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Specific STI knowledge may be acquired too late

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Abstract Adolescent females in this study knew more about their previously diagnosed sexually transmitted infections (STIs) than about other STIs, including ones that they had unknowingly contracted. They appeared to learn about STIs primarily after diagnosis, too late for effective prevention, early detection, or prompt treatment of their disease. © 2006 Society for Adolescent Medicine. All rights reserved.

Despite widespread school-based sexuality education [1], adolescents remain uninformed about sexually transmitted infections (STIs) other than human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) [2]. Limited disease knowledge is associated with multiple sex partners [3], inconsistent condom use [4], delaying treatment of disease [5], and failing to return for STI-screening results [6].

Health care providers often miss the opportunity to counsel adolescents during routine screening [7]. Adolescents' knowledge of STIs is correlated with their experience with the disease, but it is not clear whether they receive information after diagnosis, or are already knowledgeable before learning of their infection [8]. This study presents secondary analyses of an existing dataset examining when adolescent females learn about STIs.

Methods

Participants

Three hundred sexually active adolescent females, aged 14–18 years (median = 16), were recruited from healthcare sites. Most were African-American (75%) or white (15%). We received approval from Institutional Review Boards at participating institutions. Consent was obtained from participants, and from parents or guardians for those under 18.

Procedure

We analyzed data from a longitudinal study evaluating an educational interactive-DVD intervention providing information about STIs [9]. Participants indicated previous diagnosis with any of eight STIs: Chlamydia, Genital Herpes, Genital Warts, Gonorrhea, Hepatitis B, HIV, Syphilis, and Trichomoniasis. They completed 15 knowledge questions about symptoms, transmission, treatment, and consequences of those STIs (sds.hss.cmu.edu/risk/knowledge_test_STIs.htm). Each question had response options for all eight STIs and indicated how many STIs should be selected. Correct and incorrect responses were weighted so that chance performance for each STI was 50%. Knowledge was measured four times over 6 months. The test had convergent validity, with performance increasing over time for diseases that participants had selected during the intervention, $t(1156) = 3.59$, $p < .001$, and discriminant validity, with performance remaining similar for disregarded diseases, $t(1156) = 0.60$, n.s. At baseline and 6 months, participants self-administered vaginal swabs for polymerase chain reaction (PCR) tests of *Chlamydia trachomatis* [10]. Those testing positive were referred for treatment.

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Statistical analyses

Four analyses were conducted. First, a repeated measures analysis of variance (ANOVA) examined differences among the eight STI knowledge-test scores, using Bonferroni-adjusted paired comparisons.

Second, a single hierarchical regression predicted each participant's eight STI-knowledge scores from two moderately correlated (r = 0.13) independent variables, entered in Step 2: (a) whether they had been diagnosed with the disease corresponding to the knowledge score, and (b) how many of the other seven STIs they self-reported. Control variables, entered in Step 1, included age, dummy codes for individual participants and for specific diseases, and participant race (African-American vs. other). Eighteen participants missing data on age or race were excluded from this analysis.

Third, a one-way analysis of covariance (ANCOVA) compared baseline Chlamydia knowledge for participants with: (a) self-reported prior Chlamydia diagnoses, (b) positive PCR results for Chlamydia but no self-reported diagnoses, and (c) neither positive PCR results nor diagnoses. The ANCOVA controlled for other STI diagnoses, and used Bonferroni-adjusted paired comparisons.

Finally, because self-reports may confound specific STI knowledge with diagnosis recall, we conducted a repeated-measures ANCOVA that compared Chlamydia knowledge over time between those with positive and negative PCR results at the start and end of the 6-month trial. These analyses covered an interval in which all participants received information about Chlamydia, and controlled for intervention condition.

Results

Sample characteristics

Most respondents (63%) reported no previous STI diagnosis, 24% a diagnosis with one STI, 9% with two different STIs, 4% with three, and < 1% with four. The most commonly reported diagnosis was Chlamydia (27%), followed by Trichomoniasis (13%), Gonorrhea (8%), warts (5%), herpes (3%), and Syphilis (<1%). None reported Hepatitis B or HIV. The Chlamydia PCR clinical assay was positive for 16% at baseline, and for 7% at 6 months.

