University of Colorado Hospital
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Simeprevir/Sofosbuvir versus Triple Therapy (Telaprevir or Boceprevir) For HCV GT1: A Cost Analysis

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Purpose:

Simeprevir plus sofosbuvir (with or without ribavirin) (SMV/SOF) increases rates of sustained virologic response (SVR) over telaprevir- or boceprevir-based triple therapy (TT) However, the medications have a higher cost. Our objective was to examine the total treatment cost and cost per SVR of SMV/SOF versus TT.

Inclusion Criteria:

a. Chronic hepatitis C Genotype 1 infection
b. Prescribed either SMV/SOF or TT between May 1, 2011 - August 1, 2014

Exclusion Criteria:

a. Liver transplant recipients and HIV co-infected patients

Methods:

Electronic medical records were used to collect patient specific data on: demographics, duration of HCV treatment, virologic response, clinic visits for treatment monitoring, HCV-related emergency room visits, and hospitalizations, treatment related blood transfusions, management of hematologic side effects by medications (epoetin alfa, filgrastim) and outpatient laboratory monitoring (estimated per clinic-defined treatment protocol).

SVR rates were defined SVR24 for TT and SVR12 for SMV/SOF. Unit costs for all medical services and labs were obtained from a 10% random sample (8 million covered lives) of national claims database IMS Lifelink. HCV drug treatment costs were obtained from Average Wholesale Prices of RED Book.

The following outcomes were determined between the two treatment groups. **These included: a. cost per SVR, b. total HCV treatment costs. c. treatment completion, and d achieving SVR.** Cost/SVR was calculated by dividing the mean total cost by the SVR rate; and modeled across treatment groups using a Generalized Linear Model with log link controlling for age, fibrosis level, treatment experience (naïve vs experienced), BMI, ethnicity, race and gender. Likelihood of treatment completion and achieving SVR were similarly modelled between the two groups using logit regression.

Results:

Demographic characteristics, mean unadjusted line item costs and percentage of specific cost components for each group are presented. Only Cost/SVR model results are shown. Other model results are summarized under "Findings".

Table 1: Descriptive Statistics

Sample Size	Triple Therapy (n=113)	Sim/Sof (n=70)	p-value
Gender			
Male	61 (54%)	40 (57%)	0.676
Female	52 (46%)	30 (43%)	
Race			
Caucasian	98 (87%)	61 (87%)	0.759
African American	9 (8%)	4 (6%)	
Other/Unknown	6 (5%)	5 (7%)	
Ethnicity			
Hispanic	15 (13%)	7 (10%)	0.675
Non-Hispanic	95 (84%)	62 (89%)	
Unknown	3 (3%)	1 (1%)	
Age			
Mean Age (SD)	53.0 (9.9)	59.0 (7.4)	0.000
BMI			
Mean (SD)	27.5 (6.7)	27.1 (5.1)	0 .721
Treatment Completion			
Yes	49 (43%)	67 (96%)	0.000
No	64 (57%)	3 (4%)	
Treatment Duration			
Actual mean weeks (SD)	29.1 (14.6)	11.9 (0.5)	0.000
Expected protocol mean weeks	40.5	12	
Treatment Group			
Naïve	51 (45%)	25 (36%)	0.209
Experienced	62 (55%)	45 (64%)	
Fibrosis Level			
Minimal (F0-F2)	50 (44%)	20 (29%)	0.034
Advanced (F3-F4)	63 (56%)	50 (71%)	

Table 2: Mean Total Costs (Unadjusted)

Mean Cost per Patient	Triple Therapy (n=113)	SMV/SOF (n=70)
Cost for HCV Medications	$81,515.09	$150,409.10
Lab Monitoring Cost	$1,518.23	$1,031.15
HCV Inpatient Costs	$5,234.06	$0.00
HCV Outpatient Costs	$4,124.57	$966.79
HCV Emergency Room Costs	$325.61	$164.26
Other Costs*	$3,224.97	$203.36
Total Mean Costs per Patient	$95,942.52	$152,774.70
SVR Rate	0.59	0.86
Mean cost per SVR	$ 161,813.49	$178,237.14

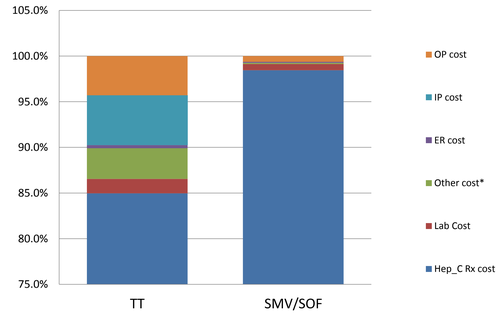
* Other cost includes cost of: Transfusions, EPO, and filgrastim

Table 3: Cost per SVR (Adjusted)

Variable	Incremental Cost in $$ compared to the reference group	p-value
Treatment Group (SMV/SOF compared to Triple Therapy)	-5190.53	0.571
Treatment Naïve (compared to Treatment Experienced)	824.7682	0.914
Advanced Fibrosis F3-F4 (compared to Minimal Fibrosis F0-F2)	**22030.16**	**0.005**
Treatment Completion (compared to those who discontinued treatment)	**32521.18**	**0.001**
50-59 year olds (compared to 20-49 year olds)	**21827.54**	**0.029**
60-69 year olds (compared to 20-49 year olds)	**20894.54**	**0.049**
Obese (BMI >= 30) compared to normal weight BMI 18.5-24.9)	-3044.286	0.756
Hispanic (compared to non-Hispanic)	6467.642	0.603
African American (compared to Caucasian)	15124.78	0.297

Bolded denotes significance at the 95% significance level.

Percentages of Different Components in The Total Cost



Key Findings (some results not shown):

- SMV/SOF patients have higher SVR rate (86% vs 59%)
- The mean adjusted total cost of HCV treatment is $39,806 higher for SMV/SOF compared to TT patients.
- SMV/SOF patients have 6 times higher odds to achieve an SVR vs TT patients.
- Treatment completion rates were higher in SMV/SOF vs TT (SMV/SOF patients have 39 times higher treatment completion odds vs TT).
- After controlling for SVR rates, treatment discontinuation rates and other relevant variables, the cost per SVR was not statistically different between the two groups.

Conclusion:

Our analysis shows no difference in the cost per cure between the older and the early new DAA regimens. This new multi-DAA regimen dramatically reduced the non-drug components of cost/cure, but is offset by higher drug prices. Competition in the marketplace, lowering drug prices, will dramatically reduce the cost/cure and allow expansion of highly effective treatment to an increasing number of patients.