

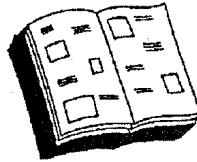
Report of

The Reading Level Determination Study

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The Report of the Reading Level Determination Study

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The Report of the Reading Level Determination Study

Introduction

This study was conducted in 1998 at Parkland Memorial Hospital, its Outpatient Clinics and its Community Oriented Primary Care clinics (COPCs), hereafter referred to as Parkland, located in Dallas, Texas, USA.

Parkland Memorial Hospital, with 997 beds, is the primary teaching institution of the University of Texas Southwestern Medical School. It is the only public hospital for Dallas County, and serves both paying and non-paying patients. In 1998, almost 40,000 patients were admitted to the hospital, over 13,000 babies were delivered, over 750,000 clinic and health center patients were seen, and more than 133,000 patients were treated in the Emergency Department. The excellence of the Trauma and Burn Centers is internationally recognized, and the hospital has recently been rated as one of the top 25 in the nation.

The Community Oriented Primary Care clinics (COPCs) are neighborhood-based health centers providing primary care to reduce illness and mortality rates from preventable diseases in low-income areas.

One of the most important components of patient care, regardless of the setting, is patient education. The benefits of effective patient education — reduced morbidity and mortality, shorter hospital stays, fewer emergency, clinic and doctor visits, increased patient satisfaction, decreased national healthcare costs and improved quality of life — have been well substantiated for years, and the importance of such education is reflected in the standards of the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), the Patient Bill of Rights, and Nurse Practice Acts throughout the country.

In order to provide Parkland Memorial Hospital, the Outpatient Clinic and the COPC patients with education compliant in both spirit and letter with JCAHO standards, it is critical that patient education materials be written at a reading level comprehensible and useful to the patients being taught. Most commercial patient education materials are written at above a 9th-grade level, and for this reason, Parkland has, for many years, created in-house patient education materials designed for patients with low-literacy skills. Patient education materials at Parkland are presently written at an approximately 4th - 5th grade level. This level was chosen based on a 1984 study conducted at Parkland and on observation of the patient population. While there has not been much change in the literacy levels of patients between 1984 and the present, there has been a considerable change in the Parkland population — a rise in the percentage of Hispanic patients, particularly in Women and Children's Services, where the percentage of Hispanic births has more than doubled in that time period and now represents about 70% of total births. An assessment of this population for the purposes of patient education was desirable, particularly as the 1984 study did not examine literacy levels in Spanish of Hispanic patients.

The purpose of this study was to evaluate the current health literacy level of Parkland patients in both English and Spanish to determine if changes are indicated in the reading level at which patient education materials are written.

Review of the literature

The literacy level of the population of the United States has been much studied and is a topic of a great deal of comment and concern (Council on Scientific Affairs, 1999; Bastable, 1997). Literacy has been defined by the National Literacy Act of 1991 as "an individual's ability to read, write, and speak in English, and compute and solve problems at levels of proficiency necessary to function on the job and in society, to achieve one's goals, and develop one's knowledge and potential" (Council on Scientific Affairs, 1999). Illiteracy has been defined as having less than a 5th-grade education (Bastable, 1997). The U.S. Department of Education reports show that about 90 million adults have poor reading and comprehension skills. It is estimated that about 50% of Americans have adequate literacy skills, 30% have marginal, and 20% have inadequate literacy skills (Council on Scientific Affairs, 1999; Doak et al, 1996).

The scope and impact of low (and no) literacy skills on patient education is frequently addressed (Doak et al, 1996; Dixon and Park, 1990; Weiss and Coyne, 1997; Pepe and Chodzko-Zajko, 1997; Bastable, 1997; Parker et al, 1995; Wilson, 1995; Glazer-Waldman, Hall and Weiner, 1984). It has long been recognized that reading comprehension, problem-solving skills, synthesis and analysis of information, abstract thinking and reasoning ability, the capacity to recognize patterns and to generalize from them, as well as a broad general knowledge base are tied, to some large extent, to literacy level, and that these skills and processes are diminished in patients with low literacy skills (Council on Scientific Affairs, 1999; Doak et al, 1996).

The high price of low literacy is paid not only by the individual patient, but also collectively, through the ever-increasing national cost of health care (Council on Scientific Affairs, 1999; Weiss and Coyne, 1997; Doak et al, 1996). Failure to receive preventive care and screenings, failure to seek early treatment, failure to comprehend and follow medication, treatment and discharge instructions, failure to manage chronic illness, and failure to obtain timely intervention for complications result in greater morbidity, more frequent and longer hospitalizations, more radical and expensive treatments and surgeries, a greater need for rehabilitative services – in short, greater expenditure of national dollars for health care.

Providing patient education that is understandable to and usable by the patient is not only mandated (The Patient and Family Education Standard of the Joint Commission on Accreditation of Healthcare Organizations, 1997; The Patient Bill of Rights; The Nurse Practice Act, Board of Nurse Examiners for the State of Texas, 1996) but is the only ethical and rational course (Council on Scientific Affairs, 1999; Doak et al, 1996; Dixon and Park, 1990; Weiss and Coyne, 1997; Pepe and Chodzko-Zajko, 1997; Bastable, 1997; Parker et al, 1995; Wilson, 1995; Glazer-Waldman, Redman, 1993; Hall and Weiner, 1984). Most patient education materials produced both by for-profit and non-profit organizations are at 9th - 10th grade reading levels and higher (Doak et al, 1996; Weiss and Coyne, 1997; Parker et al, 1995; Redman, 1993) – far above the 3rd - 7th grade reading levels of Parkland patients suggested by Glazer-Waldman's 1984 study.

