

Executive Summary

Project title:

A modelling study for assessing the effect of expanded HCV testing and direct-acting antiviral therapy on the HCV epidemic among HIV-positive MSM in Hong Kong (MSS302R)

Objectives

The objectives of this project are:

1. To assess the effect of expanded HCV testing on the incidence and prevalence of HCV among HIV-positive MSM in Hong Kong
2. To examine the potential impacts of scaling-up HCV DAA treatment for HIV-positive MSM in Hong Kong

Project design

A mathematical modelling study

Target population

HCV in HIV-positive MSM

Methods

A deterministic compartmental model was used to simulate transmission dynamics of HCV among HIV-positive MSM in Hong Kong in 2005-2030. Five scenarios, including (a) basecase scenario, (b) Scenario 1: expanded HCV treatment coverage, (c) Scenario 2: expanded treatment coverage and all on direct-acting antiviral therapy (DAA), (d) Scenario 3: expanded treatment coverage, all on DAA, and treatment initiation for both with acute and chronic HCV, and (e) Scenario 4: expanded HCV screening were assessed. Incidence, prevalence and proportion of new infections averted above basecase scenario were estimated in 2019-2030.

Main achievements

In basecase scenario with the estimated baseline value of HCV treatment coverage in 2019 of 44% coverage (of which 20% on DAA), full baseline screening and 30% follow-up annual screening), the simulated HCV incidence among HIV-positive MSM increased from 0.1% per 100 person-years (PY) in 2005 to 8.3% in 2015, and to 6.3% PY in 2030. Estimated HCV prevalence increased from 0.3%, 20%, and to 42.1%, respectively. The projected number of new HCV infections (including re-infections) increased from 544 in 2019 to 739 in 2030.

Scaling-up of HCV treatment in Scenario 1 with 90% coverage (of which 20% on DAA) had minimal effect on HCV incidence (0.5% of new infections averted above basecase scenario in 2019-2030). An expansion of DAA therapy in Scenario 2 (90% HCV treatment coverage, all on DAA) was projected to reduce new HCV infections by 2.9% in 2019-2030. In Scenario 3, treating all with acute HCV would further decrease new HCV infections by 7.7%. In Scenario 4, scaling-up HCV testing rate twice annually without HCV treatment and DAA coverage expansion was projected to increase new HCV infections by 1.5% than basecase scenario.

Prevalence of HCV infection was predicted to decrease from 34.4% in 2019 to 30.0% in 2030 with expanded treatment coverage of 90%, of which all on DAA (Scenario 2). Providing DAA for all with acute HCV (Scenario 3) would result in a further decrease in HCV prevalence to 25.2% in 2030. In Scenario 4 with expanded HCV screening rate of twice annually, HCV prevalence in HIV-positive MSM was predicted to slightly decrease to 40.3%, compared to 42.1% in basecase scenario in 2030.

Conclusions

This project indicated that expanded HCV testing alone is not sufficient to reduce HCV incidence in HIV-positive MSM. Scaling-up HCV treatment coverage and access to DAA therapy would enhance the reduction of HCV incidents among HIV-positive MSM in Hong Kong.

項目名稱

評估感染愛滋病的男男性接觸者中對擴展丙型肝炎測試和直接作用抗病毒治療的效果的建模研究 (MSS302R)

目標

計畫目標包括:

1. 評估感染愛滋病的男男性接觸者中進行擴展丙型肝炎測試對丙型肝炎的發病率及患病率的影響
2. 測試在香港男男性接觸的愛滋病感染者中擴大丙型肝炎直接作用抗病毒治療的潛在影響

項目設計

數學模型研究

目標人群

感染愛滋病及丙型肝炎的男男性接觸者

方法

使用確定性間隔模型，模擬在 2005 至 2030 年香港男男性接觸的愛滋病感染者的丙型肝炎傳播動力學。五種方案，包括 (a) 基本方案; (b) 方案一：擴大丙型肝炎治療的覆蓋範圍; (c) 方案二：擴大丙型肝炎治療的覆蓋範圍及全部使用直接作用抗病毒治療; (d) 方案三：擴大丙型肝炎治療的覆蓋範圍、及全部使用直接作用抗病毒治療於急性和慢性丙型肝炎患者; (e) 方案四：擴展丙型肝炎測試。使用數學模型研究推算出在 2019 至 2030 年，丙型肝炎新感染的發生率、丙型肝炎的患病率和比例。

主要結果

基本方案顯示於 2019 年設定丙型肝炎治療覆蓋率的估計基準值為 44% (其中 20% 使用直接作用抗病毒治療)，完整的基線篩查和 30% 的年度跟進丙型肝炎測試篩查，感染愛滋病的男男性接觸者中模擬的丙型肝炎發病率由 2005 年的 0.1% (每一百人年)，增至 2015 年的 8.3% 及 2030 年的 6.3%。估計的丙型肝炎患病率分別從 0.3%，增加至 20% 和 42.1%。預計新的丙型肝炎感染 (包括再感染) 數量將從 2019 年的 544 個增加到 2030 年的 739 個。

在方案 1 中擴大丙型肝炎治療的覆蓋率達到 90% (其中使用直接作用抗病毒治療為 20%) 對丙型肝炎發生率的影響最小。方案 2 中擴展直接作用抗病毒治療 (90% 的治療覆蓋率及全部使用直接作用抗病毒治療) 預計將在 2019-2030 年將新的丙型肝炎感染減少 2.9%。在方案 3 中，治療所有急性丙型肝炎患者將進一步使新的丙型肝炎感染減少 7.7%。

在方案 4 中，擴大丙型肝炎檢測率為每年兩次，卻預計將新的丙型肝炎感染率比基本方案增加 1.5%。

擴大治療覆蓋率達到 90% (其中全部進行直接作用抗病毒治療)，預計可將丙型肝炎感染的患病率從 2019 年的 34.4% 降低到 2030 年的 30.0% (方案 2)。為所有急性丙型肝炎患者提供直接作用抗病毒治療 (方案 3)，將使丙型肝炎患病率進一步下降到 2030 年的 25.2%。在方案 4 中，相比基本方案中丙型肝炎患病率的 42.1% (2030 年)，丙型肝炎篩查率擴大至每年兩次只使患病率略為下降到 40.3%。

結論

是此研究顯示，僅擴大丙型肝炎檢測並不足以減少感染愛滋病的男男性接觸者中的丙型肝炎發生率。相對於此，擴大丙型肝炎治療的覆蓋面及使用直接作用抗病毒治療將有助於減少男男性接觸愛滋病者中感染丙型肝炎。