GYNECOLOGY

Pharmacy-level barriers to implementing expedited partner therapy in Baltimore, Maryland

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BACKGROUND: Addressing record high rates of *Chlamydia trachomatis* incidence in the United States requires the utilization of effective strategies, such as expedited partner therapy, to reduce reinfection and further transmission. Expedited partner therapy, which can be given as a prescription or medication, is a strategy to treat the sexual partners of index patients diagnosed with a sexually transmitted infection without prior medical evaluation of the partners.

OBJECTIVE: There are multiple steps in the prescription—expedited partner therapy cascade, and we sought to identify pharmacy-level barriers to implementing prescription—expedited partner therapy for *Chlamydia trachomatis* treatment.

STUDY DESIGN: We used spatial analysis and ArcGIS, a geographic information system, to map and assess geospatial access to pharmacies within Baltimore, MD, neighborhoods with the highest rates of *Chlamydia trachomatis* (1180.25—4255.31 per 100,000 persons). Expedited partner therapy knowledge and practices were collected via a telephone survey of pharmacists employed at retail pharmacies located in these same neighborhoods. Cost of antibiotic medication in US dollars was collected.

RESULTS: Census tracts with the highest *Chlamydia trachomatis* incidence rates had lower median pharmacy density than other census tracts (26.9 per 100,000 vs 31.4 per 100,000, $P < .001$). We identified 25 pharmacy deserts. Areas defined as pharmacy deserts had larger proportions of black and Hispanic or Latino populations compared with non-Hispanic whites (93.1% vs 6.3%, $P < .001$) and trended toward higher median *Chlamydia trachomatis* incidence rates (1170.0 per 100,000 vs 1094.5 per 100,000, $P = .110$) than non—pharmacy desert areas. Of the 52 pharmacies identified, 96% (50 of 52) responded to our survey. Less than a fifth of pharmacists (18%, 9 of 50) were aware of expedited partner therapy for *Chlamydia trachomatis*. Most pharmacists (59%, 27 of 46) confirmed they would fill an expedited partner therapy prescription. The cost of a single dose of azithromycin (1 g) ranged from 5.00 to 39.99 US dollars (median, 30 US dollars).

CONCLUSION: Limited geographic access to pharmacies, lack of pharmacist awareness of expedited partner therapy, and wide variation in expedited partner therapy medication cost are potential barriers to implementing prescription—expedited partner therapy. Although most Baltimore pharmacists were unaware of expedited partner therapy, they were generally receptive to learning about and filling expedited partner therapy prescriptions. This finding suggests the need for wide dissemination of educational material targeted to pharmacists. In areas with limited geographic access to pharmacies, expedited partner therapy strategies that do not depend on partners physically accessing a pharmacy merit consideration.

Key words: Baltimore, Chlamydia, expedited partner therapy, partner therapy, pharmacy access, pharmacy desert, sexually transmitted disease, sexually transmitted infection

Chlamydia trachomatis (Ct) is the most common notifiable sexually transmitted infection (STI) in the United States with more than 1.5 million new Ct infections reported annually. The rate has increased every year since 2013, and the most recently reported rate of 497.3 cases per 100,000 persons is the highest ever reported to the Centers for Disease Control and Prevention in US history.[1]

Untreated Ct infection can increase a woman's risk of acquiring HIV and can cause pelvic inflammatory disease, which is a major cause of infertility, ectopic pregnancy, and chronic pelvic pain.[2,3] Furthermore, the odds of pelvic inflammatory disease are 4- to 6-fold higher after 2 (odds ratio [OR], 4.0, 95% confidence interval [CI], 1.6—9.9) and 3 or more (OR, 6.4, 95% CI, 2.2—18.4) Ct infections compared with the initial infection; and the odds of ectopic pregnancy are 2- to 4-fold higher after 2 (OR, 2.1, 95% CI, 1.3—3.4) and 3 or more (OR, 4.5, 95% CI, 1.8—5.3) Ct infections.[4]

Although reinfection can be prevented by prompt treatment of both patients and their partners, 20% of treated female patients are reinfected with Ct within a year after treatment.[5] Despite the record rates of Ct incidence in the United States and significant reproductive morbidity, state and local funding for STI prevention has dropped, leading to clinic closures, fewer services, and less access to care.[1]

Addressing rising Ct incidence rates in an environment of fewer public health resources requires a multipronged approach, including more effective treatment strategies like expedited partner therapy (EPT). EPT is a treatment option that allows health care providers to treat the sexual partners of index patients diagnosed with an STI without medically evaluating the partners. It has been shown to decrease Ct reinfection among index patients and increase treatment of sex partners.[6] Additionally, randomized control trials have reported that EPT reduces Ct reinfection more than unassisted patient referrals.[7,8]

EPT can be given as medication or in the form of a physical prescription.[9] Although more common, prescription-EPT involves numerous steps to treat the sexual partner. A continuum of 7 steps for complete implementation of prescription-EPT has been proposed by

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Schillinger et al,[10] which includes the following: (1) index patient treated by EPT-utilizing provider; (2) index patient offered prescription-EPT by provider; (3) index patient accepts prescription-EPT; (4) index patient gives the physical prescription-EPT to sexual partner(s); (5) sexual partner(s) receives and fills the prescription at a pharmacy; (6) sexual partner(s) pays for the medication; and (7) sexual partner(s) ingests the medication.

