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## The Burden of Illness for Patients with Viral Hepatitis C: Evidence from a National Survey in Japan

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### ABSTRACT

**Objective:** Viral hepatitis C (HCV) affects 170 million patients worldwide and 2 million patients in Japan. The objective of the current study was to examine the burden of HCV in Japan from a patient's perspective. **Methods:** Using data from the 2008 and 2009 Japan National Health and Wellness Surveys, patients who reported an HCV diagnosis ( $n = 306$ ) were compared with a propensity-score-matched control group ( $n = 306$ ) on measures of quality of life (using the Medical Outcomes Study 12-Item Short Form Survey Instrument version 2), work productivity (using the Work Productivity and Activity Impairment questionnaire), and health-care resource use. All analyses applied sampling weights to project to the population. **Results:** Prior to matching, patients with HCV had higher rates of hepatocellular carcinoma (4.88% vs. 0.02%) and cirrhosis (12.20% vs. 0.11%) than did subjects without HCV. The propensity-matching process eliminated differences between the two groups on demographics and patient

characteristics. The postmatching analysis found significantly lower levels of quality of life for patients with HCV as measured by bodily pain (72.07 vs. 76.28), general health (44.64 vs. 48.61), and mental health (66.50 vs. 70.32) (all  $P$ s < 0.05). Furthermore, compared with the matched group, the HCV group had significantly higher workplace absenteeism (8.59% vs. 4.12%), overall work impairment (26.08% vs. 17.32%), and health-care provider visits in the past 6 months (14.80 vs. 9.74). **Conclusions:** The results of this study suggest that HCV can be a substantial burden on patients in terms of quality of life in both physical and mental health measures. In addition, HCV can be a significant cost driver in terms of health-care use and lost productivity.

**Keywords:** hepatitis C, quality of life, resource use, work productivity.

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### Introduction

Viral hepatitis C (HCV), a blood-borne communicable disease, affects 170 million patients worldwide [1] and 2 million patients in Japan [2]. HCV genotype 1b, the most prevalent genotype, spread quickly in Japan in the 1930s because of the use of contaminated needles, both among injectable drug users and among those receiving blood transfusions [3]. The incidence of HCV has since decreased, but its sequelae, hepatocellular carcinoma (HCC) in particular, have become a major public health burden. Japan has the highest rate of HCC in the industrialized world [4], where it is the fourth leading cause of death among males and fifth among females [3]. Evidence suggests that HCV is related to 50% to 76% of these cases [3–5].

Apart from pathological complications, the presence of HCV has been associated with decreased health-related quality of life (HRQOL) and work productivity, and increased resource use—though most of the research has been conducted in the United States. Patients with HCV reported significantly lower

levels of HRQOL relative to healthy controls [6], especially among the domains of depression, fatigue, vitality, and social and cognitive function [7–9]. Also, in the United States, estimated direct health-care costs related to HCV amounted to \$2070 per patient per year in 1997 [10] and a median of \$6864 per patient per year during the period 2002 to 2006 [11]. The indirect costs of work productivity loss have also been shown to be associated with the presence of HCV. Specifically, absenteeism (missed work because of illness) and presenteeism (impairment while at work) have been shown to be higher among patients with HCV [12] while the overall labor force participation has been shown to be lower [13,14].

Unlike data from the United States, data on the HCV disease burden from other parts of the world, particularly Asia, are limited. Across all member countries, the World Health Organization estimates the burden of disease for a variety of conditions by calculating the number of lives lost because of premature death and disability (disease-adjusted life-years) [15]. A total of 260,000 and 229,000 years of healthy lives were lost in Southeast Asia and the Western Pacific, respectively, because of HCV [15].

**Conflicts of interest:** The National Health and Wellness Survey (NHWS) was conducted by Kantar Health. M.D. and J.S.W. are full-time employees of Kantar Health and P.L. serves as a consultant to Kantar Health. Bristol-Myers Squibb purchased access to the NHWS data set and funded the analysis and writing of this article. Y.Y. and G.J.L. are full-time employees of Bristol-Myers Squibb.

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**Table 1 – Representativeness of the 2008 Japan NHWS database.**

	NHWS 2008			Japan population* (%)
	NHWS sample size	Raw data (not weighted) (%)	Data (weighted) (%)	
Gender				
Male	10,994	55.0	48.3	48.3
Female	9,006	45.0	51.7	51.7
Age (y)				
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
Annual household income				
<¥3,000,000 (<\$36,000)	3,057	16.8	17.6	21.1
¥3,000,000–¥4,999,999 (\$36,000–<\$60,000)	5,279	29.0	28.7	29.0
¥5,000,000–¥7,999,999 (\$60,000–<\$96,000)	5,244	28.8	28.6	27.5
≥¥ 8,000,000 (≥\$96,000)	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

NHWS, The National Health and Wellness Survey.

\* Data 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/>).

Because of the limited number of inputs (number of deaths, incidence, disease duration, and disease weight), the variety of assumptions inherent in the calculation, and the scarcity of country-level (as opposed to region-level) results, the disease-adjusted life-year comparisons are crude and are difficult to use to determine the incremental effect of HCV in countries such as Japan.

Some studies have shown detriments in HRQOL (Short form 36 health survey [SF-36]) among Japanese patients with HCV compared with the general Japanese population (normative SF-36 scores) [16,17]. No study to our knowledge, however, has assessed comprehensive differences between patients with HCV and a comparable group without HCV. Direct medical costs in Japan related to viral hepatitis have been estimated (¥256 billion per year or approximately \$3.2 billion per year) [18], but more evidence is needed to ascertain the specific costs attributable to the presence of HCV. Furthermore, we are not aware of any studies published that have assessed the HCV-related indirect cost (lost productivity) among the Japanese population.

Because of the unique history and epidemiology of HCV in Japan, it would not be prudent to extrapolate health outcome findings from the United States to Japan. Population-level research using Japan data is necessary to fully understand the societal impact of HCV, including the association of the virus with HRQOL, work productivity, and resource use. It is also crucial to investigate potential confounding variables that may contribute to a relationship between HCV status and these outcomes. As such, the present study attempts to determine the incremental effect of HCV on HRQOL, work productivity loss, and resource utilization by using a large, nationally representative Japan database. The study was designed to control for the potential confounding factors across the study groups by using a propensity-score matching methodology. These results will

help provide a robust estimate of the association between HCV and health outcomes in Japan.

## Methods

### Data source

The current study used data from the 2008 (N = 20,000) and 2009 (N = 20,573) Japan National Health and Wellness Surveys (NHWS; Kantar Health, New York, NY), an annual, cross-sectional study of adults aged 18 years or older. The NHWS includes epidemiological data, treatment information, information on health risk behaviors, and health-related outcome data. Potential respondents to the NHWS are recruited through an existing Web-based consumer panel. The consumer panel recruits its panel members through opt-in emails, coregistration with panel partners, e-newsletter campaigns, banner placements, and both internal and external affiliate networks. All panelists must explicitly agree to be a panel member, register with the panel through a unique email address, and complete an in-depth demographic registration profile. All subjects provided informed consent, and the study was approved by Essex Institutional Review Board (Lebanon, NJ).

Using a stratified random sample framework (with quotas based on gender and age), the demographic composition of the 2008 and 2009 Japan NHWS samples is comparable to that of the Japanese adult population (see Table 1). Because the NHWS uses random sampling with replacement each year, a subset of 2008 respondents also completed the survey in 2009. In these instances, only 2009 data were included so as to avoid nonunique responses. Of the total sample (N = 37,683), 312 patients reported ever experiencing HCV and 37,371 respondents reported otherwise.

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