can similarly activate patients with reading difficulties. In another randomized controlled trial of 433 elderly or chronic disease patients, a one-page intervention handout written below the

fifth grade level that encouraged inquiry about pneumococcal vaccination resulted in increased vaccination discussion and rates.[47] McMahon et al. conducted a study which randomly assigned parents of children with otitis media who were prescribed antibiotic suspension to three study groups.[48] Group 1 patients received prescription and verbal instructions, Group 2 patients received a syringe and a demonstration, and Group 3 was similar to Group 2 except that a line was marked at the correct dose. Thirty seven percent of children with parents from Group 1 received the correct dose. Group 2 children received the correct dose 83%. All children in Group 3 received the correct dose. A wide variation in percentage of the correct dose administered was evident in Group 1 (32% - 147%). This underscores the sentiment that verbal instructions alone may not be sufficient, particularly in low FHL patients who may have problems processing oral information as well. Increased knowledge does not necessarily lead to better outcomes. In a study of 558 patients with diabetes attending diabetes education programs, neither global nor specific improvements in knowledge predicted metabolic control (assessed via HbA_{1c}).[49] There are other steps between the acquisition of knowledge and the modification of health behavior that need to be investigated and targeted for intervention.

Interventions have addressed the high reading levels of written health materials by simplifying their text, using multimedia, or by incorporating pictographs (images which represent ideas or actions). Simplification of ED discharge instructions has been shown to improve understanding.[50] Lowering readability does not always imply increased understanding unless the patient displays motivation for learning. Moreover, memory has more access points for visuals than for text. Visuals also impart a more graphic perspective than text.[34] In a randomized control study of 101 discharged emergency

department patients, the addition of illustrations to discharge instructions (intervention) improved comprehension, particularly among non-white, female, or $\leq 12^{\text{th}}$ grade educated patients.[51] In another study employing a cross-over design, 21 remedial reading class students listened to instructions for managing fever and sore throat. Concurrent use of pictographs during the audio portion enhanced recall (mean = 85%) in comparison to audio only (mean = 14%).[52] About 97% of individuals older than 65 consider television an important vehicle for attaining health information.[10] This may also be characteristic of individuals with impaired literacy. Multimedia technologies relying heavily on audiovisual information may therefore be powerful and compelling delivery agents of health care content for patients already “television literate”. They have thus far been found to be effective in increasing short-term knowledge. Yet, results from endeavors to promote long-term knowledge or behavior modification have been mixed.[10] One notable study with positive short-term findings entailed the randomization of 446 low literate, low income women with no prior history of mammography to a group which received a personal recommendation for mammography, a recommendation plus a low literacy National Cancer Institute brochure, or a recommendation, a brochure, and a 12-minute interactive program and educational “soap-opera style” video developed with women from the target population.[53] Six month follow-up revealed a 30% increase in utilization rates of mammography for the group with the video. Two year follow-up did not reveal significant differences. A study among low literate patients comparing the use of video with an educational brochure for sleep disorders, concludes that even video may pose comprehension barriers if the script

requires a high reading level or excessive facts cloud the behavioral evidence presented.[112]

Automated telephone disease management (ATDM) provides patients with the opportunity to access multilingual patient education material and report test results such as self-monitored blood glucose.[54] Among patients with chronic diseases, the information provided is as reliable as the information attained via structured clinical interviews or chart reviews. Moreover, patients often are more inclined to report health problems to this automated technology than to a clinician.[55] Diabetic subjects receiving bi-weekly ATDM calls for one year were receptive to self-care and dietary education via the technology. Spanish speakers selected self-care information more often than their English speaking counterparts.[56] The authors conclude that most low-income patients are not averse to the presence of ATDM in their health care. If telephone nurse follow up is included with ATDM, patients report greater satisfaction with their care, enhanced perception of access to care, and improved communication with their providers.[57] The effectiveness of nurse follow-up is not surprising. Prior to the advent of ATDM, monthly telephone contacts by nurses that provided patient education, reinforcement with compliance, resolution of identified problems, and facilitation of access to primary care modestly improved glycemic control in diabetic patients.[58] Among vulnerable populations with diabetes, ATDM with nurse follow up, in one particular randomized control trial, resulted in better glycemic control, fewer symptoms of hyper- and hypoglycemia, and a twofold likelihood of normal HbA_{1c} levels than usual care patients.[59] So what is it about this technology that yields satisfaction and motivation for patients? FHL screening did not occur in these studies so the specific

impact of ATDM on low FHL patients remains to be determined. Yet the study on vulnerable patients from a county health care system should resonate well with advocates of low literate populations. Nurse follow-up might facilitate navigation of the health care system. The studies, however, required a telephone and were conducted for a one-year period. Patients at the lowest poverty levels have difficulty securing telephone service or might find themselves in transient housing situations, therefore, ATDM and one year study periods become less feasible. Interventions reconciling such realities remain to be developed.

Communication strategies employed to aid low literate patients can also be useful for highly literate patients. Among patients with adequate comprehension, two-thirds have adequate recall of their medical recommendations. Only one-third of patients with poorer comprehension have adequate recall.[34] Therefore, compensatory strategies employed by physicians may benefit the remaining one-third of adequately literate and two-thirds of inadequately literate patients. Delivery of behavioral information should take precedence over delivery of factual information. Patients prefer practical (behaviors) over background (pathophysiology) information.[2, 34] Emphasis on the latter may lead to a diminished sense of empowerment and self-efficacy. Patient understanding improves when physicians ask for re-statements, repeat their own instructions, and demonstrate key points.[60, 61] The more drug information given towards the end of a visit, the fewer drug changes patients remembered.[62] Interestingly, this finding negatively correlated with the length of the patient-doctor relationship. Partitioning information into digestible segments, providing visual aids, and presenting context before giving new information can enhance comprehension.[34] In a

randomized-controlled study of diabetic patients presenting to a safety-net institution, screening for FHL was conducted.[63] The intervention entailed affixing the S-TOFHLA scores of marginally or inadequately literate patients to the top of their charts prior to their clinic visit. Analysis of a subset of audiotaped English interactions revealed that only 12% of intervention physicians that presented new medical information or a change in medication, followed-up with an assessment of patient recall, comprehension, or interpretation. Thus, despite the revelation of a patient's impaired health literacy, minimal compensatory actions were taken by physicians.

