Available online at www.sciencedirect.com
SCIENCE DIRECT
Preventive Medicine 41 (2005) 865 – 872
Preventive Medicine
www.elsevier.com/locate/ypmed

Is provider continuity associated with chlamydia screening for adolescent and young adult women?

Robert J. Reid, M.D., Ph.D. [a,b,*], Delia Scholes, Ph.D. [a], Lou Grothaus, M.S. [a], Yaffa Truelove, B.A. [a], Paul Fishman, Ph.D. [a], Jennifer McClure, Ph.D. [a], Jane Grafton, B.A. [a], Robert S. Thompson, M.D. [a,b]

[a] *Center for Health Studies, Group Health Cooperative, 1730 Minor Avenue, Suite 1600, Seattle, WA 98101, USA*
[b] *Group Health Permanente Medical Group, 521 Wall Street, Seattle, WA 98121, USA*

Available online 16 September 2005

Abstract

Background: Longitudinal patient–provider relationships are a cornerstone of primary care. For many prevention services, better continuity of provider has been associated with better adherence to recommended practice. Our objective was to examine the relationship between continuity of care and chlamydia screening in adolescent and young women, a preventive service where large performance gaps exist.

Methods: The study population included 4117 sexually active women aged 14–25 years continuously enrolled at a large U.S. HMO. Administrative data from 2000 to 2002 were used to document chlamydia testing, provider continuity, and selected covariates. We used logistic regression to examine the relationship between provider continuity and chlamydia testing after controlling for potential confounders.

Results: 57.2% of eligible young women received a chlamydia test over the 2-year period. After controlling for utilization and other confounders, we found women in the lowest continuity of care quartile had 41% greater odds of being tested than those in the highest quartile (OR 1.41, 95% CI 1.14–1.76).

Conclusions: For adolescents and young women, the likelihood of testing for chlamydia was reduced when care was concentrated with a usual provider. Potential implications for health service delivery are discussed.

Keywords: Continuity of patient care; Chlamydia infections; Mass screening; Primary care; Women's health; Health maintenance organizations; United States

Background

Chlamydia trachomatis infection is the most prevalent bacterial sexually transmitted disease (STD) in developed countries (Communicable Disease Surveillance Centre, 2003; Cates, 1999; Panchaud et al., 2000). In the US, infections occur in approximately 4% of young adults aged 18–26 (Miller et al., 2004; Turner et al., 2002). For women, untreated infections may result in pelvic inflammatory disease (PID), ectopic pregnancy, infertility, and chronic pain (Cates and Wasserheit, 1991; Mangione-Smith et al., 1999). Early diagnosis and treatment can both prevent PID sequelae (Scholes et al., 1996) and reduce costs (Honey et al., 2002; Coffield et al., 2001). A consensus has now emerged to screen sexually active women under 25 years (Centers for Disease Control and Prevention, 2002; Department of Health, 2001; Berg et al., 2002; American Medical Association, 1997; American Academy of Family Physicians, 2003; American Academy of Pediatrics, 2000; Hollblad-Fadiman and Goldman, 2003). However, despite these recommendations, chlamydia screening rates remain disappointingly low (Mangione-Smith et al., 2000; Torkko et al., 2000; St. Lawrence et al., 2002). Even in large US health plans, only about one quarter of all sexually active women aged 16–25 years receive annual testing (National Committee for Quality Assurance, 2003a).

In response to these low screening rates, new strategies are being sought to engage young women and their providers in this prevention service. One approach has been to target providers directly with interventions to improve their knowledge and skills and to provide them with improved practice supports (Shafer et al., 2002; Scholes et al., submitted for publication). A more general approach is to modify underlying health system features to facilitate this prevention service. Some suggest that chlamydia screening breakdowns may result from a "lack of connection"

* Corresponding author. Center for Health Studies, Group Health Cooperative, 1730 Minor Avenue, Suite 1600, Seattle, WA 98101, USA. Fax: +1 206 287 2871.
E-mail address: reid.rj@ghc.org (R.J. Reid).

0091-7435/$ - see front matter © 2005 Elsevier Inc. All rights reserved.
doi:10.1016/j.ypmed.2005.08.005

between young women and their health care providers (Miller et al., 2004). Thus, strategies designed to promote relationships between patients and their primary care providers (termed "provider continuity" or "longitudinality" (Starfield, 1980)) may enable greater opportunity to discuss screenings and counsel about healthy behaviors (Stange et al., 1991). Continuity is believed to foster communication, trust, and knowledge (Haggerty et al., 2003) which in turn may facilitate primary and secondary prevention (Nutting, 1986).

Provider continuity is associated with more appropriate use of a variety of other clinical preventive services. When measured by asking patients about a "regular" source of care or by examining their utilization patterns over time, provider continuity is associated with better adherence to immunization recommendations (Christakis et al., 2000; Weiss and Blustein, 1996; Xu, 2002), cancer screenings (Xu, 2002; O'Malley et al., 1997; Haggerty et al., 1999; Kelly and Shank, 1992; Ettner, 1999), hypertension and cholesterol screenings (Xu, 2002; McIsaac et al., 2001), and behavior change counseling (Ettner, 1999). Provider continuity has also been associated with better medication adherence (Charney et al., 1967; Becker et al., 1972), improved problem recognition (Kelleher et al., 1997; Koopman et al., 2003), superior chronic illness care (Christakis et al., 2001), fewer hospitalizations (Weiss and Blustein, 1996; Gill and Mainous, 1998), less emergency room use (Christakis et al., 1999; Gill et al., 2000; Wasson et al., 1984), greater patient satisfaction (Weyrauch, 1996; Hjortdahl and Laerum, 1992), and lower total costs (Weiss and Blustein, 1996; De Maeseneer et al., 2003).

