Introduction

Baltimore City has one of the highest HIV incidences and prevalences in the United States. An HIV testing program, implemented in several emergency departments (EDs), has accounted for 11% of newly diagnosed HIV cases from 2008–2013. We derive an agent-based model (ABM) for HIV transmission in Baltimore City, and use this to determine the significance of ED-based HIV testing on HIV transmission.

Methods

An agent-based computational simulation was performed via the Python programming language, using 523,113 agents to represent the 13+ population of Baltimore City. The simulation was calibrated using HIV prevalence and incidence data culled from 2007 to 2013 City surveillance data. During each timestep, agents interacted with other agents. Agents were assigned one of three categories: seronegative, seropositive aware, or seropositive unaware, and individual risks were assigned from these categories, with seropositive unaware agents to represent the 13+ population of Baltimore City. The model parameters, and a range of incidence projections was calculated.

Results

Baltimore City HIV incidence decreased from 1,052 new cases (0.207%) in 2007 to 356 (0.068%) in 2013. Overall HIV incidence is forecast to be 3.5 times more likely to transmit the disease. ED testing accounted for 11% of newly diagnosed HIV cases in 2008–2013.

Conclusion

We conclude that ABM provides an effective means of describing an epidemic with a highly heterogeneous population, and that additionally the ED-based testing program has had a significant impact on curtailing HIV transmission in Baltimore City.

Disclosure of interest statement

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Introduction Low HIV serostatus awareness and delayed treatment initiation among people living with HIV (PLHIV) contribute to HIV sexual transmission. An unacceptably low proportion of PLHIV are aware of their HIV status in Latin America. Improved understanding of sexual risk among PLHIV could help guide HIV prevention strategies.

Methods A cohort of 401 men who have sex with men (MSM) and transgender women at high risk were enrolled and assessed every three months for condomless sex and sexually transmitted infections (i.e. syphilis, HIV and anal chlamydia, and anal gonorrhoea). Among those who were positive at entry, we compared condomless sex and anal chlamydia/gonorrhoea according to prior knowledge of HIV serostatus; among those who seroconverted during follow-up, we compared condomless sex and anal chlamydia/gonorrhoea before vs. after HIV diagnosis, using McNemar’s Chi-square test.

Results At baseline, 82 (20.5%) participants self-identified as HIV positive and an additional 42 (10.5%) were diagnosed with HIV. Among the 42 unknown HIV positives, 71% reported recent condomless receptive anal sex compared to 53% of known HIV positives (p-value = 0.078). No difference was observed in condomless insertive anal sex; 48% in each group. Among the 24 sero-converters during follow-up, 79% reported condomless receptive anal sex prior to their diagnosis and 32% after their diagnosis (59% decline, p-value = 0.001); 46% reported condomless insertive anal sex prior to their diagnosis and 14% after diagnosis (70% decline, p-value = 0.011). Anal gonorrhoea and/or chlamydia were diagnosed among 46% prior and 27% after diagnosis among the observed sero-converters (41% decline, p-value = 0.096).

Conclusions Risk behaviours and concurrent STIs diminish after a new diagnosis, following the patterns previously reported elsewhere. Current prevention efforts for PLHIV are insufficient and must take into account motivations for sexual risk taking, encourage people to reach viral suppression, and improve available prevention strategies to prevent onward transmission of HIV.

Disclosure of interest statement None.