**Table 1. Treatment Strategies**

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy 1</td>
<td>Treat F4 only</td>
</tr>
<tr>
<td>Strategy 2</td>
<td>No treatment at all</td>
</tr>
<tr>
<td>Strategy 3</td>
<td>Sequential treatment of the most advanced cases (F4→F0)</td>
</tr>
<tr>
<td>Strategy 4</td>
<td>Sequential treatment of the rest of the stages (F0→F4)</td>
</tr>
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</table>

**Table 2. Data Inputs**

<table>
<thead>
<tr>
<th>Health state utilities</th>
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**Table 3. Impact of Budget Expansion With the Optimal Treatment Strategy**

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**Figure 1. Path to HCV Elimination Under 3 Budget Scenarios (F4→F0, Strategy 12)**

- Treatment budget increased to $15 billion and maintained throughout 2017–2030.
- Treatment budget declining 5% annually ($10 billion in 2017, $5.1 billion in 2030).
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The cumulative prevalence and incidence of extra-hepatic manifestations in patients with hepatitis C virus infection: real-world evidence from the United States

Nancy Reau1, Francis Vekeman2, Eric Wu3, Yanjun Bao4, Yuri Sanchez Gonzalez2

1 Rush University Medical Center, Chicago, IL; 2 Analysis Group, Inc., Boston, MA; 3 AbbVie Inc., North Chicago, IL, USA

Presented at the European Association for the Study of the Liver (EASL), April 19 – 23, 2017, Amsterdam, Netherlands

BACKGROUND

• Between 2.7 and 3.0 million people are currently living with chronic hepatitis C virus (HCV) infection in the United States (US).
• Previous studies have shown that HCV infection is associated with both hepatic complications (e.g., cirrhosis, liver failure) and extra-hepatic manifestations (EHMs) [1,2]. Several extra-hepatic diseases, including chronic kidney disease (CKD), were also previously reported in the same study.

No previous study has assessed how the prevalence of a comprehensive list of EHMs, including for conditions previously not recognized as EHMs such as inflammatory bowel disease and paroxysmal nocturnal dyspnea (prevalence or 5-year post-index: 2.4 and 2.1, respectively, respectively, respectively).

OBJECTIVE

• To compare the 5-year cumulative prevalence and incidence of EHMs among patients with and without HCV in the US

METHODS

DATA SOURCE

• Optum’s Claims Data - Clinformatics Data Mart (01/02/2009 – 31/01/2016), a de-identified health claims dataset, including patients’ medical, prescription drug, laboratory, and eligibility information.

• Patients included: HCV cohort comprised of all adult patients with a diagnosis code for chronic HCV (International Classification of Disease, Ninth Revision [ICD-9] diagnosis codes 070.44 and 070.54, ICD-10 diagnosis code B18.2; N = 44,205); no-HCV cohort comprised of a random sample of the general adult population (N = 500,000) from which patients with diagnosis codes for chronic HCV were excluded.

STUDY DESIGN AND STUDY COHORTS

• Retrospective analysis of the cumulative prevalence and incidence of EHMs using longitudinal claims data

• Two cohorts matched 1:1 on age, sex, region, and years of follow-up: HCV and no-HCV cohorts (exact match; see Figure 1 for cohort selection and definition of index date)

• The index date was selected as the day of first HCV diagnosis for the HCV cohort and the first day of insurance eligibility for the no-HCV cohort.

OUTCOMES AND STATISTICAL ANALYSES

• The prevalence of any EHM in the 1st year post-index date was 60% in the HCV cohort and 35% in the no-HCV cohort (prevalence OR: 2.7; Figure 2), and it increased by the 5th year to a cumulative prevalence of 66% and 60%, respectively (prevalence OR: 3.1; Figure 2). The 4th year incidence of any EHM was 65% and 48%, respectively (incidence OR: 2.1; Figure 4).

• The 1st year prevalence of EHMs, HCV cohort had a significantly higher prevalence of any EHM than the no-HCV cohort; this early difference is likely due to the fact that patients in the HCV cohort were infected before the diagnosis and had an increased risk of EHM prior to the index date.