The literacy level of one or a group of patients can be evaluated using a variety of assessment tools. Several of these were examined by the committee conducting this study. Doak et al (1996) provide a good basic overview of techniques for evaluating comprehension and readability testing formulas. Several studies variously utilizing the Rapid Estimate of Adult Literacy in Medicine (REALM), The Wide Range Achievement Test - Revised (WRAT-R), the comprehension subtest of the Gates-MacGinitie Reading Test, and the Test of Functional Health Literacy in Adults (TOFHLA) were examined (Wilson, 1995; Davis et al, 1993; Parker et al, 1995; Pepe and Chodzko-Zajko, 1997; Weiss and Coyne, 1997; Glazer-Waldman et al, 1984) in order to select the evaluative tool that would provide the most comprehensive view of health literacy in a manageable time period.

The correlation between the literacy measurement of materials in terms of grade-level, and the measurement of patient literacy level in terms of functional competency is not as linear or clear-cut as might be desired (Doak et al, 1996); a fuller discussion of these concerns can be found in the Limitations section of this report.

Relationships between literacy level and several other variables in the Parkland patient population were of interest to the committee, and have also been studied extensively by others. Often examined in relation to health literacy are:

- Patient age (Council on Scientific Affairs, 1999; Doak et al, 1996; Bastable, 1997).
- Grade level completed (NIL Fast Facts on Literacy, 1999; Parker et al, 1995; Bastable, 1997; Wilson, 1995).
- Ethnicity (Weiss and Coyne, 1997; Bastable, 1997).
- Self report of perceived reading ability (Doak et al, 1996).
- General health (Council on Scientific Affairs, 1999).
- Income (NIL Fast Facts on Literacy, 1999; Weiss and Coyne, 1997; Bastable, 1997).

The research questions posed were:

1. What is the average reading level of Parkland patients?
2. What is the range of reading levels of Parkland patients?
3. Are there statistical differences between reading level and patient age?
4. Are there statistical differences between reading level and years of school completed?
5. Are there statistical differences between reading level and each of the three ethnic groups studied?
6. Are there statistical differences between reading level and the self-report of reading ability?
7. Are there statistical differences between reading level and self-report of general health?
8. Are there statistical differences between reading level and patient enjoyment of reading?
9. Are there statistical differences between reading level and economic status?
10. Are there statistical differences among the reading levels of the Parkland Hospital population, the Outpatient Clinic population and the Community Oriented Primary Care (COPC) center population?

Methods

Authorization to conduct the study was obtained from the Institutional Review Board of the University of Texas Southwestern Medical Center at Dallas, the Parkland Nursing Research Committee, and Parkland Health & Hospital System.

After reviewing several literacy tests, the Test of Functional Health Literacy in Adults (TOFHLA) was chosen for several reasons:

- It offers both reading comprehension and numeracy components.
- It is specifically health care oriented.
- It is available in Spanish.
- It is available in 14 point type, thus potentially increasing the test population pool.
- The length of time required for administration is shorter than some tests reviewed.
- Validity and reliability were already established.

“TOFHLA: Numeracy is a 17-item test using actual hospital forms and labels for prescription vials. It tests the patients' use of numeracy skills to comprehend directions for taking medications, monitoring blood glucose, keeping clinic appointments, and obtaining financial assistance.” (Test of Functional Health Literacy in Adults Technical Report, Nurss, 1995).

“TOFHLA: Reading Comprehension is a 50 item test using a modified Cloze procedure; that is, every fifth to seventh word in each passage has been omitted. The reader selects the best word to fill in the blank from a list of four possible choices.” (Test of Functional Health Literacy in Adults Technical Report, Nurss, 1995).

“Reliability was calculated by both split-half and internal consistency measures, using Equal Length Spearman-Brown and Cronbach's Alpha formulas, respectively.” (Test of Functional Health Literacy in Adults Technical Report, Nurss, 1995).

Study	N	Equal Length Spearman-Brown			Cronbach's Alpha		
		TOFHLA	Numeracy	Reading Comprehension	TOFHLA	Numeracy	Reading Comprehension
Test Dev.	200	.92	.80	.92	.98	.84	.98
Pharmacist-Patient	79	.91	.74	.93	.98	.83	.99
Physician-Patient	98	.94	.84	.93	.96	.84	.97
Total	377	.92	.79	.92	.98	.85	.98

(from TEST OF FUNCTIONAL HEALTH LITERACY IN ADULTS TECHNICAL REPORT, Nurss et al, 1995.)

“Construct validity for this functional literacy test was ensured by using actual hospital medical texts for both the Reading Comprehension and Numeracy subtests. Concurrent validity was assessed by giving the REALM and the Reading subtest of the WRAT-R. All correlations were significant. . .” (Test of Functional Health Literacy in Adults Technical Report, Nurss, 1995).

