Original article

Relation of health literacy to gonorrhoea related care

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Objective: To assess the relation between health literacy and receipt of a screening test for gonorrhoea in the past year.
Methods: Study design was multisite, cross sectional survey of subjects enrolled from clinics, from community based organisations, and by street intercept. Data were obtained using face to face interview. The dependent variable was self reported receipt of a test for gonorrhoea in the past year. Health literacy was measured by the Rapid Estimate of Adult Literacy in Medicine (REALM), recoded to represent 8th grade or lower reading or 9th grade and higher reading level. Statistical analyses were adjusted to account for selection bias in literacy assessment.
Results: 54% of the sample reported at least one gonorrhoea test in the previous year. 65% of the sample read at a 9th grade level or higher. REALM score was moderately correlated with the respondent's years of education. After adjustment for missing REALM data, past suspicion of gonorrhoea, self inspection for gonorrhoea, self efficacy for care seeking, REALM score of 9th grade reading level or higher, and younger age were independently associated with gonorrhoea testing in the previous year. For the average respondent, REALM reading grade level of 9th grade or higher is associated with a 10% increase in the probability of having a gonorrhoea test in the past year.
Conclusions: Low literacy appears to pose a barrier to care for sexually transmitted infections such as gonorrhoea.
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Keywords: literacy; care seeking behaviour; gonorrhoea

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An association between literacy and care for sexually transmitted infections (STI) has not been previously reported. However, as many as 44 million adults in the United States have impaired ability to read basic written materials[1] and low literacy has been demonstrated in several populations at risk for STI. Among clients undergoing substance misuse treatment, for example, more than half read at or below 9th grade level, often three or four grades below the reading level of most informed consent and treatment related educational materials.[2] Similar findings are demonstrated for emergency department patients, those with chronic diseases, clients of public hospitals, and those attending family planning clinics.[3–8] A recent study showed that women with low literacy skills in a low income, managed care population had less understanding of fertile periods during the menstrual cycle and indicated greater interest in learning more about birth control methods.[9]

People with low literacy are often at elevated risk of acquiring sexually transmitted diseases. Data from a multisite, population based telephone survey indicate that less educated respondents reported more sex partners than respondents with more education (Judith Greenberg, unpublished data). Similarly, in a Brooklyn study of fertility related behaviours, less educated women were slightly more likely to have received payment for sex in the past 30 days (Matthew Hogben, unpublished data). Literacy and education are often markers for larger, socioeconomic issues that relate to greater risk for STDs and less access to health care.

The studies discussed above identify low literacy as a potential barrier to care among people who are already receiving health services. However, receipt of STI related care is a complex mixture of factors associated with clients, providers, and healthcare systems.[10] Timely receipt of care requires—at a minimum—recognition of a need for care, appropriate behavioural responses, means to accomplish these behaviours, receptiveness of a provider (representing a healthcare system), and provision of care.

Low literacy could influence STI related care at each of these levels. Clients with low literacy experience a strong sense of stigma[11] and stigma is a pervasive barrier to STI related care seeking.[12] Stigma associated with both low literacy and a perceived need for STI related care could be an important barrier to care. Reading is necessary for most aspects of the healthcare system yet many low literacy clients never divulge reading difficulties to clinic personnel or providers.[13 14] Thus, written clinical material including signage, consents, educational material, and treatment instructions may be inadequately understood.[9] Literacy affects both written and oral communication.[15] Clients with low literacy skills (compared with skilled readers) interpret words literally, miss both meaning and context, skip unfamiliar words, and focus on details rather than key

points.[16] Difficulty with providers' vocabulary, language structure, and logic are all increased for clients with low literacy skills.[14 15]

This earlier research suggests that low health literacy may be a causative barrier to appropriate STI related care. However, we were unable to identify research directly examining the relation between literacy and STI related care. The purpose of this paper, therefore, is to assess the relation between health literacy and receipt of a specific type of STI related care—that is, a screening test for gonorrhoea in the past year. Gonorrhoea testing is an appropriate clinical behaviour to assess since routine screening is not recommended for the general adult population.[17] Testing is therefore restricted to those at risk because of their behaviour or symptoms. This type of selective testing—potentially influenced both by decisions to seek care as well as by clinical communication—is expected to be most affected by low literacy.