A large body of literature exists around the issue of patient centered communication in which physicians actively seek patient point of views (thoughts, feelings, and expectations), activate them, and engage them in their own care.[64] Effective patient-centered communication occurs if the physician harbors positive attitudes towards psychosocial aspects of care. Such physicians use statements of empathy and reassurance and fewer closed-ended questions. Their patients consequently become more engaged in the discussions by expressing their opinions and asking more questions.[65] Patient satisfaction is generally higher when psychosocial issues are discussed. Yet biomedically focused discussions tend to occur in the presence of sicker, older, or lower-income patients with younger, male physicians.[66] Patient-centered communication has been shown to improve compliance, emotional health and reduce the number of diagnostic tests and referrals thereby increasing the efficiency of care.[64, 67] Patients tend to indirectly and non-spontaneously verbalize their emotions by offering clues. Physicians tend to be oblivious to both clues and direct expressions by returning to the preceding topic, usually symptom related.[68] In a descriptive, qualitative study of

116 primary care and surgical office visits, encounters that addressed psychosocial concerns tended to be shorter than those where clues were offered but not acknowledged by physicians.[69] These results intimate that time constraints may not be justifiable arguments for avoiding patient-centered discussions and that fears of opening a Pandora's box are more theoretical than actual reality. A continuing medical education program designed to enhance physician communication skills improved physicians' facilitation, augmented their use of open ended questions, activated patients and increased their satisfaction.[70] Therefore, physicians who feel ill-equipped to incorporate a patient-centered approach can find solace in the presence of such CME programs. Low literate patients who encounter difficulties successfully functioning as patients can benefit from patient-centered discussions that address their psychosocial concerns. Such discussions may chisel away at the barrier erected by shame and a low sense of self-efficacy. Further inquiry into this area is needed.

MEDICOLEGAL

Failure to effectively transmit information to patients may have medicolegal consequences. Among the requirements for hospitals put forth by the Joint Commission on Accreditation of Health Care Organizations (JCAHO), increased comprehension of informed consent procedures, medication and discharge instructions, and other documents is included.[10] Physicians could be held liable for failure of informed consent if the information is presented in an incomprehensible manner.[10] In a descriptive review of 45 malpractice suits, poor delivery of information was an identified reason for filing in a quarter of the suits.[71] Studies of patient satisfaction reveal that

complaints about doctors are due to communication problems and not technical competency issues.[72] In a study of communication behaviors of physicians with and without a malpractice claim history, primary care physicians with no such history tended to use more statements of orientation, assessments of understanding, solicitations of opinion from patients, and encouragement for patient participation than their counterparts with a malpractice claim history.[73]

Transition

It is becoming increasingly imperative to address the quality of the information being transmitted to the patient, particularly those with low functional health literacy. The repercussions of poor communication are widespread. Medical jargon in the patient encounter has been an understudied topic area. How it plays out in the setting of low functional health literacy is unknown. The following section represents a study describing the function of medical jargon in the communication between physician and their patients with low functional health literacy.

MEDICAL JARGON USE BY PHYSICIANS IN THEIR COMMUNICATION WITH TYPE 2 DIABETES PATIENTS WHO HAVE HEALTH LITERACY PROBLEMS

Medical Jargon

Effective communication within the physician - patient relationship rests on the premise that both participants draw from a common vocabulary during their interactions. Prior studies suggest associations between effective communication and patient compliance and satisfaction.[1] Patient dissatisfaction appears to derive mainly from the type and quality of the information they receive.[2] Barriers to effective medical communication have been previously scrutinized. Medical jargon, profession-specific language that suggests tacit understanding between parties, consists of 'medical terminology' and lay terminology. The latter exhibits dual meanings depending on the setting of use. An example occurs with the term "nervous system". To the clinician, it represents a collection of neurons and their attendant functions. To the patient, it may connote mental duress and anxiety.

Medical jargon, particularly unclarified, may therefore impede communication. The use of medical jargon by physicians arguably represents a double-edged sword. On the one hand, it symbolizes precise and efficient transmission of health information. Yet, this presupposes that the recipient of jargon is capable of capturing, processing, and correctly integrating such terms into their health-related schemas. Inquiries into the understanding of common medical terms by patients in the ward, emergency department, community, or clinic setting revealed substantial knowledge

deficits.[1, 3-5] However, these studies relied on lists of jargon terms generated by the investigators, who constructed *a priori* definitions of medical jargon. None utilized direct observation methodologies, where the use of audio or video-taped medical visits allow for examples to be extracted from the actual experiences of the physician- patient interaction. Moreover, many of the studies were unable to provide a context for examining patients' familiarity with any given term. Poorer faring subjects in these studies tended to be from lower socioeconomic classes.

No study to our knowledge has examined how medical jargon influences communication between physicians and patients with low functional health literacy. Functional health literacy (FHL) reflects the ability to apply literacy skills to health-related materials such as prescription labels, appointment slips, discharge instructions, and informed consent forms.[6] It approximates one's capacity to successfully function as a patient and adequately navigate the medical system. Low FHL suggests difficulty with written and verbal comprehension and conceptualization of risk. It is independently associated with poor understanding of disease, worse health outcomes, and higher utilization of services.[7-11] Prior research has shown that the prevalence of low FHL is greatest among patients in settings such as public hospitals, which care for a disproportionate share of publicly insured and uninsured patients, racial and ethnic minorities, immigrants, and patients of low socioeconomic status.[12] Low FHL is also especially common among patients with chronic medical conditions, such as Type 2 diabetes.[13]

We applied direct observation techniques to ascertain the frequency, range, distribution, and context of unclarified medical jargon usage by physicians with

their low FHL patients with diabetes mellitus (DM). Furthermore, we describe a subset of these patients' comfort, comprehension, and familiarity with both unclarified and clarified medical jargon.