Study	N	REALM			WRAT		
		TOFHLA	Numeracy	Reading Comprehension	TOFHLA	Numeracy	Reading Comprehension
Test Dev.	200	.84	.71	.83	.74	.63	.73
Pharmacist-Patient	79	.85	.82	.82	-	-	-
Physician-Patient	98	.87	.84	.85	-	-	-
Total	377	.84	.76	.83	-	-	-

(from TEST OF FUNCTIONAL HEALTH LITERACY IN ADULTS TECHNICAL REPORT, Nurss et al, 1995.)

“Spanish TOFHLA - To ascertain clarity and comparability of the resulting (*translated*) test , the Spanish TOFHLA was then back-translated into English”. (Test of Functional Health Literacy in Adults Technical Report, Nurss, 1995).

A script and a training video were developed in order to standardize test administration. The script included tester comments (bold and in 18 point) in regard to patient eligibility for the study, obtaining verbal consent for inclusion in the study, answers to concerns or questions that the patient might raise and directions about completing the Scantron form on which patient responses were to be marked (non-bold, italic and also 18 point). The statements and questions in the script were worded to minimize embarrassment or anxiety on the part of the patient.

The video featured two of the committee members providing a dramatization of a tester approaching a patient, determining eligibility, obtaining consent, demographic information and beginning the study. Two interviews were presented. In the first, the 'patient' was agreeable to being studied, had few, if any questions, and the interview proceeded smoothly. In the second, the 'patient' was initially dubious about participating and raised several questions before settling into the testing process. The purpose of the video was to provide testers with a visual model to emulate, and to show appropriate responses in the event of patient suspicion, doubt or curiosity.

Thirty six testers underwent training. Depending on their availability and the need at the site, testers conducted from 2 - 12 tests apiece. Testers were free to paraphrase the script except at certain places, as guided by the TOFHLA restrictions. Patient answers were marked on a Scantron form by the tester. Patients could choose not to answer the question regarding their income.

The study was designed to include 340 patients, 100 in the hospital, 50 in the outpatient clinics, and 140 (20 from each of 7) in the COPCs. Demographics of the test subjects reflected those of Parkland in regard to ethnicity and gender: About 40% African-American, 40% Hispanic and 20% Caucasian, and about 66% female, 33% male. The study population in each COPC was also designed to match the demographics of that particular location. Patients under the age of 12 and patients with ethnicity other than African-American, Hispanic and Caucasian were excluded from the study population. Other patients excluded from the study were those in ICUs, those who did not speak or read English or Spanish, and those in whom the presence of alcohol or mind-altering drugs was detected. Names and medical record numbers were not used except to ascertain that the patient had not been previously tested for this study. Answer sheets were devoid of this information.

The final study population totaled 281 patients, 141 patients at Parkland Memorial Hospital and the Out-patient Clinics and 140 COPC patients. Data were collected on each hospital unit and in each clinic, and in each of the COPCs. Patients were asked to provide demographic data and take the Test of Functional Health Literacy in Adults (TOFHLA). Four responses could not be used, leaving a total of 277, and as not all demographic questions were answered for each patient, the total number of patient responses vary slightly per research question examined.

The table below compares the proposed and the actual study population by location, ethnicity and gender.

Study population	Proposed	Actual	Percentage of proposed N
Total patients	340	277	81.5%
Hospital	150	93	62.0%
African-American	58	43	
Hispanic	61	26	
Caucasian	31	24	
Male	50	23	
Female	100	70	
Clinic	50	44	88.0%
African-American	22	20	
Hispanic	19	15	
Caucasian	9	9	
Male	18	15	
Female	32	29	
COPC	140	140	100%
African-American	48	49	
Hispanic	74	74	
Caucasian	18	17	
Male	51	42	
Female	89	98	
Total Afr.-Amer.	128	112	87.5%
Total Hispanic	154	115	74.7%
Total Caucasian	58	50	86.2%
Total Male	119	80	67.2%
Total Female	221	197	89.1%

The Scantron forms were tabulated by machine, and the data recorded in a computer file and then analyzed using the Statistical Products and Service Solutions (SPSS) software.