• No previous study has assessed how the prevalence of a comprehensive list of EHMs, including for conditions previously not recognized as EHMs such as inflammatory bowel disease and paroxysmal nocturnal dyspnea (prevalence or 5-year post-index: 2.4 and 2.1, respectively, respectively).

RESULTS

• The prevalence of any EHM in the 1st year post-index date was 60% in the HCV cohort and 35% in the no-HCV cohort (prevalence OR: 2.7; Figure 2), and it increased by the 5th year to a cumulative prevalence of 66% and 60%, respectively (prevalence OR: 3.1; Figure 2). The 4th year incidence of any EHM was 65% and 48%, respectively (incidence OR: 2.1; Figure 4).

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• No previous study has assessed how the prevalence of a comprehensive list of EHMs, including for conditions previously not recognized as EHMs such as inflammatory bowel disease and paroxysmal nocturnal dyspnea (prevalence or 5-year post-index: 2.4 and 2.1, respectively, respectively).

• Some severe and relatively uncommon conditions in the general population, such as CKD, reached a prevalence of >50% among the HCV population in the 5th year post-index (Figure 5)

• Some EHM that are more characteristic of older populations (e.g., cognitive impairment, Parkinson’s disease, and cancer) had low prevalence in both study cohorts; this could be explained by the fact that the cohorts included relatively young patients (median age 53 years).

• Cumulative incident cases of any EHM from the 1st to the 5th year post-index

DISCUSSION

• In light of the growing EHM risk associated with HCV infection, current restrictions on treatment access based on fibrosis stage may exacerbate the clinical burden to patients and economic burden to payers in both the short and long term

• The gap in EHM observed in patients with HCV as early as their year of diagnosis or at early fibrosis stages suggests a need for immediate intervention to delay the development of these conditions.

• The extent to which the excess EHM risk of HCV financially burdens the healthcare system can be mitigated with effective HCV screening, adequate linkage to care, and treatment upon diagnosis regardless of fibrosis stage

LIMITATIONS

• The study sample comprised of commercially insured patients may not be representative of the general HCV population

• Some patients included in the no-HCV cohort could be HCV-infected but not yet diagnosed, and thus the prevalence OR of EHM could have been underestimated

• The HCV and no-HCV cohorts were matched on age, sex, region, and duration of follow-up; however, residual confounding due to other factors associated with HCV infection (e.g., risk behaviors in the HCV cohort) may persist

• This study was subject to the limitations of retrospective studies such as reliance on healthcare claims data, including occasional errors or claim omissions. However, such limitations would likely affect both HCV and no-HCV cohorts similarly

• The extent to which the excess EHM risk of HCV financially burdens the healthcare system can be mitigated with effective HCV screening, adequate linkage to care, and treatment upon diagnosis regardless of fibrosis stage

CONCLUSIONS

• EHMs pose a high clinical burden on patients with HCV, which grows over time and could translate into a substantial economic burden

• Expanded HCV screening and early treatment may help reduce the risk of EHM associated with HCV by closing the gap in EHMs delaying the development of the EHM.

• Further research is also needed on the best policies to close the existing EHM gaps between HCV and no-HCV patients, which may involve targeted HCV screening, adequate linkage to care, and treatment upon diagnosis regardless of fibrosis stage

DISCLOSURES

Funding for this research was provided by AbbVie Inc.; the study sponsor was involved in all stages of the study research and manuscript preparation. Nancy Reau is an employee of Rush University Medical Center and is a consultant for AbbVie Inc. She is also a consultant for GlaxoSmithKline, Inc, Merck & Co., Inc., and Bristol-Myers Squibb, and her institution has received research support from AbbVie Inc. and GlaxoSmithKline Inc. Eric Wu is an employee of Analysis Group which received consultancy fees from AbbVie Inc. For conducting research analysis, Frances Herrera was an employee of Analysis Group at the time this analysis was conducted. Yanjun Bao and Yuri Sanchez Gonzalez are employees of AbbVie, and may own AbbVie stock or stock options.