Setting and Study Participants:

This study took place in two large primary care clinics at San Francisco General Hospital, an urban public hospital that is affiliated with the University of California San Francisco (UCSF). The two clinics, one a family health center (FHC) and the other a general internal medicine clinic (GMC), serve patient populations that are medically complex, ethnically diverse, and of low socioeconomic status. Prior work in these clinics has demonstrated that over half of patients have either inadequate or marginal FHL. The patients followed in these clinics are cared for in a continuity fashion by attending UCSF faculty or by primary care residents with attending oversight.

In order to be eligible for this study, patients were required to be followed in GMC or FHC, as determined by being a patient of their primary care physician (PCP) for at least 6 months, and having made at least one visit to their PCP within the prior 6 months. Only PCPs who were second-year residents, third-year residents, or attending faculty were included. In addition, patients had to have an upcoming appointment with their PCP over the subsequent 3 months, had to be over age 18, have type 2 diabetes, and speak English. We identified such patients by querying the hospital's clinical and administrative database. We then provided PCPs with a list of eligible patients and asked them to alert us to those who fit criteria for exclusion. Exclusion criteria included age less than 18, non-English speaking, incorrectly assigned to the PCP, and a diagnosis

of psychosis, dementia, severe substance abuse problems, end-stage renal disease requiring dialysis, or blindness.

Eligible patients were approached in the waiting rooms prior to their appointments with their PCP and were asked for permission to audiotape an upcoming medical encounter. Research assistants explained the project to each patient, who was assured that the decision to participate would not affect care and that the audiotape could be stopped at any time during the encounter. Patients were informed that they would also undergo a brief questionnaire to obtain demographic information, as well as a measure of how well they understand doctors' written medical instructions (FHL level).

In order to assess FHL, each patient was administered the short-form Test of Functional Health Literacy in Adults (S-TOFHLA). The S-TOFHLA is a reliable and validated shortened version of the well-established instrument, the TOFHLA, commonly used to assess a patient's FHL level. The S-TOFHLA is a timed reading comprehension test that requires the patient to read 2 health care passages and to fill in blanks with correct word choices. It is scored on a 0-36 scale, with 0-16 points corresponding to *inadequate* FHL, 17-22 points *marginal* FHL, and 23-36 points *adequate* FHL. In this study, we only enrolled patients with "Low" FHL (inadequate or marginal; 0-22 points). We then requested permission to audiotape an outpatient encounter between each patient and his/her PCP. The majority of audiotaped encounters occurred immediately after the patient interview, and the remainder took place during a subsequent visit with their PCP.

Written and/or verbal consent to participate was obtained from patients. Written consent was also obtained from PCPs prior to the study. The protocol was approved by the Human Subjects Committee of UCSF and the Committee for the Protection of Human Subjects at the University of California, Berkeley.

Methods

Audiotape Analysis

We analyzed audiotaped encounters between physician and low FHL patient dyads at the San Francisco General Hospital's General Internal Medicine Clinic and Family Health Centers. Jargon terms were coded and classified as either medical or mismatched terminology. We operationally defined the former as unclarified technical terms listed in a medical dictionary and the latter as commonly encountered lay terms that also contain specific meanings in a health care setting. Our objectives were to determine the frequency, range, distribution, and function of the jargon terms across the medical encounters.

We subsumed each term under one of four contextual domains created to capture four major physician roles within the medical encounter that were consistent with the literature. These include physician provision of *Test Results*, *Symptom Assessment*, *Recommendations*, and *Health Education / Teaching*. *Test Results* revolve around laboratory, imaging, or objective physical examination results. The *Symptom Assessment* function encompasses the medical history taking process and reflects physicians' queries about patient complaints. *Recommendations* entail issues dealing with diagnostic

procedures, treatment or self-management instructions, and adherence. This category also includes visits with hospital or clinic personnel, appointment scheduling, and health related paperwork (e.g. consent forms) that are not medical records or printed test results. *Health Education / Teaching* reflects moments when physicians capture the biological processes revolving around health and illness, particularly their pathophysiology or pharmacology. This category also encompasses statistical concepts such as risk, bell curves (normal or above / below average), probabilities (e.g. pre-test/post-test, odds ratio), particularly if used in the context of education. Coders were instructed to capture the main emphasis of the jargon's context.

Patient Survey

To ensure our designation of jargon reflected our population knowledge levels, we surveyed a representative sample of patients and assessed jargon comprehension and comfort. Through a telephone survey, we assessed patient understanding of twelve unclarified and six clarified jargon terms, each embedded in a sentence or short paragraph derived from the audiotaped interactions. At least one of the unclarified terms were employed in the patient's own encounter. The remaining were DM related terms found across encounters that we regarded as essential for the self-management or comprehension of DM and its complications (Figure 1). Similarly, our list of six clarified jargon terms reflected instances when physicians re-defined or tailored an explanation immediately after introducing the term.

We assessed comprehension via self-reported understanding (4 point Likert scale) of a jargon term out of context followed by an open-ended definition. To

provide a context for each example of jargon, we transcribed an excerpt from the visit that included the term. These were read to the subject and were ensued by a self-reported understanding of the term. Participants were then asked to infer, in an open-ended manner, the general message the physician was trying to convey. We assessed subjects' comfort with their own use and with their physician's use of the specific jargon term. Open-ended answers were scored via consensus based on previously defined criteria. Answers were rated with the same four point Likert scale employed for self-reported understanding. Coders first evaluated whether the responses included, at minimum, either a correct value judgment of the context (good or bad) or some definitional understanding. Responses failing to provide either were coded as having "*No understanding*". Those that did provide them were further coded as follows: "*A little understanding*" meant the subject provided a partially correct definitional understanding of the term or a correct value judgment; "*Some understanding*" was assigned to answers that provided a partially correct definitional understanding and a correct value judgment; "*Total understanding*" meant a full understanding of the term and a correct value judgment. At the survey's conclusion, we asked subjects to indicate whether they felt jargon hurt, did not affect, or helped communication between doctors and their patients.

