Estimating the impact of hepatitis C virus therapy on future liver-related morbidity, mortality and costs related to chronic hepatitis in Europe

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The presentation summarizes the results of a global HCV disease burden and elimination project – European Countries

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<th>Countries Studied</th>
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Disclosure: This project has been funded through a grant by Gilead.

A more detailed summary of this analysis will be published in the March issue of the Journal of Viral Hepatitis as a supplement.
Modeling the Disease Progression of Hepatitis C Virus (HCV) infection

- Developed a system dynamics model in Excel
- Calibrated with published data in each country up to 2013
- Project the impact of key decisions after 2013 on the disease burden
- Estimates the total healthcare cost, in the absence of treatment.

**Future Strategies**

**Historical Trends**

**Input**
Contains input data for Population, Incidence, Mortality Rates, Disease Progression Rates and several other measures.

**Calculations**
Calculates the progression of patients and associated costs from Incidence (newly infected) to Cured or Death.

**Dashboard**
User input sheet for assumptions about future Incidence, Diagnosis, Treatment Eligibility, SVR Rates and Costs.

**Outputs**
Displays a summary table of the key output measures and more detailed results in numerous charts.
Hepatitis C Virus (HCV) Infection – Disease Progression

Acute Hepatitis

Chronic Hepatitis – F0 → Chronic Hepatitis – F1 → Chronic Hepatitis – F2 → Chronic Hepatitis – F3

Compensated Cirrhosis

Diuretic Sensitive Ascites

Variceal Hemorrhage

Hepatic Encephalopathy

Hepatocellular Carcinoma

Refractory Ascites

Liver Related Death

Liver Transplantation

Liver Related Death
The Leaky Bucket – explaining the current and future HCV disease burden

In the 1960’s through the 1990s, the rate of new infections outpaced mortality leading to an increase in the total number of HCV infected cases.

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Blood screening, the HIV scare, and start of needle exchange programs in the 1990s lead to a drop in new case infections. The total number of infections started to level off in the late 1990s.
Aging of the population, increased mortality, and increased treatment are expected to result in a drop in HCV infections.

After 2013, assumed the same treatment and cure rate as today.
Total viremic HCV infected cases in thirteen European countries

Total HCV Infected Cases

- 1960
- 1965
- 1970
- 1975
- 1980
- 1985
- 1990
- 1995
- 2000
- 2005
- 2010
- 2015
- 2020
- 2025
- 2030

Total Infected (Viremic)

- 500,000
- 1,000,000
- 1,500,000
- 2,000,000
- 2,500,000
- 3,000,000
- 3,500,000
- 4,000,000
- 4,500,000
Total number of infections will decline, but the remaining population will progress to more advanced liver diseases.

The number of HCV related cirrhotic cases will increase by 20%, decompensated cirrhosis by 30%, HCC by 40%, and liver related deaths by 40%.
The new therapies are expected to have a higher cure rate, shorter duration of treatment, and fewer side effects.

If the same number of patients (as today) are treated with high SVR therapies, a significant reduction in disease burden increase can be achieved.
If higher treatment rate is combined with higher cure rate, HCV can be eliminated before 2030.
In addition, the corresponding advance liver sequelae can be avoided.

The avoided healthcare costs associated with the HCV sequelae can offset the upfront cost of treatment.

HCV Related Cirrhotic Cases

HCV Related Decomp Cirrhosis, HCC, & Liver Related Deaths

- Higher SVR & Treatment Rate

- Total Infected (Viremic)
Key insights from this study

• Total number of HCV infections are declining in most countries

• Mortality will accelerate the decline in total infections due the aging population

• However, the remaining infected population will progress to more advance liver diseases

• HCV can be eliminated before 2030 by using higher SVR therapies, increased treatment, and prevention

• Active screening will be required to find cases to treat – age cohort screening

• In a resource limited setting, treating patients $\geq$F2 is a reasonable option if it is followed by treating F1 and F0 patients