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Choosing a metric for measurement of pre-exposure prophylaxis

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As the results of HIV prevention trials transition to public health practice, Susan Buchbinder and colleagues¹ have provided a timely exploration of how to prioritise the targeting of pre-exposure prophylaxis (PrEP) to men who have sex with men (MSM). They have drawn attention to the need to examine the efficiency of PrEP in seroconversion prevention and the effect on the HIV epidemic that could be achieved through targeting potential subgroups of the MSM population. Buchbinder and colleagues used the efficiency metric number needed to treat and the effect metric of population-attributable fraction (PAF). However, in the context of PrEP delivery, PAF might not be the ideal metric for evaluation and interpretation of the effect of the intervention.

Kenneth Rothman and colleagues² provide a common definition of the PAF as “the reduction in incidence that would be achieved if the population had been entirely unexposed, compared to its current (actual) exposure pattern”. The PAF can be useful when assessing the effect of an intervention that modifies an exposure and potentially reduces the risk in the exposed subgroup to the level in the remaining unexposed individuals. As noted by Buchbinder and colleagues, the PAFs of modifiable traits and behaviours were previously assessed for MSM subgroups in Australia.³

The interpretation of PAF is less meaningful in a PrEP setting because the sub groups are defined according to risk factors that we do not plan to modify, but merely to use in targeting PrEP; and treatment with PrEP might be more or less efficacious than reducing the risk to the level in the non-targeted population. We suggest that the fraction of population incident cases that arise in each subgroup is more relevant and interpretable than is the PAF for judging the contribution of each subgroup to overall population incidence. An assessment of the potential effect of PrEP might then be obtained by multiplying each subgroup’s fraction of population incident cases by PrEP efficacy within that subgroup. Our suggested metric is thus given by:

$$\text{Fraction of incident cases averted by PrEP} = (\text{incident cases in targeted subgroup} / \text{incident cases in total population}) \times \text{PrEP efficacy}$$

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By contrast with the PAF, which assumes that only the excess infections in a particular subgroup can be averted, our proposed metric would assess the fraction of total infections potentially averted by targeting each subgroup. Using this metric in conjunction with the number needed to treat would allow a more direct assessment of the cost-benefit tradeoffs for targeting different subgroups of the population.

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