Results

858 patients were identified by the SFGH clinical database as potentially eligible for the larger cross-sectional study. 142 were subsequently deemed ineligible by their noted primary care physician. Of the 716 remaining eligible patients, 250 did not make a primary care visit during the enrollment period. All of the remaining 466

patients were approached at the time of a clinic appointment. Of these, 36 patients refused to participate. 430 patients were recruited; 22 patients were subsequently excluded as they were too ill to participate, were acutely intoxicated, had poor visual acuity $\geq 20/50$, or had no HbA_{1c} on record. 408 patients completed the s-TOFHLA and the questionnaire. Of these, 105 were eligible for audiotaping by virtue of being English-speaking and having low FHL. 25 encounters could not be audiotaped because either the patient refused to be taped at the time of the visit, their physician refused to be taped, or because the visit was not with the primary care physician. We audiotaped 75 outpatient encounters, of which 1 had to be eliminated because the tape was not clearly audible. The remaining 74 audiotapes represented visits between 74 patients and 38 physicians. Physicians were paired with as few as 1 and as many as 5 study patients (mean= 1.9).

The median s-TOFHLA score of audiotaped patients was 12, which roughly corresponds to a grade 4-6 reading level. On average, patients were 64 years of age, 49% were men, 85% were non-white, 37% used insulin, and the median length of time with diabetes was 8 years. The mean HbA_{1c} was 8.6% and the median HbA_{1c} was 8.3%. 38% of patients received their primary care from a faculty-level physician, 54% from a female physician, and 78% from a general internist.

Audiotape Analysis

60 of the 74 encounters contained at least one jargon term (81%). There were a total of 213 jargon terms across encounters. There was a range of 0 to 14 terms per visit with a mean of 3.5 and a median of 3. On average, one jargon term was used every five

minutes—approximately 0.22 terms per minute. PCPs employed most of the jargon terms (66%) when providing recommendations (37%) or health education (29%).

Survey

Seven subjects (12% of jargon visits) were randomly selected and surveyed by phone. We examined the average comprehension of unclarified and clarified jargon with and without context.

Unclarified Jargon (Figures 2, 3)

Nearly 40% of subjects had a self-reported “no understanding” of unclarified jargon without context. The coders graded 65% of the open-ended responses as having “no understanding”. After providing the sentence or phrase, 80% self-reported themselves, at best, as having “a little understanding” of the terms. With context, 80% of the open-ended responses, at best, were scored as having a “little understanding”. One of the most difficult words for subjects was “glucometer” (Figure 6, 7).

Clarified Jargon (Figures 4, 5)

Nearly 90% of the respondents self-reported themselves as having, at best, a “little understanding” of the terms out of context. 45% of them felt they had no understanding whatsoever. Coders deemed 75% of open-ended responses out of context to have no understanding. When a sentence or phrase was provided, 50% of patients self-reported themselves to have a little understanding. Coders actually found that 50% of the open-ended responses were completely incorrect.

Perception of Jargon, Comfort, and Familiarity

Overall, 70% felt that the use of medical words improved communication. Nearly 50% of subjects would not feel comfortable using the unclarified jargon terms with their own physician. About 50% would feel comfortable using such words. In regards to familiarity with the unclarified terms, 35% never heard their own physician use the term. 30% of subjects expressed not feeling comfortable with their own doctors' use of the unclarified terms in the visits. About 40% expressed comfort. For the clarified jargon, about 45% of subjects would not feel comfortable using the terms themselves. Another 45% would feel comfortable doing so. 45% never heard their physician use such terms. 40% would feel comfortable whenever their physician used clarified jargon.

Discussion

This is the first study to our knowledge that measured (qualitatively or quantitatively) the extent of jargon use by physicians with patients previously screened as harboring health literacy difficulties (low FHL). Moreover, we attempted to internally validate our designation of jargon by querying a representative sample of subjects about their understanding, comfort, and familiarity of jargon. Given the burden of chronic diseases among populations with low FHL, such as the elderly, ethnic minorities, and those of low socioeconomic status, ensuring effective health communication is crucial to successful management. Despite this, 81% of total visits contained at least one unclarified jargon term. These terms were mainly employed in, arguably, the two most important functions of the medical encounter—provision of recommendations and health education.

Poor recall and comprehension is likely to be more prevalent among patients with low FHL than among those with high FHL. Low FHL appears to be a marker for an array of communication and information processing problems that extend beyond reading ability.[14-16] Research in developing nations suggests that low literacy skills are associated with poor comprehension of oral communication. Literacy may promote a cognitive process that facilitates comprehension of formal spoken language, such as those frequently included in health messages. Furthermore, the consequences of poor recall and comprehension may be more detrimental for patients with low FHL, as they may not have the resources to compensate for lapses in communication.[11, 17]

We assessed comprehension of diabetes related terms by patients with diabetes. This overcame the issue of querying patients with heterogeneous medical conditions about heterogeneous medical terms that plagued some of the earlier studies. The survey responses revealed some interesting points. In regards to unclarified jargon, the use of context only improved understanding (as assessed by coders) from 20% to a little over 30%. Yet, self-reported measures of comprehension suggested that the context increased understanding somewhat (40% out of context versus 60% with context). Whether or not context was present, comprehension of unclarified jargon was limited. The extent of clarified jargon use was not analyzed in our study. Clarified jargon was included in our survey with the expectation that comprehension would improve. The finding that even clarified jargon posed comprehension challenges to low FHL patients was unexpected. The results intimate that there were no substantial differences in comprehension between clarified and unclarified jargon. So, regardless of how one views it (with context /

without context or clarified / unclarified), subjects with low FHL and diabetes mellitus have trouble understanding terms such as glucometer or hemoglobin A1c.