To our knowledge, no research has examined the relationship between provider continuity and STD screening. The above research suggests systems that promote long-term relationships between young women and their care providers may also improve chlamydia screening practices. However, it is also possible that long-term relationships may not translate into better screening because of the potential for stigma and embarrassment associated with discussing sexual activity and STD prevention (Barth et al., 2002). Both patients, particularly adolescents, and providers may be less likely to discuss sexual behaviors if they have longstanding care relationships (Dixon-Woods et al., 2001). This paper explores the association between provider continuity and chlamydia screening.

Methods

Study sample

This observational study was conducted at Group Health Cooperative, a US health maintenance organization (HMO) with about 540,000 members. Using administrative data, we examined the relationship between continuity of care and chlamydia testing for adolescent and young women between August 1, 2000 and July 31, 2002. This study is set within a randomized controlled trial (RCT) that tested two interventions designed to increase adherence to a chlamydia screening guideline for sexually active women aged 14–25 years. Using a two-by-two factorial design, the RCT interventions included: a clinic-level intervention directed at health care providers (consisting of opinion leaders, newsletters, clinic posters, and feedback) with randomization of 23 HMO clinics to control ($n = 11$) or intervention ($n = 12$) arms; and a patient-level intervention (consisting of chart prompts) with randomization of 3585 women aged 14–20 years to have chlamydia screening prompts placed in their chart or not. The Group Health Institutional Review Board approved all study procedures.

This analysis focuses only on the 9723 continuously enrolled women in the control arms RCT (i.e., enrollees of the 11 non-intervention clinics and who received no chart prompts). Continuous enrollment was defined as having no more than one gap in enrollment of ≤45 days in either study year. We did not include participants in the intervention groups because of our interest in continuity and chlamydia screening in the context of usual care. The definition of sexual activity is based on the Health Plan Employer Data Information System (HEDIS) quality performance measure (National Committee for Quality Assurance, 2003b), modified by extending the reference period from 1 to 2 years. We excluded 4487 women based on this definition. As with other studies of provider continuity using administrative data (Gill and Mainous, 1998; Gill et al., 2000), we also excluded 1119 patients with fewer than three visits during the study period because continuity measures may be spuriously high for patients with few visits (Steinwachs, 1979; Smedby et al., 1986). The remaining 4117 patients constituted the study sample.

This study used data from five linkable population-based administrative databases: a patient enrollment file, an ambulatory encounter file, a claims file for payment of out-of-plan services, a laboratory database, and a pharmaceutical database. These databases have been used extensively for health services research (Saunders et al., 1994; Thompson et al., 1995) and capture all covered services including members' ambulatory encounters, outpatient prescription fills, and laboratory tests.

Continuity variables

For each study subject, we measured provider continuity over the 2 years using the usual provider continuity (UPC) index (Breslau and Reeb, 1975) and the continuity of care (COC) index (Bice and Boxerman, 1977). These indices range in value from zero (each visit to different provider) to one (all visits to same provider). We calculated the UPC as the proportion of all primary care visits that were made to the patient's "usual" primary care provider, defined as the one seen most frequently. HMO patients choose a primary care provider on enrollment but may opt to see other clinicians if they desire. The COC index is a refinement of this measure that also accounts for the number of different providers seen. Both indices were analyzed continuously and in quartiles. The indices were calculated as follows:

$$\mathrm{UPC} = n_i/N \qquad \mathrm{COC} = \frac{\sum_{i=1}^{k} n_i^2 - N}{N(N-1)}$$

where n_i is the number of visits to usual provider i in the two study years and N is the total number of visits.

Visits were defined as face-to-face visits with primary care physicians (family physicians, general internists, and pediatricians), nurse practitioners, or physician assistants that took place in primary care clinics, urgent care clinics, or emergency departments. We excluded outpatient specialist visits, hospitalizations, outpatient surgery, home visits, and visits to other non-physician providers.

Outcome and control variables

The study outcome was the receipt of chlamydia testing over the 2-year study period, consisting of receipt of at least one of three tests: chlamydia culture, DNA probe, or nucleic acid amplification. The control variables (possible confounders which were controlled for in multivariable models) related both to patients and to their "usual" providers. Patient variables included age categories, Medicaid eligibility, marital status, pregnancy, chronic disease comorbidity (defined with the RxRisk method (Fishman et al., 2003)), and total number of primary care visits over the 2-year period. The RxRisk method uses automated pharmacy data to classify adults into 28 homogenous chronic disease classes (Fishman et al., 2003). Pregnancy was defined using pregnancy diagnoses and relevant laboratory tests. Provider variables included provider sex, age category, and registered specialty.

Statistical analyses

Continuous and categorical variables were first examined using box-and-whisker plots (McGill et al., 1978) and frequency tables. We then examined the