ACKNOWLEDGEMENT

Author contributions: Willy Weyler, and Eric Wu formulated, developed, implemented, analyzed, and interpreted the data analysis. AbbVie provided funding for the study to this work.

REFERENCES

Effect of hepatitis C treatment with ombitasvir/paritaprevir/ritonavir + dasabuvir regimen on patient-related quality of life: Analysis of Phase 3a and Phase 3b clinical trials

Sammy Saab, Darshan Mehta, Stacie Hughes, Nathan Grunow, Yanjun Bao, Brett Pinsky

1. Department of Gastroenterology, School of Medicine, University of California, San Diego, CA, USA; 2. Schaeffer Center for Health Policy and Economics, University of Southern California, Los Angeles, CA, USA; 3. Health Economics and Outcomes Research, AbbVie Inc., North Chicago, IL, USA; 4. Clinical Outcome Solutions, Tucson, AZ, USA

Presented at the European Association for the Study of the Liver (EASL), April 19 – 23, 2017, Amsterdam, Netherlands

BACKGROUND

• Chronic hepatitis C (CHC) infected patients have diminished health-related quality of life (HRQoL), particularly driven by fatigue and symptoms of depression and anxiety.
• Patients treated with an interferon (IFN)- and ribavirin (RBV)-based regimen had a lower HRQoL compared to patients treated with IFN-α alone.
• Prior patient-reported outcome (PRO) studies on these DAA regimens demonstrated improvements in HRQoL during the treatment period. This improvement was seen as early as week 4 in post-treatment treatment 3.

OBJECTIVES

• This study aims to report on the impact of treatment with the 3D regimen on patient-reported function and quality of life as measured by the SF-36 Short Form Health Survey (SF-36) and the EuroQol five-dimension questionnaire (EQ-5D) for CHC GT3b patients during treatment and up to 12 weeks post-treatment.

METHODS

STUDY DESIGN and the analyzed PROs from:
• Six registration phase 3 trials (Phase 3a study population) – SOFVAP (SOFVAP 1154, TURQUOISE I), TURQUOISE II
• Two Phase 3b trials (Phase 3b study population) – TURQUOISE I (NCT013218100), TURQUOISE II (NCT01321817)
• SF-36 was collected at 12 and 52 weeks during treatment.
• Assessment of Chronic Fatigue Therapy Fatigue (ACT-F) was used in TURQUOISE II.
• The study period comprised of the treatment period and at 48 and 12 weeks of post-treatment follow-up for Phase 3a and 3b trials, respectively.

PROCEDURE

• PRO questionnaires utilized in this study are described in Table 1.

RESULTS

PHASE 3A STUDY POPULATION (TABLE 1)

- A total of 296 GT3b patients and 855 GT2a patients from Phase 3a and Phase 3b trials, respectively, were included for analysis.
- Baseline demographics of the study population are shown in Table 2.

PHASE 3B STUDY POPULATION (TABLE 4)

- Baseline HRQoL
- Baseline values across SF-36 domains and component scores were lower than those in the general population.
- Treatment Period HRQoL
- Across domains and component scores, there was no statistically or clinically meaningful decline in patient HRQoL during the treatment period.
- Post-treatment HRQoL
- Across domains and component scores, there was a statistically significant increase in HRQoL across all SF-36 domains by treatment week 4.
- Increases observed during the treatment period persisted during the post-treatment period.

POST-TREATMENT WEEK 12

- Increased from baseline at 30 weeks.
- Standard deviation decreases for Phase 3b.
- Increases from baseline at 12 weeks.

DISCUSSION

• This study is the first comprehensive assessment of GT3b patient experience during and post-treatment with an RBV-free regimen for CHC.
• Patients enrolled in Phase 3b trials had a lower baseline PRO score compared with patients enrolled in Phase 3a trials. The difference may be one of the driving factors for Phase 3b trials to demonstrate higher improvements at subsequent follow-up time points.
• The GT3b population, treated with the RBV-free 3D regimen, did not report decrements in their HRQoL during the treatment period, which is consistent with previous research.
• Post-treatment, there were improvements in HRQoL that were statistically and clinically significant. Only SF-36 vitality remained stable. For the largest improvements included the VT domain of SF-36 and PCS in FACT-G.
• Our results are consistent with HRQoL gains documented with other RBV-free DAA regimens.