The majority of these subjects, by virtue of being patients of these two clinics, have received diabetes education. They have been previously exposed to major concepts and terms required to successfully manage their diabetes. Yet about a third to a half of respondents never heard their doctors use such terms in the visits. The explanation to this may lie in findings from prior research demonstrating that patients fail to recall between one third and one half of the information conveyed by physicians.

Despite the lower comprehension, both self-reported and coded, we find it intriguing that nearly 50% of patients expressed comfort using the jargon terms with their own physicians while another 50% felt uncomfortable. Part of this may deal with the function of jargon to both patients and doctors. Sharing a medical vocabulary may suggest a more enhanced relationship with their PCPs. This may partially explain why nearly 70% considered the use of jargon as beneficial to patient-doctor communication. Jargon use may empower them in an otherwise powerless reality of low health literacy coupled with shame. It is conceivable that jargon use by patients with low FHL serves to feign understanding and evade detection of reading difficulties. A major drawback paints a scenario where the patient employs jargon terms without full understanding and the PCP incorporates such misleading feedback into their care of that patient.

A currently debatable issue is the extent to which patients must understand medical terms and disease mechanisms. Equipping patients with medical terminology enables them to apply such knowledge with new health care providers or in emergent situations. This presupposes that the patient has the ability to retain and integrate such

terms into their health care schemas. Patients with low FHL may need further follow-up assessments of their understanding. Others question the overall ethics of jargon use, citing them as inappropriate acts that diminish the humanity of patients during their most fragile states.[18] We support the notion that patients with diabetes need to understand, for example, what a glucometer or hemoglobin A1_c is. Yet, our findings suggest that even clarified jargon may not serve that purpose effectively. Other strategies, such as multimedia or pictographs, may impart greater understanding. Recently, it was found that continued application of follow-up assessment and perception questions was independently associated with improved glycemic control in this same subject pool.[19]

There may be several reasons why physicians employ unclarified jargon terms. To begin with, the majority of physicians have not received formal training to make their teaching efforts with their patients more effective. While most medical school curricula and primary care residency training programs now include courses in the physician-patient relationship, very few include skill-based training in health education[20, 21] As such, physicians may not have the self-awareness to recognize when they are conveying medical terminology and they may not have the skills to best present, reinforce, and promote recall and comprehension of such terms. In addition, physicians may underestimate the extent to which patients need tailored explanations of information provided in the medical encounter. Prior research has demonstrated that physicians consistently misperceive patients' information needs and their own informativeness. [22]

The major limitation of this study was the small sample size. By limiting our subjects to English-speaking only and low FHL we excluded a large number. The addition of Spanish speaking subjects in future studies would more adequately reflect the

population frequenting urban public hospitals. Possible pitfalls would include use of interpreters and PCPs with limited Spanish skills. Enrolling patients with higher FHL levels could serve to address whether medical jargon actually empowers patients via increased knowledge or whether it hinders communication even with patients with stronger reading skills. Future studies, with greater funding and resources to capture larger numbers and more bilingual personnel, are thus needed.

Limited external validity may be an issue in our study because it was conducted in a single hospital center. Nevertheless, our subjects represented a diverse patient population and the PCPs were trained at a variety of medical schools, thus attenuating these limitations. The subjectivity of the coding of open-ended responses was another limitation. We addressed this by using medical dictionary entries as the gold standard. Scores were defined as previously reported and responses were graded via consensus.

CONCLUSION

A common limitation of research endeavors is selection bias. Demonstrating similarities between responders and non-responders alleviates such concerns. Yet, if individuals with low health literacy harbor substantial shame and are so poorly integrated into the socioeconomic and health care environments that they refuse to enroll or are not even approached, we may fail to capture the full reality. Therefore, studies will tend to overestimate their subjects' reading skills. The fact that the literature reveals a paucity of adequate literacy levels among vulnerable populations intimates worse reading skills than reported. In other words, the situation may be more alarming than depicted.

Health status, quality of life, and other types of measures need to be validated in low literate patients to rule out response styles as reasons for differences in reported health.[17] Studies have demonstrated that such patients encounter difficulties with the comprehension and completion of Likert-type scales and other survey instruments regardless of whether they were administered verbally.[11]

In 1996, Parikh et. al. called for hospital-based educational programs that strove to heighten awareness of low literate patients' shame.[5] Their hope was to minimize stigma through the creation of shame-free environments from the time of registration to the end of the patient's visit. To date, no such educational programs have been reported. Adults with literacy impairments have been generally marginalized by society, possess poor social support systems, and cannot adequately meet their economic needs. The Council on Scientific Affairs of the American Medical Association contends that, "low-literacy patients, by definition, cannot be empowered consumers in a market-driven health care system." Moreover, lack of an adequate constituency for health literacy means that it will remain tangential to the US health care system.[2]

Health literacy issues are applicable in basically every facet of health care. Yet some may deem it as a problem with the educational and not the medical system. Low literacy in the health setting may become a public health concern if it is not addressed promptly. The literature suggests that initial proper steps have been taken. CME training has shown effectiveness. Yet, medical students and residents, while still malleable to some extent, can adopt proven communication skills and be attuned to patients with low health literacy. Low FHL can potentially be introduced as a complicating variable in a

case-based medical school curricula. Development of a standardized low FHL patient may improve competence as well.