Methods

RESPONDENTS

Data were collected as part of the Gonorrhea Community Action Project (GCAP). GCAP is a multisite research programme designed to evaluate STI related care from the multiple perspectives of clients, providers, and healthcare systems. Participating sites included Prince George's County (MD), Denver (CO), Los Angeles (CA), Indianapolis (IN), St Louis (MO), Central Harlem (NY), and Birmingham (AL).

Respondents were recruited from clients of clinics, from community based organisations, and by street intercept in each of the seven locations. Clinic sites focused on primary care settings but also included clinics for sexually transmitted diseases. Each research site was asked to interview an equal number of subjects from each source. The intent was to enrol a sample that represented a broad range of experiences with gonorrhoea related care but not necessarily representative of the population of at-risk people. Because of some local community and investigator concerns, only four of the seven sites (CO, IN, NY, AL) collected evaluable health literacy data. All information was collected by face to face interview requiring 20–40 minutes to complete. Interviewer training was conducted during a 2 day meeting in Atlanta (to train on-site trainers) and by twice monthly conference calls among individual interviewers. No effort was made to match interviewers and respondents on sex, race/ethnicity, age, or sexual preference. The study protocol was approved by the institutional review boards of each participating site as well as that of the Centers for Disease Control and Prevention.

MEASURES

The dependent variable was whether the subject was tested for gonorrhoea in the past 12 months. Respondents were asked "In the past 12 months, how often have you been to a doctor, hospital or clinic to get tested for gonorrhoea?" Response options were "Never," "Once," "Twice," "Three times," and "More than three times." Responses were recoded to represent "no gonorrhoea testing in the previous year" or "any gonorrhoea test in the previous year."

Health literacy was measured by the Rapid Estimate of Adult Literacy in Medicine (REALM). REALM is a 66 item literacy screening instrument based on word pronunciation. REALM requires about 3 minutes to administer and has excellent reliability and validity.[18] Subjects are presented with three columns of words that may be used in medical encounters: for example, "fat," "abnormal," and "gonorrhoea." Initial words are one syllable; final words are three to six syllables. One point is given for each correctly pronounced word, with zero points for skipped or mispronounced words. The raw REALM score is the sum of correctly pronounced words. REALM scores of 0–18 represent a reading level of 3rd grade or less; scores of 19–44 represent 4th–6th grade reading level; scores of 45–60 represent 7th–8th grade reading level; and scores greater than 60 represent 9th grade reading level or above. For the current analyses, REALM scores were recoded to 8th grade (or less) reading level versus 9th grade (or above) reading level to reflect reading levels commonly used for clinical printed material.

In addition to the measure of health literacy, demographic, and attitudinal/behavioural variables that may also influence the likelihood of being tested for gonorrhoea were included. Demographic variables included sex (male/female), age (in years), recruitment location (CO, IN, NY, AL), recruitment site (community/clinic), usual source of payment for health care, and years of education. Source of payment was coded as "insurance or third party payer for medical services," "free services," "self pay for medical services," and "don't know." Years of education was measured as the current grade for subjects still in school or highest completed grade for those out of school.

Attitudinal/behavioural variables included whether the subject ever suspected a gonorrhoea infection and ever physically checked for evidence of gonorrhoea. Both conditions were coded with dichotomous indicators (11 respondents indicated "don't know" to the question about past suspicion of gonorrhoea and these responses were reclassified to "no"). Self reported health status was assessed by a single item: "Overall, how would you rate your health?" Response choices were excellent, good, fair, or poor, but in the analysis excellent/good are compared to fair/poor. Self efficacy for care seeking was assessed by asking the respondent to describe (on a 7 point semantic differential scale from "Very unsure" to "Very sure") their ability "to go for a check up every 6 months even if it was difficult." We consider this as a general measure of self efficacy for healthcare seeking. Finally, we gathered information on perceived risk of acquiring gonorrhoea by asking, "In the next 12 months, what are your chances of getting gonorrhoea?" Responses were on a 5 point

semantic differential scale from "No chance at all" to "Definitely will get gonorrhoea."