STI knowledge

The ANOVA revealed that participants had more knowledge about some diseases than others, F (7,2093) = 149.98, $p < .001$ (Table 1). Scores ranged from just above chance (for syphilis) to fairly high (for HIV/AIDS).

Prior diagnosis

The two independent variables entered in step two of the regression improved prediction of STI knowledge over step one: $\Delta R^2 = .013$, F (2,1940) = 27.20, $p < .001$. Prior diagnosis with an STI was associated with increased knowledge about that STI, $\beta = 0.26$, t (1940) = 4.68, $p < .001$, as were diagnoses with more of the other seven STIs, $\beta = 0.18$, t (1940) = 3.33, $p < .001$.

Table 1
Mean knowledge-test scores for each of the eight specific STIs

STI	Score (%)
HIV/AIDS[a]	86
Chlamydia[b]	76
Gonorrhea[b]	75
Genital herpes[b]	73
Genital warts[c]	67
Hepatitis B[d]	63
Trichomoniasis[d]	63
Syphilis[d]	60

Scores with different superscripts are significantly different at $P < .05$, as indicated by Bonferroni pairwise comparisons.

New diagnosis

The ANCOVA indicated differences among the three groups, F (2,292) = 20.83, $p < .001$. Those who reported Chlamydia diagnoses knew more about Chlamydia compared both with those who had never had it ($p < .01$), and with those who did not yet know that they had a positive PCR result ($p < .01$). The latter groups were not significantly different (Figure 1).

Clinical diagnosis only

Those testing positive at baseline showed significantly higher Chlamydia knowledge in the following 6 months (M = .82) than those testing negative (M = .77), F (1,211) = 4.02, $p < .05$. In contrast, those testing positive at the end of the study had not known more in the previous 6 months than those testing negative (M = .78 for both), $F < 1$. Knowledge increased throughout the intervention period, F (1,211) = 24.44, $p < .001$, with no interactions.

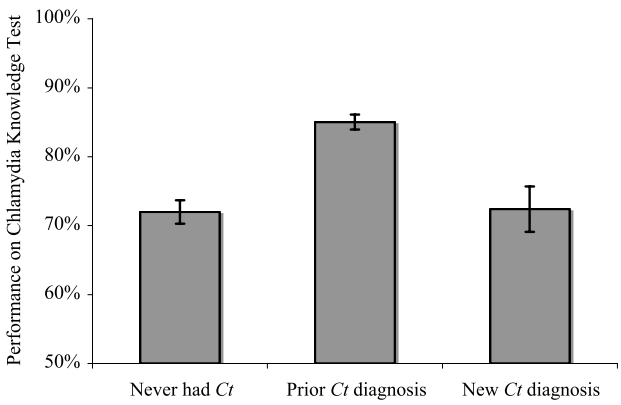

Fig. 1. Knowledge associated with never having been diagnosed, having a prior diagnosis, or new diagnosis of *Chlamydia trachomatis* (*Ct*). Error bars indicate standard errors.

Discussion

Despite receiving sexuality education leading to good knowledge about HIV/AIDS, adolescents seem to learn basic facts about other STIs only after diagnosis. One limitation of this study is that our knowledge scale is not directly linked to risk-protective behaviors. However, recent evidence suggests that knowledge of STIs may have a role in reducing risky behavior [4–7]. Furthermore, interventions providing information about STIs, among other constructs, have shown promise in both increasing knowledge and reducing risk (e.g., [9]). A second limitation is reliance on self-reports, as participants who learned more about an STI may be more likely to remember their diagnosis. However, the consistent pattern of results using PCR assays suggests that the findings are robust. It is interesting to note that exposure to information about STIs through interventions drastically increases knowledge among adolescents with and without prior diagnoses, but that the latter group continues to lag behind. If adolescents knew this information earlier, they may be more likely to recognize symptoms, routinely screen for STIs in the absence of symptoms (especially after risky behavior), seek earlier treatment, and avoid infecting their partners.

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