For many individuals, the Emergency Department (ED) represents a portal of entry into the health care system. And for a sizeable subset, the ED may function as their only recourse for care. As mentioned already, individuals who are not competent enough to successfully navigate the health care system are captured infrequently with research endeavors in general or specialty clinics. Therefore, queries and interventions in diverse ED settings may provide ways for attaining a clearer picture of the impact of health literacy on diverse populations. The role of the ED has increasingly expanded from acute care towards sub-acute management. For the ED physician, the provision of care has extended to the interim period between a patient's ED visit and a primary care provider visit.[74] Therefore, impaired health literacy for ED patients encompasses more than just incomprehensible discharge instructions. An array of self-management skills, conceptualization of risk, and congruent health beliefs may be requisites for successful transition to PCP care and prevention of an ED return visit. Underlying these factors is health literacy. Mass screening for functional health literacy in ED patients, however, has not been conducted before. It has the potential to make a significant impact on the delivery of health care to vulnerable populations.

The link between maternal literacy and the health outcome of their children has not been fully explored in the United States. Such an association has been demonstrated in under-developed countries. Infant mortality rates within poverty stricken regions of Brazil were strongly correlated with the female illiteracy rate.[75] Preston's health transition model considers maternal literacy to be an instrumental prerequisite for the

dissemination of health information. Higher maternal literacy levels in Nepal, Mexico, and Zambia enhance understanding of written and oral health information and thus support Preston's model.[76] A prospective cohort study of parents accompanying their children for acute care entailed screening for FHL via the REALM.[78] A correlation between parental literacy and knowledge of their children's current medical condition was not evident. Their child's health measures (e.g. reported status of well-child care and dental care and number of hospitalizations) also lacked any significant association with parental literacy. Of note, parents with lower literacy compared with their more literate counterparts regarded their child as sicker than their actual medical condition. The study authors posit that such a perception may actually lead to greater adherence thus explaining their inability to perceive significant associations. Screening for maternal FHL via S-TOFHLA within other medical populations may shed further insight into the health outcomes of vulnerable children.

Physicians employ unclarified medical terminology in a majority of their visits with patients and mainly when providing recommendations and health education. Patients with low FHL have difficulties understanding both clarified and unclarified jargon. Future endeavors need to determine more effective ways to deliver important concepts (such as HBA1c) if we truly are going to have patients as partners. We need to make physicians more self-aware about the use of jargon. Strategies are necessary to sensitize physicians to be more self-aware about the use of jargon especially when giving recommendations or health education. Despite having decreased comprehension, many patients with low FHL feel comfortable using medical terminology with their PCPs. PCPs must therefore be more attuned to their patients' actual comprehension levels.

Larger studies are needed to assess the extent of both clarified and unclarified jargon use by PCPs and determine whether they are associated with health outcomes. Patients with low literacy need to be included in future research designs.

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Figure 1: Jargon terms used in survey

Unclassified	Clarified
Glucometer	Angina
Immunizations	Microalbuminuria
Weight is stable	Ophthalmology
Microvascular complication	Genetic
System of nerves	Creatinine
HbA1c	Symptoms
EKG abnormalities	
Dialysis	
Wide Range	
Risk factors	
Kidney function	
Interact	

Figure 2: Comprehension of Unclarified Jargon (Out of Context)

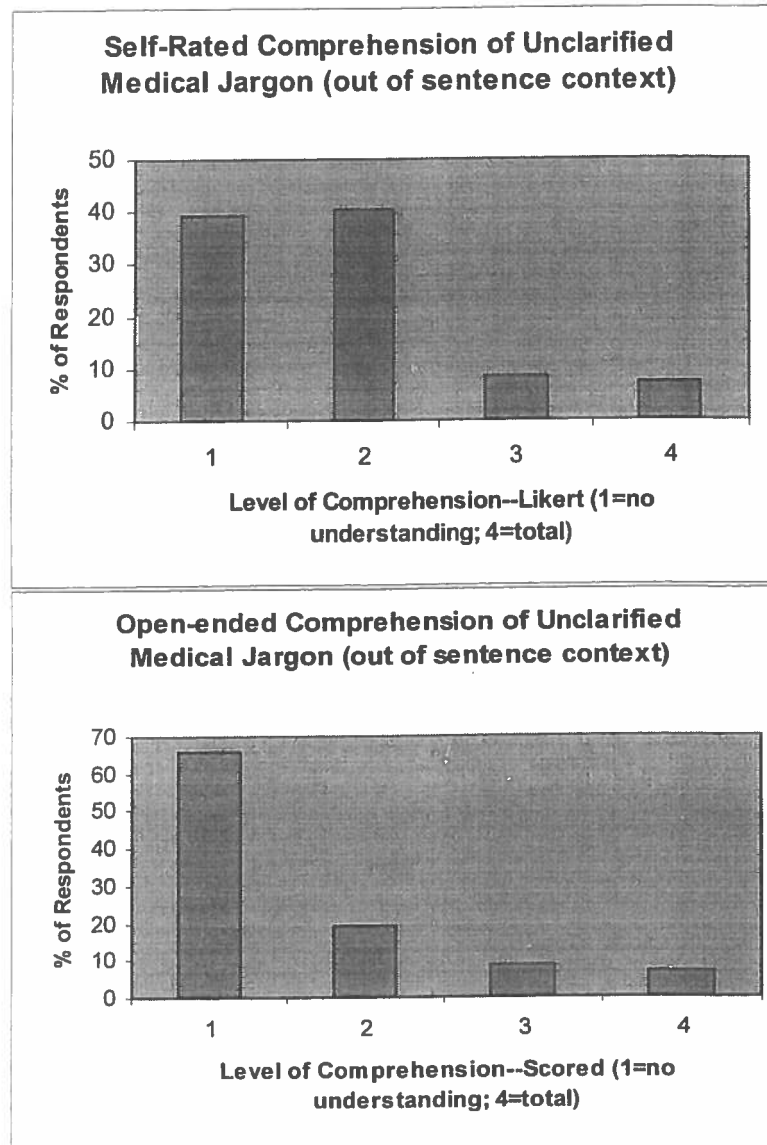


Figure 3: Comprehension of Unclarified Jargon (Context provided)