DATA ANALYSES

All analyses were conducted using STATA (Stata Corporation, College Station, TX, USA). Preliminary analyses showed that REALM scores were missing for a significant proportion of respondents. This suggests there may be differences between respondents who did and did not complete the REALM. If these differences are systematically related to gonorrhoea related care, biased parameter estimates for the predictors of gonorrhoea related care (including literacy) will result even in the selected population who did complete the REALM.[19 20]

Our analytical approach to this potential selection bias used now standard procedures to assess selection bias and adjust parameter estimates.[21–23] The selection bias adjustment is accomplished by splitting the analysis into two equations. The first equation identifies a specified set of variables to predict the likelihood of missing data (for example, REALM data present or absent). These predictor variables are those that may plausibly affect the presence or absence of REALM data. The second equation predicts gonorrhoea related care (for example, has the respondent been tested for gonorrhoea in the past year) on the basis of attitudinal and behavioural variables. When both equations are estimated simultaneously, parameters of the first equation are estimated for the entire sample. Parameters for the second are estimated just for the subsample of respondents who have REALM scores. This analysis is typically done using probit regression analysis, a type of regression analysis appropriate for dichotomous outcomes. Probit analyses assume a cumulative normal distribution of the underlying probability of data availability. Thus, probit regression coefficients are in the metric of Z scores. Like logistic regression coefficients, changes in Z scores are only monotonically related to changes in probabilities. To aid in the interpretation of the probit regression coefficients, we also present the changes in probability (for example, the marginal effect) in the outcome *for the average respondent* in all the regression results.[22]

The specification of each equation and the rationale for the inclusion of the predictor variables follows.

Equation 1: Is REALM data present or absent?

Predictors

(1) Sex. Included because of potential differential effects of sex related to the social desirability of completing surveys and cooperation with researchers.
(2) Years of education. Because one aspect of REALM literacy is related to verbal skills, more educated respondents may be more likely to complete this section of the instrument.
(3) Age. Older respondents may experience more stigma associated with low literacy and be more likely to reject literacy assessment.
(4) Site of survey administration. Because the survey content is more salient to respondents in a healthcare setting such as a sexually transmitted diseases clinic, such a setting should produce higher compliance rates with the REALM than for respondents in the community setting.
(5) Research site dummy variables. This is a general adjustment for variability in implementation in the survey across sites. No specific cross site differences are hypothesised.

Equation 2: Was there a test for gonorrhoea in the past year?

Predictors

(1) Suspicion of gonorrhoea. Suspicion of infection is an important stimulus for care seeking and testing.
(2) Self inspection for infection. Self inspection for evidence of gonorrhoea is an aspect of health monitoring that may motivate care seeking and subsequent testing.
(3) Self efficacy for healthcare seeking. Because gonorrhoea screening is generally available only through healthcare facilities, greater self efficacy for healthcare seeking should be associated with obtaining a gonorrhoea screening test.
(4) Assessment of general health. People with poor/fair health perceive greater barriers to obtaining gonorrhoea related care than those with good/excellent health.
(5) Source of payment for health care. These will have differential effects depending on the financial burden to the respondent.
(6) REALM score. Based on the limited research of the effects of health literacy on health services utilisation, we expect that greater literacy (9th grade or above) is associated with increased likelihood of gonorrhoea testing.
(7) Age. This is included because age is correlated with frequency of sex and number of sex partners. We expect a negative relation between age and gonorrhoea testing.
(8) A clinic location of survey administration. Some of the respondents were clinic visitors because of potential gonorrhoea infection. Thus, respondents enrolled from clinics should be more likely to have a gonorrhoea screening test.