Limitations

- In reviewing the data, it appeared that the decision to answer or decline to answer the question regarding income may have rested more with the tester than with the patient being asked the question. Most testers had a scattering of unanswered income questions, but a few had either all or most income questions unanswered, indicating perhaps embarrassment or reluctance on the part of the tester to put the question to the patient, or putting it in such a way that the patient was encouraged to decline answering it.
- One of the early questions was set up such that one line on the Scantron, depending on the patient answer to the question, was more often than not left blank. This required greater caution on the part of the tester in making certain that the following response marks were made on the correct line. The issue was addressed during the tester training and again in the script. In retrospect, it would be more reassuring if this possible obstacle were removed, and a response required on each line of the Scantron form.
- Since the population sample was restricted to African-American, Hispanic and Caucasian patients, patients of other ethnic groups were not studied. The decision to omit these patients (primarily Asian and Native American) was based partly on the tiny percentage of the total Parkland population they represent. In one or two of the COPCs, however, this unstudied population has a sizeable presence, which should be considered when examining the descriptions of the COPCs in Appendix A.
- Patient education materials are generally measured for readability in terms of grade-level equivalent. While there is much discussion of and reference to the grade-level of materials, the committee found little standardization among the formulas for determining grade-level. This is in contrast to Doak et al (1996) who comment that “. . . the 40+ readability formulas provide a reasonably accurate grade level (typically plus or minus one grade level with a 68-percent confidence factor).” Our impressions were shared by Redman (1993) who examined several materials using 3 readability formulas (SMOG, FOG and Fry) on each. She found at least two, often three, and occasionally, as high as four grade-level differences. Our impressions were also shared by Goble (1999). The title of this piece, Grammar Checkers, Reading Ease and Other Faery Tales, does a good job of reflecting her (and our) feelings about this subject. She tested a fiction section using the Flesch-Kincaid, Coleman Liau and Bormuth formulas. The grade-levels computed by these formulas were 3.9, 5.3 and 7.8 respectively. We found that the formulas yield such variable results that without knowing which formula has been used, and without a good understanding of the relationship of its ranking to the rankings of other common formulas, the information can, at best, serve only as a general guide in choosing material for a patient. Standardization of formulas would seem to be helpful and desirable. Doak et al (1996) have developed a suitability assessment of materials (SAM) instrument which numerically scores and then categorizes printed, video and audio materials as either superior, adequate or not suitable. It remains to be seen if this tool begins to bridge the gaps.
- One of the frustrations the committee encountered was in trying to match up patient education material readability measures (grade-level) with patient literacy level measures. When the revised edition of Doak et al (1996) became available, it was evident that this frustration was shared by others. Doak et al (1996) comment that patient literacy used to be measured by grade-level, but that this is changing. They describe the newer method of measuring literacy skills – functional competency level, and they further point out that there is not any method of direct conversion between such levels and grade level, though they offer an approximate correlation. An industry standard for grade-level computation, as well as one for functional competency level, and a means of conversion from one to the other

would make material descriptions more meaningful and make the process of matching materials to patients simpler, clearer and easier.

- While patient income was reported at 5 different levels, no effort was made to quantify income over \$25K annually. Only sixteen patients reported an income over \$25K. The second highest income bracket offered was \$18K - \$25K, (N= 25). Clearly, the study population is a low-income group.
- Since the percentages of patients by ethnicity and gender were set based on Parkland demographics, some of the analyses served only to reflect those percentages. Those results were unhelpful, and therefore omitted.
- For various reasons, some testers did not complete the number of tests assigned to them. The main reasons were busyness and in one or two cases, leaving the hospital for a different job. Further, there was some difficulty (despite the demographic statistics) in finding male patients in some of the COPCs. The resulting study population was, therefore, not quite as large or as demographically proportionate as originally planned.

Results

Two hundred and seventy seven completed Scantron forms were processed, and the data analyzed for descriptive statistics, analysis of variance and post-hoc contrasts, using the Statistical Products and Service Solutions (SPSS) software. There was only one patient over age 80 and this individual was omitted from the functional health literacy level and age analysis. Percentages reported may not always equal 100 due to rounding error.

The TOFHLA scores are rated as follows:

Level	TOFHLA score	Functional Health Literacy Description
Adequate Functional Health Literacy	75 - 100	Can read and interpret most health texts.
Marginal Functional Health Literacy	60 - 74	Has difficulty reading and interpreting health texts.
Inadequate Functional Health Literacy	0 - 59	Unable to read and interpret health tests

(from TEST OF FUNCTIONAL HEALTH LITERACY IN ADULTS TECHNICAL REPORT, Nurss et al, 1995.)

Demographic descriptions

◇ Percentages of patients per ethnic group by years of school:

Ethnicity/Grade	1 - 3	4 - 6	7 -11	comp. HS	any college	Total
Afr.-Amer.	0.0	6.4	33.9	37.6	22.0	100%
Hispanic	8.0	31.3	40.2	14.3	6.3	100%
Caucasian	6.0	2.0	28.0	26.0	38.0	100%

Comments - Almost 40% of the Hispanic study population reported no more than an elementary school (6th grade) education, and almost 80% had not completed high school. A positive overall relationship has been shown, both in this study and in the literature, between number of years of school and functional health literacy. The results of this study also show a lower mean for the Hispanic population than for the other two groups studied. These findings indicate a need for an especially careful assessment of the literacy and comprehension levels of Hispanic patients, and an equally careful evaluation of learning.

◇ Percentages of patients per ethnic group by enjoyment of reading:

Ethnicity/Enjoy	Yes	Sometimes	No	Total
Afr.-Amer.	58.3	30.6	11.1	100%
Hispanic	75.2	19.5	5.3	100%
Caucasian	84.0	12.0	4.0	100%

Comments - A cultural bias favoring reading and literacy may be responsible for the high percentages of Hispanic and Caucasian patients who reported an enjoyment of reading.

◇ Percentages of patients per ethnic group by age group:

Ethnicity/Age	12 - 19	20 - 39	40 - 59	60 -79	Total
Afr.-Amer.	10.1	29.4	40.4	20.2	100%
Hispanic	5.3	64.9	24.6	5.3	100%
Caucasian	6.0	36.0	44.0	14.0	100%

Comments - About 70% of the Hispanic population was under age 40, compared to about 39% of the African-American, and 41% of the Caucasian populations. The small percentage of Hispanic patients over age 60 might result from the exclusion of non-readers from the study.

◇ Descriptives: Gender: N = 274. (t = .11; df = 272; p = .92)

Gender	Mean	Std. dev.
Male	75.7	19.2
Female	75.8	18.7

Comments - There was no statistically significant difference in functional health literacy between men and women.

