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Burden of Viral Hepatitis C in Japan: A Propensity Analysis of Patient Outcomes

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ABSTRACT

Background: Viral hepatitis C (HCV) affects 170 million patients worldwide and 2 million patients in Japan. However, many patients do not receive adequate diagnosis and treatment. The objective of the current study is to examine the burden of HCV in Japan from a patient perspective.

Methods: Using data from the 2008 and 2009 Japan National Health and Wellness Surveys, patients who reported a HCV diagnosis (n=306) were compared to a propensity-score-matched non-HCV control group (n=306) on measures of quality of life (using the SF-12v2), work productivity (WPAI questionnaire), and healthcare resource use in the past six months. All analyses applied sampling weights to project to the whole population in Japan.

Results: The propensity-matching process eliminated differences between the two comparison groups on gender, age, ethnicity, income, employment status, insurance, smoking behavior, alcohol use, exercise behavior, anxiety and depression. Relative to non-HCV controls, HCV patients reported significantly lower levels of quality of life (SF-12v2) as measured by the bodily pain (72.07 vs. 76.28), general health (44.64 vs. 48.61), and mental health (66.50 vs. 70.32) subscales (p<.05 for all). Workplace absenteeism (8.59% vs. 4.12%), overall work impairment (26.08% vs. 17.32%), and the frequency of healthcare provider visits in the past six months (14.8 vs. 9.74) were significantly higher among HCV patients relative to matched non-HCV controls (p<.05 for all).

Conclusions: The results of this study suggest that HCV can be a substantial burden on patients in terms of quality of life at both physical and mental health measures. Furthermore, the results find that HCV can be a significant economic cost driver in terms of healthcare use and lost productivity.

BACKGROUND

- Viral hepatitis C affects 170 million patients worldwide¹; in Japan, 2 million are estimated to be carrying the disease², where it is thought to be the fourth leading cause of death among males and fifth among females³.
- Despite evidence of the overall burden of HCV in the United States⁴, few such studies have assessed HCV burden in a Japanese population.
- The aim of this study was to investigate health-related quality of life, work productivity and resource use deficits directly attributable to HCV among the Japanese HCV infected population.

METHODS

- The current study uses data from the 2008 (N = 20,000) and 2009 (N = 20,573) Japan National Health and Wellness Survey (NHWS).
- The NHWS is a self-administered, Internet-based questionnaire from a nationwide sample of adults (aged 18 or older) that is stratified by gender and age to represent the demographic composition of the Japanese adult population (see Table 1).

Table 1. Comparison of the Demographic Profile of NHWS Respondents and the Japanese Adult Population

		NHWS sample size	NHWS 2008 Raw Data (not weighted)	NHWS 2008 Data (weighted)	Japan population ¹
Gender	Male	10,994	55.0%	48.3%	48.3%
	Female	9,006	45.0%	51.7%	51.7%
Age	18-39	6,200	31.0%	34.1%	34.1%
	40-64	8,400	42.0%	40.0%	40.0%
	65+	5,400	27.0%	25.9%	25.9%
Income	< ¥ 3 Million	3,057	16.8%	17.6%	21.1%
	¥ 3 - < ¥ 5 Million	5,279	29.0%	28.7%	29.0%
	¥ 5 - < ¥ 8 Million	5,244	28.8%	28.6%	27.5%
	¥ 8 Million or more	4,641	25.5%	25.1%	22.4%
Region	Hokkaido	1,005	5.0%	5.2%	4.4%
	Tohoku	957	4.8%	4.8%	7.6%
	Kanto	8,332	41.7%	41.5%	32.4%
	Chubu	2,767	13.8%	13.9%	17.0%
	Kinki	4,022	20.1%	20.0%	17.9%
	Chugoku	952	4.8%	4.7%	6.0%
	Shikoku	461	2.3%	2.4%	3.2%
	Kyushu	1,391	7.0%	7.0%	10.5%
	Okinawa	113	0.6%	0.6%	1.1%

¹Data on the Japan population was obtained from the Japan Ministry of Internal Affairs & Communications via the US Census Bureau's International Database <http://www.census.gov/ipc/www/idb/>.