Results

The initial sample consisted of 1035 subjects, ages 12–55 years of age. REALM scores were obtained from 809 (78%). Time demands, interviewer judgment, and respondent reluctance were primary reasons for failure to administer the REALM. Descriptive information on the variables used in the regression analysis are shown in table 1. Fifty four per cent of the sample reported at least one gonorrhoea test in the previous year, 28% suspected a gonorrhoea infection in the past, and half the respondents report checking themselves for gonorrhoea in the past.

Sixty five per cent of the sample read at a 9th grade level or higher. Distribution of REALM scores was negatively skewed: the average REALM score was 56.50 (SD 12.78) but the

Table 1 Descriptive statistics

A: Predicting the absence or presence of REALM data (equation1)	
*Variable**	
REALM data available (% Yes)	78
Female (%)	59
Years of education, mean (SD)†	11.80 (2.16)
Age, mean (SD)	26.36 (9.96)
Clinic recruitment site (%)	64
Enrolment location (%)	
Denver	24
Indianapolis	21
New York	31
Alabama	34
B: Predictors of gonorrhoea testing in the previous year (equation 2)	
Variable	
Gonorrhoea test in past year (% Yes)	54
Suspected gonorrhoea (% Yes)	28
Self inspection for gonorrhoea (% Yes)	50
Self efficacy for healthcare seeking, mean (SD)	5.64 (1.69)
Assessment of health (% good/excellent)	74
Source of payment for health care	
Insurance (%)	59
Free	5
Self pay	27
REALM, 9th grade or above (%)	65
Clinic recruitment site (%)	64
Age (years) mean (SD)	26.36 (9.96)

*n=1035,†n=930 because of missing data on years of education. All variables are dichotomies reflecting the characteristic except that self efficacy is a 1–7 Likert item, self rated health represents a "excellent" or "good" rating, and age and education are coded in years.

median score was 62 (the observed values ranged from 0 to 66). In addition, REALM score was only moderately correlated with the respondent's years of education (r = 0.35, n=735). Thus, we conclude that REALM measures an aspect of literacy not completely captured by years of education.

Bivariate analyses showed that reading at a 9th grade or higher level (as measured by the REALM) increased the odds of a gonorrhoea screen in the past year by 1.37 (95% confidence interval = 1.02, 1.93). The Q correlation, a measure of association based on the odds ratio, was 0.16. Thus, greater health literacy is associated with gonorrhoea testing in the past year. However, these results do not control for potential selection bias (owing to missing REALM data) or for other factors associated with gonorrhoea testing. The probit regressions address these two issues.

The results of the probit regressions are shown in table 2. The total sample size for the probit regressions are 909 because of missing data on respondent education. Of these 909, 21% (n=187) are missing the REALM data. Thus, the first regression predicting the presence of REALM data is based on the initial 909 respondents. The second equation, predicting having a gonorrhoea test is based on the subset of these (n=722) who completed the REALM and have no missing data on other measures.

Results for equation 1 (table 2A) show that females were more likely than males to complete the REALM. As expected, respondent education and REALM completion were positively related. Age was also associated with REALM completion: older respondents were less likely to complete the REALM. Enrolment location (clinic versus the community sites) was not related to REALM completion. Finally, respondents in Denver were less likely to complete the REALM compared with the other sites. Thus, most a priori expectations about the effects of demographic variables on REALM completion were supported with the exception of enrollment location.

Results for equation 2 (table 2B) show that past suspicion of gonorrhoea, self inspection for gonorrhoea, self efficacy for care seeking, REALM score of 9th grade reading level or higher, enrolment from a clinic, and younger age were independently associated with gonorrhoea testing in the previous year. For the average respondent, REALM reading grade level of 9th grade or higher is associated with a 10% increase in the probability of having a gonorrhoea test in the past year, even after adjustment for selection effects and other predictors. Neither health status nor source of payment for health care was associated with gonorrhoea testing in the multivariable probit analysis.