◇ Percentages of patients per gender group by functional health literacy level:

Gender/Level	Adequate	Marginal	Inadequate	Total
Male	59.7	20.8	19.5	100%
Female	59.9	21.8	18.3	100%

Comments - Percentages of both genders within each of the functional health literacy levels are about equal.

Responses to research questions

1. What is the average reading level of Parkland patients?

§ TOFHLA results:

Patients with adequate health literacy: N = 165 (59.5%)

Patients with marginal health literacy: N = 60 (21.5%)

Patients with inadequate health literacy: N = 52 (19.0%)

§ The mean of the TOFHLA total score was 75.59 with a standard deviation of 18.83. The median was 80.00, and the mode 92.00.

2. What is the range of reading levels of Parkland patient?

§ TOFHLA total score range: 14 - 100 of a possible 0 - 100.

3. Are there statistical differences between functional health literacy level and patient age?

§ Descriptives: N = 276. (F = 2.335; df = 3, 272; p = .074)

Age	Mean	Std. dev.
12 - 19	77.1	14.0
20 - 39	77.7	17.9
40 - 59	75.5	19.2
60 - 79	68.4	21.2

Comments - Patients aged 60 - 79 had noticeably lower total TOFHLA scores than patients in any other age group (p = .01 to .08). However, no significant differences were found in functional health literacy associated with age.

Δ Percentages of patients per age group by functional health literacy level:

Age/Level	Adequate	Marginal	Inadequate	Total
12 - 19	59.1	31.8	9.1	100%
20 - 39	64.0	22.4	13.6	100%
40 - 59	58.9	22.1	19.0	100%
60 - 79	47.1	11.8	41.2	100%

Comments - Except for the oldest age group, at least half of those tested had adequate health literacy levels. About 9% of those in the 12 - 19 age group, who might be expected to still be in school had inadequate health literacy skills.

∞ Percentages of patients per functional health literacy level by age group:

Level/Age	12 - 19	20 - 39	40 - 59	60 - 79	Total
Adequate	7.9	48.5	33.9	9.7	100%
Marginal	11.7	46.7	35.0	6.7	100%
Inadequate	3.8	32.7	34.6	28.8	100%

Comments - Among those with adequate functional health literacy skills, almost half were in the 20 - 39 age group. Over a quarter of the patients with inadequate functional health literacy skills are over age 60.

4. Are there statistical differences between functional health literacy level and years of school completed?

§ Descriptives: N = 274. (F = 14.713; df = 4, 269; p = .000)

Grades	Mean	Std. dev.
1 - 3	56.1	28.5
4 - 6	65.9	19.9
7 - 11	74.6	16.5
comp. HS	78.3	16.6
any college	87.9	11.5

Comments - Patients with less than a 4th-grade education had significantly lower TOFHLA scores than those with a 4th-grade or higher education (p = .000). Those with an education between 7th - 11th grades scored no differently than those completing high school (p = .164). Patients with college experience scored highest and scores were significantly different from those of patients with less education (p = .000 to .003).

Δ Percentages of patients per grade by functional health literacy level:

Grade/Level	Adequate	Marginal	Inadequate	Total
1 - 3	30.8	7.7	61.5	100%
4 - 6	40.9	25.0	34.1	100%
7 - 11	51.6	31.9	16.5	100%
comp. HS	66.2	18.3	15.5	100%
any college	90.0	6.0	4.0	100%

Comments - The unexpected large percentage of patients with adequate health literacy skills who reported a 1st - 3rd grade education may reflect patients who have compensated (self-study, literacy courses, experience) for the limited formal schooling.

∞Percentages of patients per functional health literacy level by grade:

Level/Grade	1 - 3	4 - 6	7 - 11	comp. HS	any college	Total
Adequate	2.4	11.0	30.5	28.7	27.4	100%
Marginal	1.7	18.6	52.5	22.0	5.1	100%
Inadequate	15.4	28.8	30.8	21.2	3.8	100%

Comments - Reading adequacy, by and large, improved with level of education, but given the 3.8% of patients with some college education, and the 21.2% of high school graduates with scores in the inadequate range, adequate health literacy cannot be assumed based on level of education.

5. Are there statistical differences between functional health literacy level and each of the three ethnic groups studied?

§ Descriptives: N = 273. F = 215.538; df = 2, 270; p = .000)

Ethnic group	Mean	Std. dev.
Afr.-Amer.	77.1	18.2
Hispanic	69.6	18.8
Caucasian	86.2	14.6

Comments - Caucasian patients, reading in English had a significantly higher score than African-American patients reading in English (p = .003) and Hispanic patients reading in Spanish (p = .000). African-American patients, reading in English had a significantly higher total TOFHLA score than Hispanic patients reading in Spanish (p = .002). While the mean score for Caucasian patients is well into the range of adequate health literacy, and the mean score for African-American patients is barely into the range of adequate health literacy, many patients fall into the marginal and inadequate ranges, particularly Hispanic patients.

Δ Percentages of patients per ethnic group by functional health literacy level:

Ethnicity/Level	Adequate	Marginal	Inadequate	Total
Afr.-American	62.4	19.3	18.3	100%
Hispanic	45.1	30.1	24.8	100%
Caucasian	86.0	8.0	6.0	100%

Comments - The majority of the African-American and Caucasian patients studied demonstrated adequate functional health literacy. This was not the case for the Hispanic patients; over 50% demonstrated marginal or inadequate functional health literacy skills.