- Patients who reported a HCV diagnosis (n=306) were compared to a propensity-score matched-control group (n=306):
 - The matched control group was formed by predicting group membership (diagnosed with HCV vs. not diagnosed with HCV) in a logistic regression using gender, age, marital status, education, household income, employment status, insurance coverage, tobacco smoking, alcohol consumption, body mass index (BMI), physical exercise, and comorbidity status using the Charlson Comorbidity Index (CCI).
 - Propensity score values were output from the regression and then used to match each HCV patient with a non-HCV patient based on a greedy-matching algorithm⁵.
- Outcome measures included:
 - Health-related quality of life (HRQoL) (SF-12v2)
 - Mental (MCS) and physical component summary (PCS) scores, health state utility scores (SF-6D) and eight sub-domains: physical functioning, physical role limitations, bodily pain, general health, vitality, social functioning, emotional role limitations, and mental health.
 - Work Productivity and Activity Impairment questionnaire
 - Absenteeism (% of missed work time), presenteeism (% of impairment while at work), overall work impairment (% of total impairment, combining absenteeism and presenteeism), and activity impairment (% impairment during daily activities).
 - All metrics assessed in the past seven days.
 - Healthcare resource use
 - Number of ER visits in the last 6 months.
 - Number of hospitalizations in the last 6 months.
 - Number of traditional healthcare provider (HCP) visits in the last 6 months.
- Chi-square tests (for categorical outcomes) and t-tests (for continuous outcomes) were used to compare group differences on demographic, health history and health outcome variables.
- All analyses of HRQoL, work productivity and healthcare resource use applied sampling weights.

RESULTS

- HCV patients were comparable to propensity-score matched controls on all demographic and health history variables except comorbidity burden (Charlson Comorbidity Index), which was marginally greater in the HCV group (see Tables 2 and 3).

Table 2. Demographics and Health History Differences Between HCV Patients and Unmatched Controls

Variable	Unmatched control group n = 37,371				HCV group n = 312 ¹				p
	n	Weighted n	Weighted %	SE	n	Weighted n	Weighted %	SE	
2009 study participant	20409	57732215	53.97%	±0.27%	164	422363	52.35%	±3.16%	0.6095
Female	16513	54778253	51.21%	±0.27%	91	358050	44.38%	±3.28%	0.031
Married	25864	70671081	66.07%	±0.26%	247	594575	73.70%	±3%	0.0106
College educated	19033	53874717	50.37%	±0.27%	145	378590	46.93%	±3.17%	0.2803
Employed	21678	61645927	57.63%	±0.27%	139	377740	46.82%	±3.15%	0.001
Possess national health insurance	16865	48141358	45.01%	±0.27%	184	463469	57.45%	±3.12%	0.0001
Possess social health insurance	18180	52268246	48.86%	±0.27%	96	256988	31.85%	±2.88%	<0.0001
Possess late stage elderly insurance	684	1736734	1.62%	±0.08%	19	54545	6.76%	±1.79%	0.0052
Possess other insurance	764	2150265	2.01%	±0.08%	7	17869	2.21%	±0.84%	0.8083
Unknown insurance	878	2670937	2.50%	±0.09%	6	13884	1.72%	±0.73%	0.2945
Household income: < ¥3,000,000	5929	17643449	16.49%	±0.21%	56	139426	17.28%	±2.4%	0.7434
Household income: ¥3,000,000 to ¥4,999,999	9804	27606324	25.81%	±0.24%	102	261908	32.46%	±2.99%	0.0282
Household income: ¥5,000,000 to ¥7,999,999	9671	27381323	25.60%	±0.24%	68	160119	19.85%	±2.4%	0.0198
Household income: ¥8,000,000 or over	8538	24036840	22.47%	±0.22%	69	201471	24.97%	±2.81%	0.3765
Household income: Decline to Answer	3429	10299604	9.63%	±0.17%	17	43832	5.43%	±1.44%	0.0045
Currently smoke	9512	26586186	24.85%	±0.23%	81	211002	26.15%	±2.7%	0.6315
Use alcohol	28040	78139050	73.05%	±0.25%	204	512833	63.57%	±3.12%	0.0034
Currently exercise	18185	51121006	47.79%	±0.27%	178	436636	54.12%	±3.17%	0.0473
Presence of anxiety	1766	5228942	4.89%	±0.12%	20	53997	6.69%	±1.48%	0.2243
Presence of depression	1708	5066077	4.74%	±0.11%	20	56939	7.06%	±1.53%	0.1319
Presence of HBV	288	741583	0.69%	±0.04%	20	61505	7.62%	±1.78%	0.0002
Presence of HIV/AIDS	25	74890	0.07%	±0.01%	7	20558	2.55%	±0.95%	0.0102
	Mean	SD	SE	Mean	SD	SE	p		
Age	48.15	16.04	0.08	60.14	12.56	0.75	<.0001		
BMI	22.31	3.48	0.02	22.23	3.21	0.19	0.6928		
CCI	0.31	0.73	0	2.18	3.42	0.2	<.0001		