Note that the correlation between the error terms of equations 1 and 2 is −0.39. The likelihood ratio test (which compares the goodness of fit with and without the correlation of error terms) shows that the correlation differs from zero (χ^2= 4.22, df=1, p=0.04). Thus, the correction for selection bias is statistically necessary in this instance.

In order to assess whether low literacy respondents were likely to be at risk for gonorrhoea in their own estimation, we examined the relation between the REALM score and the question about perceived risk for acquiring gonorrhoea in the next 12 months. The REALM was significantly and negatively related to perceived risk for gonorrhoea (F = 9.12, p <0.0001)—that is, respondents with low literacy rated themselves more likely to acquire gonorrhoea in the next 12 months than respondents with higher literacy. Despite this perceived level of risk, it is clear that low literacy respondents seek health care less than respondents of higher literacy.

*Table 2 Relation of health literacy and gonorrhoea testing in previous year—selection bias adjustment results**

Variable	*Estimate*	*SE*	*z*	*Marginal probability*
A: Dependent variable: REALM data present (no/yes; n=909)				
Intercept	−0.23	0.45	−0.53	—
Female	0.28	0.12	2.36	0.031
Years of education	0.08	0.03	2.61	0.009
Age	−0.01	0.007	−1.94	−0.001
Clinic respondent†	0.12	0.11	1.08	0.013
Denver‡	−0.72	0.15	−4.82	−0.079
Indianapolis‡	1.24	0.19	6.28	0.137
New York‡	1.76	0.24	7.35	0.195
B: Dependent variable: gonorrhea test in past year (no/yes; n=722)				
Intercept	−0.44	0.30	−1.42	—
Suspected infection	0.26	0.11	2.29	0.100
Self check for STIs	0.47	0.09	4.71	0.181
Self efficacy	0.12	0.02	3.98	0.046
Self rated health§	−0.09	0.11	−0.82	−0.035
Insurance pays¶	−0.07	0.17	−0.42	−0.027
Free health care¶	−0.09	0.27	−0.33	−0.035
Self pay for care¶	−0.18	0.18	−0.94	−0.069
REALM >9th grade**	0.26	0.10	2.63	0.100
Clinic recruitment site††	0.38	0.11	3.39	0.146
Age	−0.02	0.005	−3.87	−0.008

*See text and table 1 for variable definitions. The correlation (rho) between error terms of the two equations =−0.38 and the likelihood ratio test of rho=0 estimates a χ^2(df=1) of 4.22, p = 0.04 rejecting the null hypothesis of no selection bias.
†Community respondent is the reference category; ‡Alabama is the reference category; §Poor/fair is the reference category; ¶"Don't know" is the reference category; **8th grade or less is the reference category; ††Community recruitment site is the reference category.

Conclusions

We found that health literacy—represented by reading grade levels of 9th grade or higher—was positively associated with self reports of gonorrhoea testing in the past year. This association remained significant after controlling for selection biases owing to missing data, demographic variables, and attitudinal/behavioural variables such as health status, suspicion of gonorrhoea, and self inspection. There was no evidence that literacy is simply a surrogate measure for education level. Low literacy appears to pose a barrier to care for sexually transmitted infections such as gonorrhoea.

Further, we found that respondents with low literacy perceive themselves to be at higher risk for acquiring gonorrhoea than respondents with high literacy. Thus, by their own estimation, these respondents are at elevated risk for gonorrhoea, yet are less likely to seek STD related health care. This implies that persons of low literacy are encountering significant barriers to healthcare access. Further studies on the relation between literacy, risk behaviours, and access to health care is merited.