6. Are there statistical differences between functional health literacy level and patient enjoyment of reading?

§ Descriptives: N = 275. (F = 3.894; df = 2, 272; p = .022)

Enjoy reading	Mean	Std. dev.
Yes	77.6	18.4
Sometimes	70.0	19.3
No	74.8	19.6

Comments - Patients who stated that they enjoyed reading had significantly higher TOFHLA scores than those who stated they sometimes enjoyed reading (p = .006). There were no statistical differences between patients who stated they enjoyed reading and those who stated that they do not, nor between those who stated that they sometimes enjoy reading and those who do not.

Δ Percentages of patients per reading enjoyment response by functional health literacy level:

Enjoy/Level	Adequate	Marginal	Inadequate	Total
Yes	64.1	20.8	15.1	100%
Sometimes	49.2	20.6	30.2	100%
No	50.0	30.0	20.0	100%

Comments - While most patients who stated that they enjoyed reading did demonstrate adequate health literacy skills, such skills, given the one-third with marginal or inadequate health literacy skills, cannot be assumed when a patient reports enjoyment of reading.

∞ Percentages of patients per functional health literacy level by enjoyment of reading:

Level/Enjoy	Yes	Sometimes	No	Total
Adequate	75.0	18.9	6.1	100%
Marginal	67.8	22.0	10.2	100%
Inadequate	55.8	36.5	7.7	100%

Comments - Patient self-report of reading enjoyment does not reliably reflect the level of functional health literacy. Of those who report that they enjoy reading, most demonstrated adequate health literacy.

7. Are there statistical differences between functional health literacy level and self-report of reading ability?

§ Descriptives: N = 273. (F = 8.306; df = 2, 269; p = .000).

Ability	Mean	Std. dev.
Well	77.5	17.2
Fairly well	74.4	19.1
Poorly	56.9	26.1

Comments - Patients who stated that they read well had significantly higher total TOFHLA scores than patients who stated that they read poorly (p = .000). Patients who stated that they read fairly well also had significantly higher total TOFHLA scores than those who stated that they read poorly (p = .001).

Δ Percentage of patients per self-report of reading level by functional health literacy level:

Ability/Level	Adequate	Marginal	Inadequate	Total
Well	62.2	23.2	14.6	100%
Fairly well	58.6	19.1	22.3	100%
Poorly	21.4	28.6	50.0	100%

Comments - 50% of patients who reported that they had poor reading skills demonstrated inadequate functional health literacy, with another almost 30% scoring in the marginal range. Patients reporting poor reading skills deserve particular attention to the assessment of their literacy skills and to the methods and materials used to meet their learning needs. While more than 60% of patients who reported that they read well scored in the adequate functional health literacy, it is clear that such adequacy cannot be assumed in all patients who self-report good reading skills.

∞ Percentage of patients per functional health literacy level by self-report of reading ability:

Level/Ability	Well	Fairly well	Poorly	Total
Adequate	63.8	34.4	1.9	100%
Marginal	63.3	30.0	6.7	100%
Inadequate	46.1	40.4	13.5	100%

Comments - About 2% of those with adequate functional health literacy skills reported that they read poorly, as did about 35% of those who reported reading fairly well. Of those with inadequate functional health literacy skills, over 45% reported reading well, with another 40% reporting that they read fairly well.

8. Are there statistical differences between functional health literacy level and self-report of general health?

§ Descriptives: N = 276. (F = .715; df = 2, 272; p = .490).

Gen. health	Mean	Std. dev.
Good	77.1	18.4
Fair	74.3	19.0
Poor	74.9	19.8

Comments - No significant differences were found between functional health literacy level and self-report of general health.

Δ Percentages of patients per self-report of general health by functional health literacy level:

Health/Level	Adequate	Marginal	Inadequate	Total
Good	63.0	21.3	15.7	100%
Fair	56.1	22.7	21.2	100%
Poor	60.0	20.0	20.0	100%

Comments - The percentages of patients within each level of functional health literacy are remarkably similar regardless of the general level of health reported.

∞ Percentages of patients per functional health literacy level by self-report of general health:

Level/Health	Good	Fair	Poor	Total
Adequate	41.7	45.4	12.9	100%
Marginal	38.3	50.0	11.7	100%
Inadequate	32.7	53.8	13.5	100%

Comments - There does not appear to be any relationship between the patients' perception of their general health and functional health literacy level.

9. Are there statistical differences between functional health literacy level and economic status?

§ Descriptives: N = 228. (F = 1.549; df = 5, 222; p = .176).
 Patients were instructed that they could choose not to answer the question regarding their income.

Income	Number of pts.	Mean	Std. dev.
≤ \$6K	60	75.4	20.2
\$6K - \$12K	79	71.5	18.8
\$12K - \$18K	48	77.2	17.6
\$18K - \$25K	25	78.0	17.6
≥\$ 25K	16	83.1	15.8

Comments - No significant differences were found between economic status and reading level.

