Progress towards HCV elimination among HIV-positive men who have sex with men in Germany: A modeling analysis

Authors: Lara Marquez[1*], Patrick Ingiliz[2,3*], Christoph Boesecke[4], Ivanka Krznaric[2], Knud Schewe[5], Thomas Lutz[6], Stefan Mauss[7], Stefan Christensen[8,10], Jürgen K. Rockstroh[4], Sonia Jain[9], Feng He[9], Joel Wertheim[1], Natasha K Martin[1]

Affiliations: [1]Division of Infectious Diseases and Global Public Health, University of California San Diego, USA. [2]Center for Infectiology, Berlin, Germany, [3]Charité University Medical Center, Berlin, Germany, [4]Department of Medicine, University of Bonn, Germany, [5]Infectiology Center Hamburg, Germany, [6]Infektiologikum Frankfurt, Germany, [7]Center for HIV and Hepatogastroenterology, Duesseldorf, Germany, [8]CIM Münster, Germany, [9]Department of Family Medicine and Public Health, University of California San Diego, USA, [10]Department of Gastroenterology and Hepatology, Muenster University Hospital, Muenster, Germany

Introduction

- Despite high hepatitis C virus (HCV) treatment rates, HCV incidence among HIV-positive men who have sex with men (HIV+ MSM) in Germany rose prior to HCV direct-acting antivirals (DAAs)[1].

- In 2016, the World Health Organization issued a strategy to eliminate HCV as a public health threat, including a target 80% reduction in HCV incidence by 2030[2].

- It is unclear whether existing DAA treatment rates can achieve these targets among HIV+ MSM in Germany, and modeling can be a useful tool to assess whether settings are on track for HCV elimination.

Aim

We utilize epidemic modeling to evaluate whether existing DAA treatment rates can achieve the World Health Organization (WHO) elimination target of 80% incidence reduction by 2030 among HIV+ MSM in Germany.

Methods

- **Epidemic model**: A previously developed dynamic transmission model of HCV among HIV-diagnosed MSM was adapated[3]. Incidence is dynamic, so changes over time, however the model incorporates a fixed background force of infection to represent infection from outside the HIV-diagnosed MSM population (HIV-negative or undiagnosed MSM, or PWID).

- **Model calibration:** The model was calibrated using Approximate Bayesian Calibration methods to the Germany epidemic (rising HCV incidence from 0.5 to 2.8 per 100 person-years (/100py) in 1996-2012; 8.2% HCV seroprevalence in 2012, and stable HCV reinfection rates among HIV+ MSM in the pre-DAA and DAA era (6.82/100py from 2002-2014 and 7.33/100py from 2014-2018).

- **HCV testing and treatment:** Data from a national cohort of patients from six German HIV and hepatitis treatment sites (NoCo cohort) indicated that among MSM with a recently acquired HCV infection from 2014-2020, DAA treatment was initiated a median of 6 months after diagnosis in 81% (n=148/182) of participants who did not spontaneously clear their infection, and 100% achieved sustained viral response (SVR)[4].

We modelled HCV incidence among HIV+ MSM in Germany until 2030 (relative to 2015 WHO baseline) under the following **scenarios**:

1) **Status quo:** no change in treatment rates (81% treated within 6 months of diagnosis)
2) **Status quo + early:** no change in treatment rates (81% treated within 3 months of diagnosis)
3) **Treat 90% when diagnosed:** scale-up to 90% treated within 6 months of diagnosis from 2021
4) **Treat all when diagnosed:** scale-up to 100% treated within 6 months of diagnosis
5) **Treat all when diagnosed + 20% previously diagnosed/untreated:** as in scenario 4 and 20%/year of previously diagnosed and untreated from 2021
6) **Treat all + early +20% previously diagnosed/untreated:** scale-up to 100% treated within 3 months of diagnosis, and 20%/year of previously diagnosed and untreated from 2021

References

1. Jansen K et al. High prevalence and high incidence of coinfection with hepatitis B, hepatitis C, and syphilis and low rate of effective vaccination against hepatitis B in HIV-positive men who have sex with men with a known date of HIV seroconversion in Germany. *PLoS ONE* 2015; 10(11)e0142515. **2.** World Health Organization, Global health sector strategy on viral hepatitis 2016-2021. **3.** Martin NK et al. Can combination prevention reverse the HCV epidemic among HIV+ MSM in the UK? *Clin Infec Dis* 2016 **4.** Ingiliz P, Martin N, Lutz T, Schewe K, Mauss S, Christensen S, Jain S, He F, Däumer M, Schmidt AJ, Sabranski A, Baumgarten A, Bickel M, Rockstroh JK, Boesecke C. No change in incidence of recently-acquired hepatitis C virus infection in men who have sex with men since the introduction of directly-acting antivirals in Germany (NoCo-Cohort). CROI Abstract. 2020

Results

- Continuing current treatment rates will not reduce total HCV incidence between 2015-2030, but will reduce primary HCV incidence by 34%, from an estimated 3.4/100py to 2.2/100py.