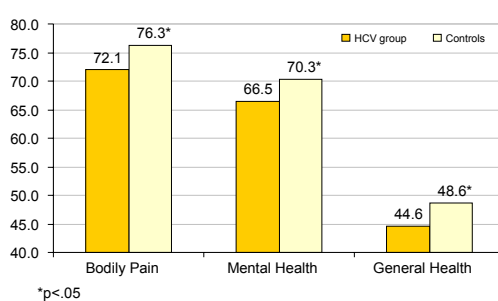
¹During propensity matching 6 HCV patients were not matched to controls and were excluded for further analyses.

Table 3. Demographics and Health History Differences Between HCV Patients and Matched Controls

Variable	Matched control group n = 306				HCV group n = 306				p
	n	Weighted n	Weighted %	SE	n	Weighted n	Weighted %	SE	
2009 study participant	157	398943	51.63%	±3.23%	162	416513	52.77%	±3.2%	0.8016
Female	86	346683	44.87%	±3.35%	86	343755	43.55%	±3.34%	0.7814
Married	248	566408	73.30%	±3.16%	243	583191	73.89%	±3.04%	0.8933
College educated	126	314148	40.66%	±3.17%	142	369682	46.84%	±3.21%	0.1713
Employed	129	326622	42.27%	±3.15%	134	362885	45.98%	±3.19%	0.4088
Possess national health insurance	194	479753	62.09%	±3.12%	178	445969	56.51%	±3.17%	0.2096
Possess social health insurance	79	214896	27.81%	±2.86%	96	256988	32.56%	±2.93%	0.2462
Possess late stage elderly insurance	22	48385	6.26%	±1.58%	19	54545	6.91%	±1.83%	0.7884
Possess other insurance	10	26237	3.40%	±1.15%	7	17869	2.26%	±0.86%	0.4305
Unknown insurance	1	3419	0.44%	±0.44%	6	13884	1.76%	±0.75%	0.1301
Household income: < ¥3,000,000	60	169867	21.98%	±2.85%	56	139426	17.67%	±2.45%	0.2521
Household income: ¥3,000,000 to ¥4,999,999	89	219719	28.44%	±2.93%	102	261908	33.18%	±3.04%	0.2617
Household income: ¥5,000,000 to ¥7,999,999	70	161563	20.91%	±2.54%	66	154415	19.56%	±2.42%	0.7019
Household income: ¥8,000,000 or over	73	180508	23.36%	±2.62%	65	189674	24.03%	±2.82%	0.8616
Household income: Decline to Answer	14	41034	5.31%	±1.52%	17	43832	5.55%	±1.48%	0.9087
Currently smoke	73	182839	23.66%	±2.68%	76	196561	24.90%	±2.69%	0.744
Use alcohol	182	423404	54.80%	±3.25%	198	495333	62.76%	±3.17%	0.0808
Currently exercise	174	408942	52.92%	±3.25%	172	419136	53.11%	±3.21%	0.9684
Presence of anxiety	7	22429	2.90%	±1.18%	14	36498	4.62%	±1.24%	0.3154
Presence of depression	8	20741	2.68%	±0.97%	14	39440	5.00%	±1.31%	0.1566
Presence of HBV	20	51816	6.71%	±1.58%	15	46703	5.92%	±1.65%	0.7299
Presence of HIV/AIDS	0	0	0.00%	–	1	3058	0.39%	±0.39%	–
Presence of HCC	0	0	0.00%	–	7	15875	3.81%	±1.77%	–
	Mean	SD	SE	Mean	SD	SE	p		
Age	62.6	11.29	0.69	60.64	12.08	0.73	0.0505		
BMI	22.32	3.37	0.2	22.23	3.19	0.19	0.7554		
CCI	1.48	1.17	0.07	1.68	1.14	0.07	0.0377		