STRENGTHS

• PRO instruments used in this study have been validated and used widely across industries and geographies.
• Results from these analyses were unique to the sequence of the follow-up data reported. PRO data were collected up to 48 weeks post-treatment for Phase 3a trials and 52 weeks post-treatment for Phase 3b trials.

LIMITATIONS

• The current study did not include GT3b cirrhotic patients from TURQUOISE III trial, since this study was designed to provide long-term HRQoL data for the study population. The TURQUOISE III trial collected data up to 24 weeks post-treatment.
• The study sample comprised of patients enrolled in clinical trials, therefore generalizability to patients in routine clinical practice may be limited due to inclusion/exclusion criteria.
• Unobservable factors, not collected in the database, may confound PRO results.
• Due to the multivariate nature of the clinical trials, bias may have been introduced due to site-specific protocol deviations.
• Our mixed models controlled for study region to reduce unobservable factors, but may own stocks.

CONCLUSIONS

• This study demonstrates that treatment with RBV-free 3D regimen for GT3b has a positive impact on HRQoL in GT3b patients and regimens that is maintained in follow-up of 48 and 52 weeks.

REFERENCES

Early versus delayed hepatitis C treatment provides increased health benefits at lower costs: A UK cost-effectiveness analysis of genotypes 1 and 4 treatment-naïve patients

Yuri Sanchez González1, Andy Ingram2, Claire Lindsay3, Hélène Parisé4, Suchin Virabhak2

1AbbVie Inc., North Chicago, IL, USA; 2Medicus Economics, Boston, MA, USA

Presented at the European Association for the Study of the Liver (EASL), April 19 – 23, 2017, Amsterdam, Netherlands

BACKGROUND

- An estimated 214,000 people in the United Kingdom (UK) are chronically infected with hepatitis C virus (HCV).
- HCV disease progression can occur over a 20-50 year period.
- Long-term sequelae of chronic infection may include cirrhosis, liver decompensation, hepatocellular carcinoma (HCC), and liver transplantation (LT).
- Patients in early-stage fibrosis may have limited access to effectively treat.
- The costs of disease progression and complications, including decompensated cirrhosis (DCC), HCC, and LT, are major drivers of the economic burden of HCV.
- While achievement of SVR is associated with reduced risk of liver-related complications, patients who achieve SVR from more severe liver disease states have been shown to continue to face an excess risk of liver disease complications including HCC, LT, and liver-related mortality.
- Therefore, early treatment is believed to reduce the overall downstream medical costs compared with treatment in later liver disease stages.
- Recent studies have demonstrated the cost-effectiveness of the 3D regimen of ombitasvir/paritaprevir/ritonavir (RBV) for treatment of genotype (GT) 1 patients, and the 2D regimen of ombitasvir/paritaprevir/RBV for treatment of GT4 patients, vs. previous and current standards of care.
- However, the cost-effectiveness of treating patients in early- vs. late-stage fibrosis with 3D or 2D is not well-understood.

METHODS

- To determine the lifetime risks of liver-related morbidity and mortality and the cost-effectiveness of treating patients with AbbVie’s 3D and 2D regimens at 80 weeks (W) at different fibrosis stages in the UK.

RESULTS

- GT1 and GT4-HCV-infected patients who were treated with 3D RBV and 2D WBV, respectively, earlier in the disease have lower lifetime risk of DCC, HCC, LT, and/or LrD compared with patients treated at later fibrosis stages.