Δ Percentages of patients per economic bracket by functional health literacy level:

Income/Level	Adequate	Marginal	Inadequate	Total
≤ \$6K	58.6	22.4	19.0	100%
\$6K - \$12K	50.6	22.8	26.6	100%
\$12K - \$18K	62.5	22.9	14.6	100%
\$18K - \$25K	60.0	28.0	12.0	100%
≥ \$25K	75.0	18.8	6.3	100%

Comments - Over 50% of the patients in each income bracket scored at the adequate functional health literacy level. There appears to be no particular relationship between economic status and functional health literacy within the study population. It should be remembered that the range of options was at the low end of the economic scale, and only 7% (N = 16) of patients studied reported incomes over \$25K.

10. Are there statistical differences in functional health literacy level between patients at Parkland Hospital, the Outpatient Clinics and the COPCs?

§ Descriptives: N = 272 . (F = 2.761; df = 2, 269; p = .065).

Location	Mean	Std. dev.
Hospital	78.0	17.5
Clinic	78.7	17.0
COPC	72.9	20.3

Comments - There were no significant differences between the hospital and the outpatient clinics and between the outpatient clinics and the COPCs. A significant difference (p = .046) was evident between the hospital and the COPCs.

Δ Percentages of patients per location by functional health literacy level:

Location/Level	Adequate	Marginal	Inadequate	Total
Hospital	65.3	20.0	14.7	100%
Clinic	64.0	18.0	18.0	100%
COPC	54.3	23.6	22.1	100%

Comments - Almost 50% of COPC patients had scores in the marginal and inadequate functional health literacy levels.

Discussion

Discussion and conclusions

Careful assessment of literacy skills and evaluation of learning are important when teaching any patient, but, based on the results of this study, are critical in the education of older patients (over age 60) and Hispanic patients at Parkland. The large percentage (41%) of patients over age 60 with inadequate functional health literacy skills reflects the findings in the literature regarding the lower literacy level of older persons (Council on Scientific Affairs, 1999; Doak et al, 1996; Bastable, 1997). The study did find that the literacy level of Hispanic patients, tested in Spanish, was lower than that of African-American and Caucasian patients tested in English, and while this finding is also in line with the literature, it is not uniformly clear whether Hispanic patients in other studies were tested in English or in Spanish (Weiss and Coyne, 1997; Bastable, 1997).

Functional health literacy skills showed a positive relationship with school grade completed, as does the relevant literature (NIL Fast Facts on Literacy, 1999; Parker et al, 1995; Bastable, 1997; Wilson, 1995), but a sizeable portion of this study's population with higher education (43% of those who had completed high school, and almost 9% of those with some college) did not show adequate functional health literacy skills.

While most patients who stated that they enjoyed reading demonstrated adequate functional health literacy skills, many did not, again indicating the need for careful assessment and evaluation, and the avoidance of assuming that proficiency accompanies enjoyment. It is possible that affirmative answers to this question reflect cultural valuation of good literacy skills.

Most patients (over 60%) who stated that they read well did in fact fall into the adequate functional health literacy level, but the other almost 40%, despite reporting that they read well, did not demonstrate adequate literacy skills. In fact, over one third of those stating they read "well" and "fairly well" fell into the inadequate functional health skills level. It is helpful to note that of those who reported poor reading skills, fully 50% had inadequate functional health literacy skills, and another almost 30% had marginal skills. Clearly, health care professionals should heed those patients who state that they do not read well, and provide teaching and materials designed for those with low-literacy skills. Doak et al, (1996) cite the National Adult Literacy Survey (NALS) in which "over two-thirds of those who tested at the very lowest reading level reported that they 'read well' or 'read very well'". In this study, 86.5% of those with inadequate functional health literacy skills reported that they read "well" or "fairly well". Patients who state that they read well require a careful assessment of their literacy skills – many have adequate functional health literacy skills, but many do not.

No relationship was noted between self-report of general health and functional health literacy skills. This is in contrast to the findings reported in the Council on Scientific Affairs, (1999) which states ". . . functional health literacy was worse among . . . individuals who reported poor overall health".

Nor was any relationship demonstrated between economic status and functional health literacy skills. At first glance, this finding seems to contrast with the literature, representatively summarized by Weiss and Coyne (1997) who state, "Illiteracy is more frequent among persons of lower socioeconomic status". The NIL Fast Facts on Literacy, (1999) state "Forty three percent of people with the lowest literacy skills live in poverty". Bastable, (1997) lists "the economically disadvantaged" as having "poorer reading and comprehension skills than the

average American.” However, given that only the low end of the economic scale was addressed in this study, with a total of 16 patients (7%) reporting income levels over \$25K annually, it may not be expected that this study would reflect other findings.

A higher percentage of hospital patients did demonstrate adequate functional health literacy levels than did patients in the COPCs, with the out-patient clinic results being very similar to those of the hospitalized patients. This might reflect the heavy usage of the COPCs by Hispanic patients.

It is clear from the analysis of the data that no assumptions can be made about the literacy level of patients based on gender, education, income, enjoyment of reading, and self-report of general health or reading ability. Neither is location within the Parkland system indicative in any way of functional health literacy skill. Each patient must be assessed, and the learning of each patient carefully evaluated for effective patient education to take place.

The same caveats about making assumptions regarding functional health literacy skills are true of patients in any and all settings. An assessment of literacy (in its broadest sense) skills and the evaluation of learning remain critical in every patient, regardless of setting. At Parkland and in every instance of a health care professional teaching a patient, it is evident that the professional should have not only low-literacy materials available, but also the knowledge and skills needed to effectively teach patients with low-literacy skills.