These data are consistent with other research demonstrating the importance of social-structural antecedents of healthcare access for STI prevention.[10] Such research suggests that factors distal to individual risk and protective behaviours are important elements in many public health problems including STIs. Ultimately, comprehensive STI prevention programmes may require attention to issues such as impaired literacy. For example, STI prevention programmes could attempt to identify low literacy clients and provide support to improve reading skills. Such efforts would not directly impact STI related behaviour but could provide important tools for overcoming barriers to appropriate health care.

The mechanisms by which health literacy influences gonorrhoea related health care are not understood. Low literacy could serve as a barrier to appropriate care either by reducing the likelihood of seeking care, by inhibiting communication between providers and patients, or both. Qualitative studies of the healthcare experience of low literacy patients suggest that most clients do not divulge reading difficulties to care providers.[14] At the same time, these clients note significant difficulties in managing the entire healthcare visit, including clinic signage, written consent forms, and written instructions. Several studies note that the reading level of consent forms and written instructional material—even for clients at risk for STI—is substantially higher than the average reading level of the clientele.[24–27] The stigma of poor literacy is a recurrent barrier identified by clients and may be a particularly important barrier for clients at risk for STI.[13]

Our finding that low literacy skills are associated with decreased probability of gonorrhoea testing is important because literacy is a barrier that may be amenable to intervention.[28–30] Clinical materials can be prepared using short words and sentences. Technical words and jargon can be eliminated or carefully explained. A limited number of concepts should be presented with each communication.[31] Typographic emphases and simple graphics can highlight important points. Visual presentation by video or laser disc may improve comprehension.[32] Materials can be evaluated by readability indices such as the Simple Measure of Gobbledegook (SMOG) or the Flesch-Kinkaid formula.[33] Most importantly, clinicians and staff can be trained to recognise patients with low literacy skills and respond with appropriate sensitivity. Although some may argue that such recognition risks additional stigmatisation of low literacy patients, it is exactly within clinical settings that sensitive, informed interventions may be of greatest use.

The influence of such interventions for improved health outcomes has not been directly demonstrated. Tailored communications and educational material may improve patient knowledge and understanding.[15] The Stanford Nutrition Action Program (SNAP), for example, showed that educational materials tailored for participants with low literacy skills (defined as 8th grade reading level or lower) produced greater improvement in knowledge, attitudes and nutrition self efficacy than a comparable group of subjects receiving traditional nutrition advice and education.[34]

Several limitations of these data should be considered. Firstly, assessment of STI related care was limited to a single self report item inquiring about gonorrhoea screening in the past year. Obviously, STI related care is a complex phenomenon not limited to clinical behaviours or infections caused by one organism. Self report of gonorrhoea testing may itself be influenced by literacy skills. We cannot say, for example, whether low literacy respondents actually received fewer gonorrhoea tests or were simply less likely to report gonorrhoea screening. If low literacy patients in fact communicate less efficiently with providers then lower levels of risk based screening are possible. If low literacy impairs a patient's ability to accurately report a complex word such as "gonorrhoea" then incomplete reporting is possible. Finally, our measure of health literacy—the REALM—is designed as a screening instrument rather than an assessment of functional health literacy, comprehension, or numeracy. The advantage of the REALM, however, is the brief time required for administration compared with more comprehensive literacy assessment tools.

A comment is warranted on our decision to exclude examination of race/ethnicity as a variable. Despite its widespread use in social/epidemiological research related to STI, we believe that race and ethnicity are not useful scientific constructs in studies such as this where long histories of social and economic disparities clearly influence literacy and STI related care.[35] This is not to demean the experience of insidious prejudice associated with race and ethnicity. Rather, we believe that the scientific study of STI cannot be furthered by inclusion of terms whose meanings cannot be separated from their myriad negative connotations.

The Council on Scientific Affairs of the American Medical Association recently recognised the pervasive influences of low literacy on health and recommended a broad agenda of research, education, and policy aimed improving these health outcomes.[28] Data from this study suggest that literacy influences receipt of a specific type of health service as well as its larger influences on health services utilisation and health status.

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