Figure 2. Lifetime Risk of DCC, HCC, LT, and LrD with HCV Treatment at Different Fibrosis Stages

- Table 3. SVR Rates from AbbVie Clinical Trials

<table>
<thead>
<tr>
<th>GT</th>
<th>24W SVR</th>
<th>48W SVR</th>
<th>72W SVR</th>
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<tr>
<td>GT1</td>
<td>97.2%</td>
<td>97.2%</td>
<td>96.3%</td>
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<tr>
<td>GT4</td>
<td>100%</td>
<td>100%</td>
<td>97.9%</td>
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- Treatment in early fibrosis stages is not only cost-effective, but also a dominant strategy as it provides greater QALY benefits at lower costs.

DISCUSSION

- In the UK, the National Health Service (NHS) operates a fixed-budget, centrally-based, commissioning policy for HCV treatments which limits the number of eligible patients who can receive direct-acting antiviral therapy.
- The NHS budget allocation has been prioritized to include only patients with more severe liver disease states.
- While access is now unrestricted in terms of fibrosis score (METAVIR F5-F6), the limiting step is the annual cap (run rate) in patients treated in order to keep within the budget threshold.
- This analysis justifies this cost-effectiveness argument for expanding eligibility criteria to include early stage treatment, but should be accompanied by increasing capacity (run rate) to treat patients regardless of fibrosis score.

LIMITATIONS

- SVR inputs are obtained from AbbVie clinical trials and may differ from rates observed in a real-world setting.
- Results for GT4 F4 patients are imputed from the PEARL-I clinical trial, as analysis was conducted prior to AGATE-I trial data availability. SVR rates were assumed equal to GT1 patients treated with 2D + RBV for 24 weeks as there is no data available for GT4 F4 patients.
- Transition probabilities and costs were obtained from the best available estimates in the literature; actual values for these may differ across other settings and patient subgroups.
- While our findings are based on treatment-naïve patients, sensitivity analyses were conducted for treatment-experienced patients.
- Results may not be generalizable to specific real-world settings.

CONCLUSIONS

- GT1- and GT4-HCV-infected patients who are treated with 3D RBV and 2D RBV earlier in the disease process have reduced risk of liver-related morbidity and mortality.
- Treatment in early fibrosis stages is not only cost-effective, but also a dominant strategy as it provides greater QALY benefits at lower costs.

DISCLOSURES

- Authors declare no conflict of interest.

ACKNOWLEDGEMENT

Funding: This research was supported by AbbVie, Inc., North Chicago, IL, USA. The contents of this supplement were developed independently of the sponsor.

REFERENCES

Overall Potential effect of hepatitis C treatment on renal, cardiovascular and metabolic extrahepatic manifestations: Results from clinical trials of ombitasvir/paritaprevir/ritonavir and dasabuvir ± ribavirin

Tram T. Tran1, Darshan Mehta2, Andrea Goldstein3, Eric Cohen4, Yanjun Bao5, Yuri Sanchez Gonzalez2

1Vedanta-Simal Medical Center, Los Angeles, CA, United States; 2Schaeffer Center for Health Policy and Economics, University of Southern California, CA, United States; 3AbbVie Inc., North Chicago, IL, United States

Presented at the European Association for the Study of the Liver (EASL), April 19 – 23, 2017, Amsterdam, Netherlands

BACKGROUND

• Hepatitis C virus (HCV) is both a hepato- and lymphotrophic virus.
• Most HCV-infected patients are at risk of developing liver-related complications; however, HCV infection is also linked with the development of extrahepatic manifestations (EHMs).
• Studies have shown that approximately two-thirds of infected patients experience EHM symptoms, although, a relatively small number of these have been reported, including cardiovascular, metabolic, and renal EHM.
• Benign mixed cryoglobulinemia and B-cell lymphomas are the most frequently recognized EHM; however, all EHM have been reported, including cardiovascular, metabolic, and renal complications.
• The effects of the newer direct-acting antiviral (DAA) treatments on EHM-related outcomes are not well understood.

OBJECTIVES

• To determine the impact of treatment with ombitasvir/paritaprevir (identified by AbbVie and Enanta) and dasabuvir/ribavirin (SBV/RBV) on cardiovascular, metabolic, and renal EHMs in genotype 1-infected patients.
• To investigate the differential effect of SBV/RBV treatment in clinically relevant subgroups based on EHMs severity.