- If current treatment rates continued but treated within 3 months of diagnosis, total HCV incidence would decrease by 10% across 2015-2030, from an estimated 4.0/100py to 3.6/100py.

- Scaling-up DAAs from 80% to 100% treated within 6 months of diagnosis from 2021 onwards will be insufficient to reach the incidence target (achieving a 35% reduction by 2030)

- Achieving the 80% incidence target is achievable if all are universal treatment at diagnosis is combined with treatment of those previously diagnosed and untreated (at a rate of 20%/year).

- If acute treatment is provided in combination with the above interventions, this could reduce total incidence by 83% and primary incidence by 89% by 2030, to 0.56 and 0.38/100py.

Figure 1. Model projections for total HCV incidence (1A) and primary HCV incidence (1B) among HIV-diagnosed MSM in Germany with current treatment rates (black line) or scaled-up interventions.
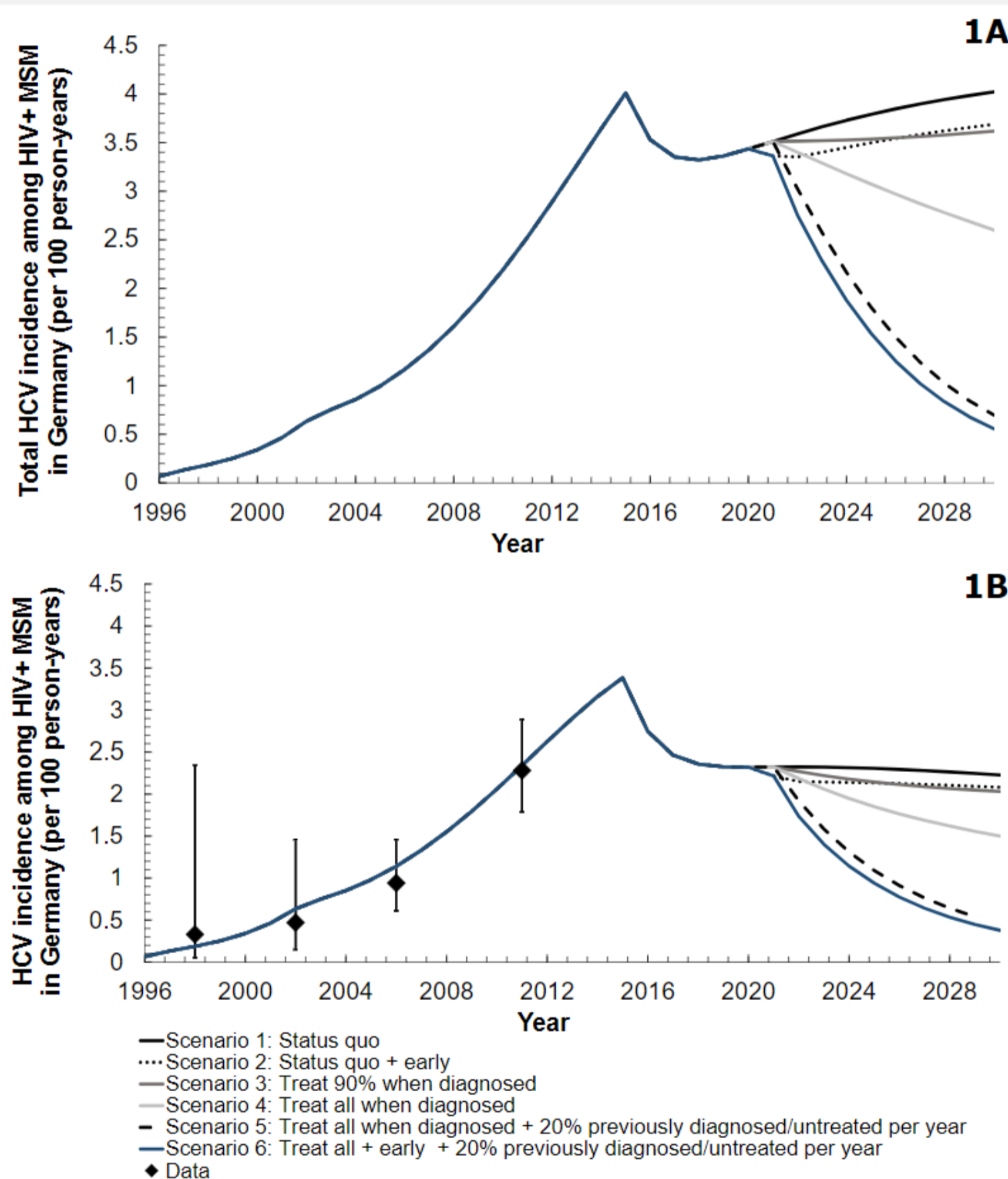
Conclusions

- HCV elimination among HIV+ MSM in Germany likely requires further DAA scale-up among those newly diagnosed combined with efforts to treat those previously diagnosed but untreated.

- Reducing the interval between diagnosis and treatment of recently acquired HCV may have a significant impact on elimination efforts.

Funding Disclosures

Author Contact Information

Lara Marquez   lkusnezo@health.ucsd.edu