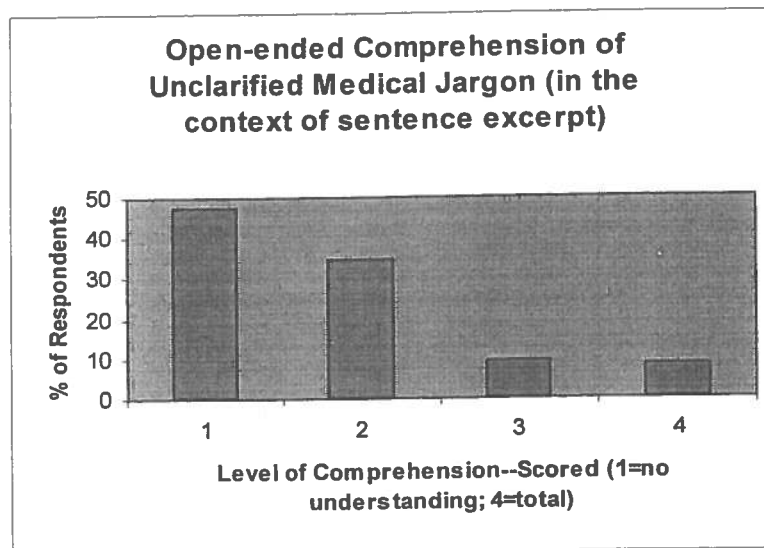
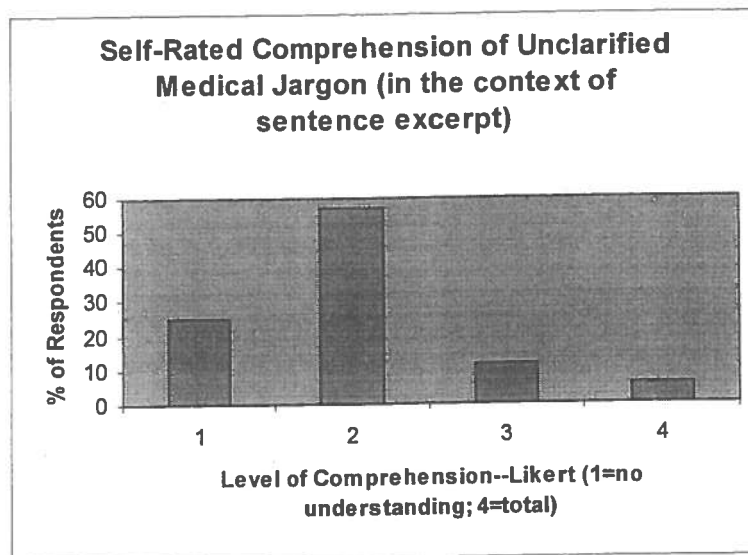


Figure 4: Comprehension of Clarified Jargon (Out of context)

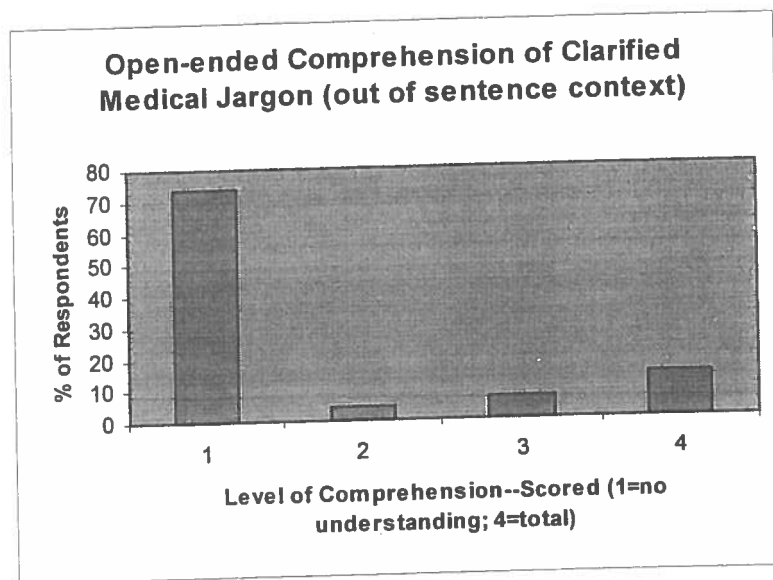
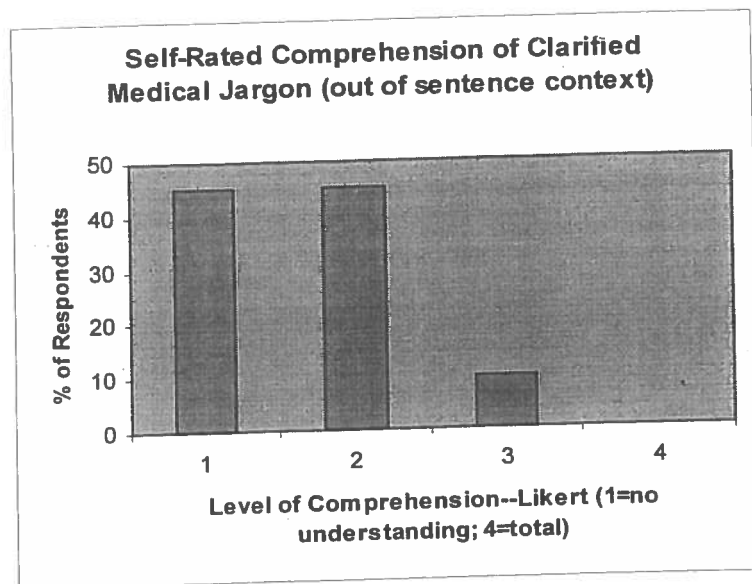