METHODS

STUDY DESIGN

We conducted a post-hoc analysis of clinical trial data from six Phase 3a trials investigating SBV/RBV treatment for patients with genotype 1 HCV infection.

DATA SOURCES

• Data were pooled from all trial sites.

PATIENTS

• Study populations were defined as follows:
  - SFL: All HCV-infected patients treated with SBV/RBV for 12 weeks in the placebo-controlled SAPPHIRE I and II trials.
  - SP1: All HCV-infected patients treated with placebo for 12 weeks, followed by 12 weeks of SBV/RBV regimen during the open-label period in the SAPPHIRE I and II trials.
  - SFL: All HCV-infected patients treated with SBV/RBV for 12 or 24 weeks in the SAPPHIRE I and II trials, PEARL II, III, and IV, and TURBO II trials.

EXTRAHEPATIC MANIFESTATIONS

• The following EHMs were studied: cardiovascular, metabolic, and renal diseases.
• Each EHM was analyzed collectively as a group using the following biomarkers, respectively: fasting triglyceride, glucose levels, and estimated glomerular filtration rate (eGFR).

STATISTICAL ANALYSIS

• Treatment effects were measured using longitudinal mixed model (LMM) regression analyses, which were performed for each EHM with the respective biomarker values at each time point as the main dependent variable.
• The main explanatory variable was whether patients were in the treatment (SFL) or placebo group (SP1) at each time point.
• Patient biomarker measurements at baseline, demographics, and clinical characteristics were included as fixed-effect covariates.
• Study enrollment was treated as a random effect.
• The LMM population was used to study the differential effect of HCV treatment with SBV/RBV by clinically relevant subgroups using MM analyses for each EHM.

The subgroup for each EHM were defined as baseline biomarker levels (Table 1).

The change from baseline at subsequent time points was estimated and plotted based on the regression predictions (if, trend value) from the MM analysis.

RESULTS

• The biomarker levels used in the current study to evaluate DAA treatments have been associated with varying risks of clinical outcomes.
• Dasabuvir/ribavirin regimens have been associated with increased risk of coronary heart disease and all-cause mortality.
• The overall improvements in biomarker levels observed in the current study for all HCV patients treated with the SBV/RBV regimen, specifically in patients with advanced EHM severity at baseline, may indicate long-term clinical benefits including:
  - Lower risk of coronary heart disease and all-cause mortality in cardiovascular and metabolic manifestations.
  - Delayed development of metabolic syndrome and associated cardiovascular events in metabolic manifestations.
• Reduced risk for ESRD and safe coronary mortality in renal manifestations.

These results are in line with previously published literature where HCV eradication with interferon/RBV based regimens has been associated with a lower risk of cardiovascular complications, prevention or delay of the onset of metabolic syndrome, and lowered risk of ESRD development.

DISCUSSION

• Adjusted mean glucose levels at week 12 were significantly (p<0.02) lower in patients treated with SBV/RBV than placebo (Figure 2A).
• Among the overall population treated from six Phase 3a trials (SFL), treatment with SBV/RBV resulted in statistically significant decreases in triglyceride levels compared with baseline at all time points (except week 12, p<0.001) (Figure 1).
• Subgroup analysis for EHM severity showed that patients with elevated triglyceride levels at baseline had large and significant decreases from baseline in triglyceride levels (-48.5 mg/dl by week 12, p=0.001).
• Patients with normal triglyceride levels showed modest but significant increases in triglyceride levels (18.3 mg/dl by week 12, p<0.001).

CONCLUSIONS

• Treatment with 3D±RBV demonstrates an association with EHR improvement in cardiovascular disease. These results are in line with previously published literature where HCV eradication with interferon/RBV regimens has been associated with a lower risk of cardiovascular complications, prevention or delay of the onset of metabolic syndrome, and lowered risk of ESRD development.

• HCV-infected patients with advanced EHR may benefit most from DAA therapy.