- Relative to non-HCV controls, HCV patients reported significantly lower levels of quality of life (SF-12v2) as measured by the bodily pain, general health, and mental health domains (p<.05 for all) (see Figure 1).

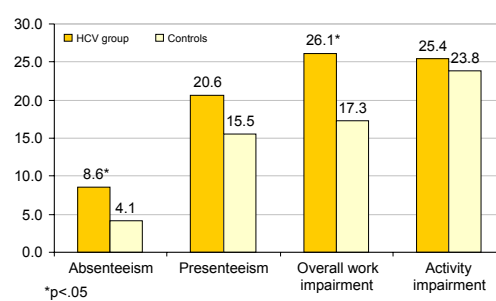
Figure 1. Quality of Life Domain Scores of HCV Patients and Matched Controls



*p<.05

- HCV patients reported significantly higher levels of absenteeism and overall work impairment (p<.05). No differences were observed for presenteeism or activity impairment (see Figure 2).

Figure 2. Levels of Work Productivity and Activity Impairment Between HCV Patients and Matched Controls



*p<.05

- HCV patients also reported significantly more healthcare provider visits in the past six months (14.80 vs. 9.74, p<.05).
- Because of the imbalance in comorbidity burden, additional analyses were rerun controlling for CCI. The results remained generally consistent:
 - HCV patients reported significantly lower levels of MCS (Adjusted means = 46.77 vs. 48.63), general health (Adjusted means = 44.35 vs. 48.43), and mental health (Adjusted means = 66.65 vs. 71.26) (all p<.05).
 - Bodily pain differences were no longer significant.
 - HCV patients reported marginally higher absenteeism (Adjusted means = 8.35% vs. 3.74%, p=.06) and marginally higher presenteeism (Adjusted means = 20.01% vs. 14.96%, p=.09) than matched controls.
 - However, HCV patients did report significantly higher overall work impairment (Adjusted means = 25.43% vs. 16.35%), emergency room visits (Adjusted means = 0.61 vs. 0.18), and physician visits (Adjusted means = 14.56 vs. 9.87) than matched controls (all p<.05). No differences were observed on activity impairment or hospitalizations.

CONCLUSIONS

- The results suggest the presence of HCV is associated with detriments in quality of life and increased levels of work productivity loss and healthcare resource use among the adult Japanese population.
- These analyses accounted for an exhaustive array of demographic and health history characteristics which are known to burden the HCV population and be associated with health outcomes.
- In sum, there is evidence that HCV places a substantial burden on the adult Japanese population.

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