The provider does not establish a relationship with the partner. This prescription-EPT continuum highlights the pivotal role of pharmacies and pharmacists in successful EPT utilization. Physical access to pharmacies is necessary. In addition, many states that have legalized EPT do not require the provider to write the partner's name on the prescription and instead accept EPT written on the prescription.[11] Thus, pharmacists must be knowledgeable about EPT. However, there is a paucity of literature on pharmacy-level barriers to EPT.

The purpose of this study was to identify barriers along the prescription-EPT continuum. Specifically, our primary objective was to determine whether there was a relationship between pharmacy access and Ct incidence. Secondary objectives included the use of geographic information systems (GIS) to organize, visualize, and analyze geographic pharmacy data and an assessment of pharmacists' knowledge and practices of filling EPT prescriptions for Ct infections. We hypothesized that low pharmacy access and lack of awareness of EPT among pharmacists are barriers to effective implementation of prescription-EPT.

Materials and Methods

GIS mapping and spatial analyses

Lists of licensed retail pharmacies were obtained from Evergreen Health's Maryland Pharmacy Directory and the Maryland State Board of Pharmacy.[12,13] Pharmacy access was measured 2 ways: pharmacy density and pharmacy desert.

First, pharmacy density was assessed both qualitatively and quantitatively. We used ArcGIS 10.4.1, a geographic information system, to map the distribution of Baltimore, MD, pharmacies located within the highest Ct incidence areas (1180.25−4255.31 per 100,000 persons), which were up to 9-fold higher than the national average (497.3 per 100,000).[14,15] We assigned latitude and longitude coordinates to pharmacy addresses using the ArcGIS Online Geocoding Service. We created a heat map of Baltimore pharmacies using kernel density estimation to qualitatively compare pharmacy density. Then we calculated the number of pharmacies per 100,000 persons in each ZIP code area to quantitatively compare pharmacy density.

Second, we identified pharmacy deserts. We calculated the percentage of each census tract that was within walking distance (within .5 miles) to a pharmacy using tabulate intersection in ArcGIS. We followed the US Department of Agriculture's Food Access Research Atlas definition of a pharmacy desert based on the following 3 conditions: (1) 33% or more of a census tract was not within walking distance of a pharmacy; (2) had low vehicle access, which was defined as more than 100 households without a vehicle; and (3) was considered low income, which was defined as a median income less than 80% of Baltimore's median income or, if more than 20% of households, had an income under the federal poverty level.[16] All 200 Baltimore City census tracts, not just areas with high Ct incidence, were included in the spatial analysis. Census tract demographic and economic data from the 2011−2015 American Community Survey conducted by the US Census Bureau were used.[17]

Telephone interviews

EPT became legally permissible on June 1, 2015, for Ct infection in Maryland, and regulations addressing the implementation of EPT for health care providers were adopted on March 28, 2016.[18,19] We conducted a telephone interview of retail pharmacies located within Baltimore ZIP codes with the highest Ct incidence from March through June 2017. Some ZIP code areas extended past the geographic boundary of the city, and pharmacies located within these areas were retained.

The telephone interview questions were based on surveys in the literature regarding prescription sales practices in retail pharmacies.[20] The interviews were designed to be answered by any pharmacist, but we requested to speak to the supervising pharmacist. We attempted to contact pharmacies up to 3 times. The study was deemed exempt by the Johns Hopkins University School of Medicine Institutional Review Board.

Data analysis

The highest quartile of Ct incidence (1180.25−4255.31 per 100,000 persons) was used as the cutoff to create a high Ct incidence variable, which was applied to each census tract. Wilcoxon rank sum tests were used to assess the relationship between pharmacy density and Ct incidence and to determine whether there were differences in demographics between pharmacy deserts and non−pharmacy deserts. Logistic regression was used to describe the relationship between minority populations (ie, non-Hispanic black and Hispanic or Latino) and pharmacy desert. We divided census tracts into 3 groups: (1) tracts that were mostly (more than two thirds) comprised of minorities; (2) tracts that had similar populations (between one third and two thirds) of non-Hispanic whites and minorities; and (3) tracts that were mostly non-Hispanic white (less than one third minorities). The results were reported as odds ratios and 95% confidence intervals.

We assessed whether income was associated with pharmacy access using both measures of access: density and desert. Pearson's correlation coefficient and Wilcoxon rank sum were used to determine whether there was an association between median income and pharmacy density and pharmacy desert (without income criterion), respectively.

Spearman's correlation coefficient was used to measure the association between medication cost and census tract characteristic (absolute Ct incidence rate, income, and pharmacy density).

We calculated response frequencies for all survey questions to determine the