ACKNOWLEDGEMENT

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REFERENCES

Extra-hepatic manifestations from hepatitis C virus infection related to female infertility and adverse pregnancy outcomes: A real-world observation

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BACKGROUND

• The majority of new hepatitis C virus (HCV) infections is among injecting drug users, some of whom are young women in their childbearing years.
• HCV infection may have an effect on ovarian senescence in women of reproductive age.
• Although there is a growing body of evidence on the extra-hepatic manifestations (EHMs) that are secondary to HCV-related inflammatory responses and/or autoimmune reactions,3,4 further evidence is needed on the potential link HCV infection may have with female infertility and pregnancy outcomes.

OBJECTIVES

• To assess the relationship between HCV infection and female infertility and pregnancy outcomes in a large real-world population in the United States (US).

METHODS

DATA SOURCE: US CLAIMS DATABASE

• Large de-identified US insurance claims database containing patient-level medical, pharmacy, and laboratory data from 2000 to 2015.
• Patient enrolment information was used to identify periods of continuous eligibility for each patient.
• Patient demographic information included year of birth, sex, and geographic region.
• All patient-level data met the Health Insurance and Portability and Accountability Act (HIPAA) requirements for fully de-identified datasets.

OUTCOMES

• Rates of female infertility associated with HCV mono-infection, HIV mono-infection, and HCV/HIV co-infection compared with women with no HCV or HIV infection.
• Pregnancy outcomes were associated with HCV mono-infection, HIV mono-infection, and HCV/HIV co-infection compared with women with no HCV or HIV infection.

STUDY DESIGN: INFERTILITY ANALYSIS (FIGURE 1)

• Inclusion criteria
  - Women aged 18–45 years
  - No pregnancy

• Case definition
  - HCV mono-infection
  - HIV mono-infection
  - HCV/HIV co-infection

• Controls: no HCV or HIV infection

• Patient enrolment information was used to identify periods of continuous eligibility for each patient
• Year of index date
• Type of health plan
• Comorbidities; reference group: no HCV/HIV

Figure 2. Sample Selection: Pregnancy Outcomes Analysis

• Inclusion criteria
  - Women aged 18–45 years
  - No pregnancy

• Case definition
  - HCV mono-infection
  - HIV mono-infection
  - HCV/HIV co-infection

• Controls: No HCV or HIV infection

• Patient enrolment information was used to identify periods of continuous eligibility for each patient
• Year of index date
• Type of health plan
• Comorbidities; reference group: no HCV/HIV

Figure 3. Comorbidities in Infertility Analysis

• Inclusion criteria
  - Women with HCV diagnosis
  - Women with HIV diagnosis

• Case definition
  - HCV mono-infection
  - HIV mono-infection
  - HCV/HIV co-infection

• Controls: No HCV or HIV infection

• Patient enrolment information was used to identify periods of continuous eligibility for each patient
• Year of index date
• Type of health plan
• Comorbidities; reference group: no HCV/HIV

Figure 4. Adjusted Odds of Infertility With HCV/HIV Co-infection, HCV Mono-infection, or HIV Mono-infection vs No HCV or HIV Infection

• Inclusion criteria
  - Pregnancy outcomes

• Case definition
  - Premature birth
  - Live birth

• Controls: No HCV or HIV infection

• Patient enrolment information was used to identify periods of continuous eligibility for each patient
• Year of index date
• Type of health plan
• Comorbidities; reference group: no HCV/HIV

Figure 5. Comorbidities in Pregnancy Outcomes Analysis

• Inclusion criteria
  - Women with HCV diagnosis
  - Women with HIV diagnosis

• Case definition
  - HCV mono-infection
  - HIV mono-infection
  - HCV/HIV co-infection

• Controls: No HCV or HIV infection

• Patient enrolment information was used to identify periods of continuous eligibility for each patient
• Year of index date
• Type of health plan
• Comorbidities; reference group: no HCV/HIV

Figure 6. Adjusted Odds of Adverse Pregnancy Outcomes in HCV-infected Women Versus No HCV Infection

