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PrEP to prevent HIV in Montreal men who have sex with men – Carla Doyle, UWW Final Report

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Background: In Canada today, the HIV epidemic is primarily concentrated within specific sub-groups of the population, such as men who have sex with men (MSM) and injection drug users. Since the start of the epidemic, MSM have been over-represented among the sub-groups affected, and this still holds true today. In the province of Quebec, the numbers of HIV diagnoses among MSM continue to increase, despite its targeted public health response. In 2016, provincial surveillance data showed that among all male HIV cases diagnosed in Quebec, MSM accounted for 79.5% of new diagnoses.[1]

Taking a daily antiretroviral pill to prevent HIV transmission is called pre-exposure prophylaxis, or PrEP. PrEP is intended for those who do not have HIV but who are at risk of getting it. Studies suggest that PrEP could decrease HIV infection rates by close to 100% among MSM who adhere to the medication schedule.[2, 3] Starting in 2013, PrEP has been recommended by the Quebec government for at-risk MSM. In the same year, it became the first province in Canada to reimburse the cost of the drug.

Preliminary data suggests that 15% of MSM in Montreal used PrEP in 2016 (unpublished data) and yet, the population-level impact of this PrEP program has never been empirically estimated. Understanding the impact of PrEP on the HIV epidemic at the population level is important to inform HIV prevention programs. Clinical studies only consider the individual benefits of PrEP and not the long-term benefits of blocking chains of transmission within the MSM population. Evaluating the population-level impact of PrEP on HIV transmission, however, is challenging as there is no suitable comparison group. Mathematical modelling – computer simulations of epidemics – can be used to construct this comparison group and tease-out the impact of PrEP from other interventions.

Aims: I will evaluate the impact of PrEP on HIV transmission in Montreal. The city of Montreal is the ideal setting for this project, because the great majority of MSM who are diagnosed with HIV in Quebec reside there. My specific objectives for this impact evaluation are to:

1) Estimate the uptake of PrEP and other prevention tools;
2) Characterize the risk profiles of prevention users in Montreal;
3) Evaluate the population-level impact of PrEP interventions on HIV transmission;
4) Explore the reasons for PrEP interventions' success or failure in reducing new HIV infections and recommend how best to optimize PrEP use; and
5) Examine the impact of PrEP on the transmission of other sexually transmitted infections.

Overview of Methods: Once I have an understanding of the uptake of PrEP and other prevention tools in Montreal, I will develop and fine tune a mathematical model of sexual HIV transmission among Montreal MSM. Using this model, I will estimate the population-level impact of PrEP by comparing model outputs with and without the PrEP program. I will then test a number of alternate scenarios where PrEP use could have been targeted and/or scaled-up differently.

Impact: PrEP is a major component of the HIV response in Quebec. As an element of HIV combination prevention, used with other prevention tools PrEP could help reduce ongoing HIV transmission among MSM. This model-based impact evaluation provides a unique opportunity to optimize the delivery of PrEP in Quebec and inform HIV prevention programs in Canada and beyond.

References

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