Figure 5: Comprehension of Clarified Jargon (In context)

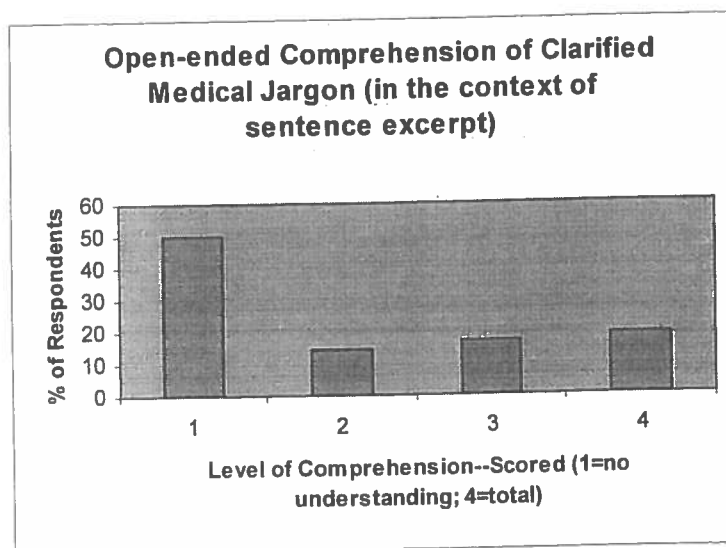
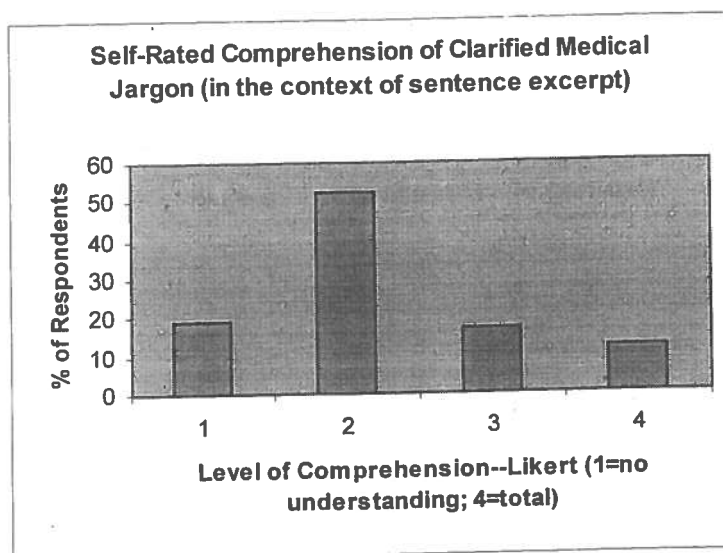


Figure 6

Glucometer

NO CONTEXT

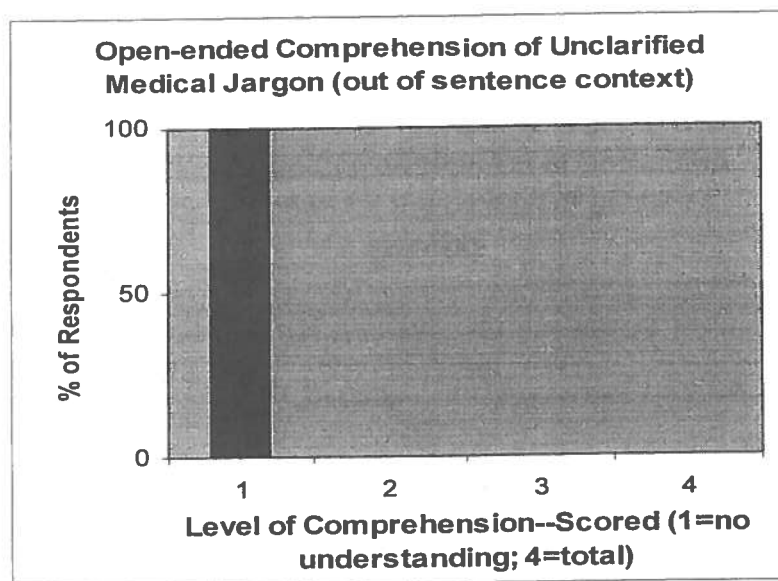
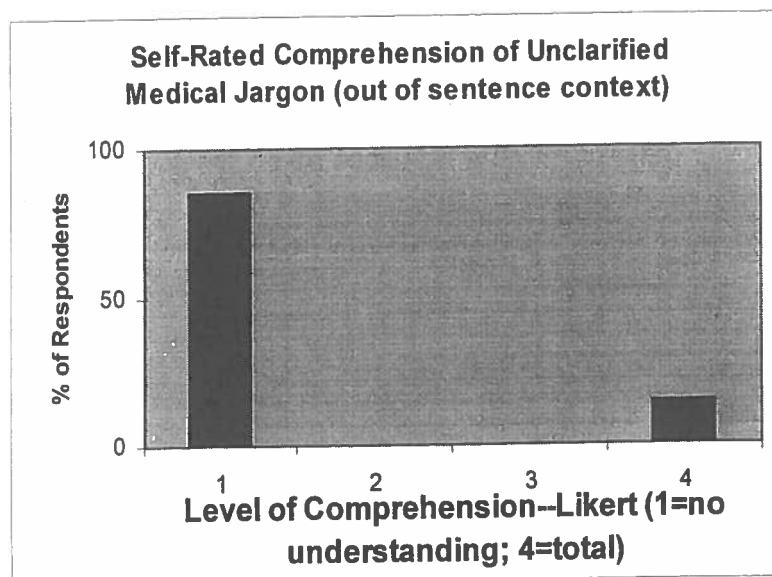


Figure 7

Glucometer—"I'll have you see the diabetes nurse that way she can talk to you about getting a glucometer"

WITH CONTEXT