• Inclusion criteria
  - Women with HCV diagnosis
  - Women with HIV diagnosis

• Case definition
  - Infertility

• Controls: No HCV or HIV infection

• Patient enrolment information was used to identify periods of continuous eligibility for each patient
• Year of index date
• Type of health plan
• Comorbidities; reference group: no HCV/HIV

Figure 7. Comorbidities in Infertility Analysis

• Inclusion criteria
  - Women with HCV diagnosis
  - Women with HIV diagnosis

• Case definition
  - HCV mono-infection
  - HIV mono-infection
  - HCV/HIV co-infection

• Controls: No HCV or HIV infection

• Patient enrolment information was used to identify periods of continuous eligibility for each patient
• Year of index date
• Type of health plan
• Comorbidities; reference group: no HCV/HIV

Figure 8. Adjusted Odds of Adverse Pregnancy Outcomes in HCV-infected Women Versus No HCV Infection

• Inclusion criteria
  - Women with HCV diagnosis
  - Women with HIV diagnosis

• Case definition
  - Infertility

• Controls: No HCV or HIV infection

• Patient enrolment information was used to identify periods of continuous eligibility for each patient
• Year of index date
• Type of health plan
• Comorbidities; reference group: no HCV/HIV

Table 1. Rates of Infertility (Table 2)

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<th>Cohort Type</th>
<th>Inclusion Period</th>
<th>Infertility Rate (per 1,000)</th>
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<tr>
<td>HCV mono-infection</td>
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<td>6.8</td>
</tr>
<tr>
<td>HIV mono-infection</td>
<td></td>
<td>6.4</td>
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<tr>
<td>HCV/HIV co-infection</td>
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Table 2. Rates of Adverse Pregnancy Outcomes

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<th>Inclusion Period</th>
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<td>HIV mono-infection</td>
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<tr>
<td>HCV/HIV co-infection</td>
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</tbody>
</table>

COMORBITIES IN INFERTILITY ANALYSIS POPULATION

• A greater proportion of HCV and/or HIV-infected women had comorbidities compared with women who were not infected with HCV or HIV (Figure 5).
• Consistent with previous literature,5 some of these comorbidities include endometriosis, circulatory system, metabolic and hematologic diseases, immunity disorders, hypertension, diabetes, and ovarian dysfunction.

COMORBITIES IN PREGNANCY OUTCOMES ANALYSIS POPULATION

• A greater percentage of pregnant women infected with HCV had EMs and other comorbidities compared with pregnant women who were not infected with HCV or HIV (Figure 5).

DISCUSSION

• Risks of infertility and adverse pregnancy outcomes were significantly increased in women with HCV.
• Only pregnancy outcomes were not statistically significant owing to a small sample size.
• It is unknown to what extent viral suppression with therapy could mitigate these risks.

LIMITATIONS

• Women filing HCV prescriptions outside the available pharmacy coverage plan or those with no HCV treatment history, which may confound and underestimate the actual effect of HCV infection.
• The rate of live births without complications in this study is less than the national live birth rate (55% vs 65%), possibly due to missing pregnancy data associated with the use of claims data.
• Results may further be confounded due to factors not included in the matching approach or as covariates.
• Given the natural limitations of claims data, results may not be generalizable to patient populations beyond the study sample.

CONCLUSIONS

• In a real-world analysis, HCV is associated with increased burdens for women of childbearing age in terms of infertility and adverse pregnancy outcomes, including stillbirths and gestational diabetes and fewer live births without complications.
• Given these risks, early treatment of HCV-infected women of childbearing age should be considered.

DISCLOSURES

Erica Villa is an employee of the Azienda Ospedaliero Universitario Policlinico di Modena and a consultant for AbbVie Inc. She is also a consultant for GSK, Novartis, and BMS. Dr. Han has received consulting fees or honoraria for research support from AbbVie Inc. and Roche. Ms. Goldstein is an employee of AbbVie Inc. Dr. Manthena is an employee of AbbVie Inc., and may have stock/option grants or equity interest in the company. Dr. Bao is an employee of AbbVie Inc. Dr. Sanchez Gonzalez has received research support from AbbVie Inc., and may have stock/option grants or equity interest in the company.

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REFERENCES