The grade-level at which Parkland patient education materials are written should not be raised from the approximately 4th - 5th grade level currently used. Even though 60 - 80% of English-speaking patients in the study demonstrated adequate functional health literacy, the others, whose needs must also be met, have either marginal or inadequate health literacy skills. Among the Hispanic population studied, less than half (45%) demonstrated adequate health literacy skills, and one quarter had inadequate health literacy skills. It is even more critical for this population that Spanish materials designed for patients with low-literacy skills continue to be made available. The positive impact of low grade-level, easy to read materials on patient comprehension and compliance has been demonstrated (Doak et al, 1996).

A re-study of the functional literacy level of Parkland patients should not be needed for several years unless there are significant changes in the demographics of the patient population. The catalyst for this study was just such a change – the increase, and in some areas, the doubling of the Hispanic population.

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Appendix A

Descriptions of the COPCs

Introduction

The following tables describe various relationships between the 7 COPCs studied. No analyses of this data were performed as the number of patients per COPC (20) was too small. The COPCs vary considerably in the number of patients seen, and since 20 patients per COPC were studied, some COPCs were proportionately over-sampled, and some under-sampled. For these reasons, caution should be used in making any assumptions or predictions based on this information.

€ Percentage of patients in each COPC by age group:

Age/COPC	East Dallas	Garland	Oak West	Deharo	Vickery	SE Dallas	Bluitt Flowers
12 -19	0.0	5.3	22.2	0.0	10.5	5.0	0.0
20 - 39	55.0	42.1	50.0	65.0	57.9	30	26.3
40 - 59	35.0	47.4	22.2	25.0	21.1	35.0	36.8
60 - 79	10.0	0.0	5.6	10.0	10.5	30.0	36.8
Total	100%	100%	100%	100%	100%	100%	100%

Comments - Only one COPC (Bluitt Flowers) has a majority of patients over the age of 40. The other six (East Dallas, Garland, Oak West, Deharo, Vickery and SE Dallas) have the majority of their patients between ages 20 and 59. Oak West had the greatest percentage of patients under age 19.

€ Percentage of patients in each COPC by educational level:

Grade/COPC	East Dallas	Garland	Oak West	Deharo	Vickery	SE Dallas	Bluitt Flowers
1 - 3	15.8	10.5	5.6	5.0	0.0	10.0	5.3
4 - 6	36.8	15.8	16.7	30.0	10.5	10.0	15.8
7 - 11	15.8	42.1	55.6	30.0	31.6	45.0	15.8
comp. HS	15.8	15.8	5.6	20.0	26.3	20.0	47.4
any college	15.8	15.8	16.7	15.0	31.6	15.0	15.8
Total	100%	100%	100%	100%	100%	100%	100%

Comments - Vickery had the highest percentage of patients with some college education.

€ Percentage of patients in each COPC by income:

Income/ COPC	East Dallas	Garland	Oak West	Deharo	Vickery	SE Dallas	Bluitt Flowers
≤ \$6K	26.3	30.8	17.7	18.2	14.3	40.0	15.8
\$6K - \$12K	31.6	23.1	35.3	27.3	42.9	33.3	42.1
\$12K - \$18K	26.3	30.8	41.2	9.1	35.7	20.0	21.1
\$18K - \$25K	5.3	7.7	0.0	18.2	7.1	6.7	21.1
> \$25 K	10.5	7.7	5.9	27.3	0.0	0.0	0.0
Total	100%	100%	100%	100%	100%	100%	100%

Comments - Garland had the highest percentage of patients with an income ≤ \$6K. Deharo reported the highest percentage of patients with an income ≥ \$25K. Three COPCs (Vickery, SE Dallas and Bluitt Flowers) reported no patients with an income ≥ \$25K. With the exception of Deharo, all the COPCs had more than half of their patients reporting incomes under \$12K.

€ Percentage of patients in each COPC by functional health literacy level :

Level/ COPC	East Dallas	Garland	Oak West	Deharo	Vickery	SE Dallas	Bluitt Flowers
Adequate	40.0	63.2	38.9	65.0	73.7	65.0	36.8
Marginal	25.0	21.1	27.8	20.0	26.3	20.0	31.6
Inadequate	35.0	15.8	33.3	15.0	0.0	15.0	31.6
Total	100%	100%	100%	100%	100%	100%	100%

Comments - The COPC with the highest percentage of patients with an adequate literacy is Vickery. No patients at Vickery fell into the inadequate functional health literacy level. Vickery is also the COPC with the highest percentage of patients reporting some college education. The COPC with the highest percentage of patients with an inadequate literacy is East Dallas, with Oak West and Bluitt Flowers almost as high.

Appendix B

Further Research Ideas Generated During the Study Process

- Checking patient literacy level by obtaining a reading level of the patient's preferred reading material, such as newspapers and magazines.
- An examination of how much cultural differences in the valuation of reading impact self-report of reading enjoyment.
- A review of existing studies examining health status in relation to economic level to see the range of income studied.
- Obtaining a truly representative sample size and proportionate demographics for detailed studies in any of the COPCs.
- Literacy level and related studies of other ethnic groups may be desirable as their numbers within the PHHS population become more significant.
- Attempts at standardization and correlation of readability measures (grade-level) and patient health literacy measures (functional competency).