

# Hepatitis B Control in China: Knowledge and Practices among Village Doctors

## ABSTRACT

**Objectives.** To guide development of a hepatitis B control program in China, we investigated village doctors' sterilization practices, injection use, vaccination levels, and knowledge and counseling skills.

**Methods.** The head doctor from each village health station in a rural county (n = 260) completed a self-administered questionnaire.

**Results.** Of the respondents, 94.2% reported adequate sterilization of needles; however, inadequate sterilization of syringes and acupuncture needles was common. Injections were found to be frequent and profitable. Of head doctors, 16.2% reported that most infants in their villages are vaccinated against hepatitis B. There was very high knowledge of modes of hepatitis B transmission, but it was not used to formulate advice for a hypothetical carrier. Knowledge of the consequences, prevalence, and use of condoms to prevent sexual transmission was lower.

**Conclusions.** The sterilization of acupuncture needles, reuse of syringes, and frequent injections are practices that may transmit the hepatitis B virus. Research into issues of vaccine acceptance is needed to expand immunization. A review of treatment practices and better training in counseling for village doctors is suggested. (*Am J Public Health*. 1993;83:1685-1688)

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### Introduction

In the People's Republic of China, approximately 10% of the population is chronically infected with the hepatitis B virus (HBV),<sup>1</sup> with rates as high as 15% in the southern coastal provinces such as Fujian.<sup>2</sup> Approximately 25% of individuals who are chronic carriers of HBV will die of cirrhosis or primary hepatocellular carcinoma.<sup>3</sup> In Fujian, liver cancer accounts for 22.36% of cancer mortality in males and 13.75% in females.<sup>4</sup> HBV is transmitted primarily percutaneously through blood, blood products, and semen. Perinatal transmission has been estimated to account for 30% to 50% of HBV carriage in China.<sup>5</sup> The spread of HBV through medical practices such as injections<sup>6</sup> and acupuncture remains an important concern, as does intrafamilial transmission. Because the likelihood of becoming a chronic carrier decreases as age at infection increases,<sup>7</sup> prevention of infection in infancy is the top priority. The hepatitis B vaccine is both safe and effective,<sup>8-10</sup> and universal immunization of infants at birth is the most cost-effective strategy for China.<sup>11</sup> Although immunization at birth is routine in many city hospitals, efforts in rural areas are hampered by the cost of the vaccine and difficulties in transportation, storage, and training.

Our survey focused on village doctors because of the important role they play in the control of iatrogenesis and in the implementation of vaccination and health education programs at the village level. Like the "barefoot doctors" who preceded them, the village doctors are first-line health care providers in rural areas. However, in recent years there has been an effort to upgrade their training, and in many areas where the cooperative medical care system has been dismantled,

they work on a fee-for-service basis.<sup>12</sup> Our survey investigated village doctors' sterilization practices, frequency of injection use, current vaccination practices, and knowledge of hepatitis B and counseling skills.

### Methods

#### Setting

Minhou is a rural, middle-income county surrounding Fuzhou, the capital city of Fujian Province. The county is composed of 294 villages divided into 15 townships. Most villages no longer have a fully cooperative medical care system, and simple fee-for-service is common. A 1990 survey by the Minhou Epidemic Prevention Station of 1862 children aged 4 through 6 years found 14.9% to be HBsAg positive (i.e., carriers of the hepatitis B surface antigen). At present there are no data available to establish the carrier rate among adults. The Fujian Epidemic Prevention Station reports the prevalence of HBsAg positivity in the province as a whole to be 14.93%. In Minhou, as in most other rural areas in the province, hepatitis B has not been targeted as a priority health

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**Editor's Note.** See related editorial by Sidel (p 1665) in this issue.

	% Doctors Who Would Administer One or More Medications by Injection	% All Medications Used That Would Be Administered by Injection
Middle-aged farmer/thiamine deficiency	77.0	58.7
2-year-old/mumps	76.2	22.2
1-year-old/upper respiratory infection	62.3	25.3
4-year-old/anemia	53.1	24.5
2-year-old/echovirus diarrhea	43.5	26.0
Married woman/early pregnancy	42.7	23.6
Conjunctivitis	29.6	12.8

problem. Consequently our findings are probably generalizable to many similar rural areas.

### Procedure

Of the 294 villages in Minhou, 260 have village health stations. The head doctor from each health station completed a confidential, self-administered questionnaire that included items on demographics; sterilization, treatment, and counseling practices; and knowledge of HBV transmission, symptoms, and prevalence. The 100% response rate is not unusual in China, where, under the authoritarian system of government, a request for participation is generally viewed as a requirement. One hundred eighty-two doctors completed the questionnaire in one of the 15 township centers during a regular meeting and were reimbursed for transportation and a meal. Seventy-eight doctors completed the questionnaire when a data collector came to their village.

### Subjects

Most of the subjects (81.2%) were male and the mean age was 37 years. Most were middle school (56.9%) or high school (38.5%) graduates. The amount of medical training varied: 1 year, 23%; 1 to 2 years, 40%; 2 to 3 years, 19%; more than 3 years, 19%. Eighty percent of the doctors had the "village doctor certificate," which indi-

Characteristic	Level (n)	No. Injections <sup>a</sup>		Knowledge Score <sup>b</sup>	
		Mean	Statistics	Mean	Statistics
Education	Middle school (153)	4.01	$t = -1.73$	18.51	$t = -2.33$
	High school (107)	4.45	$P = .08$	19.22	$P = .02$
Medical study	≤ 2 y (162)	4.06	$t = -1.22$	18.81	$t = .13$
	> 2 y (98)	4.36	$P = .23$	18.78	$P = .90$
Age	< 38 y (137)	4.14	$t = .46$	18.39	$t = -2.90$
	> 37 y (123)	4.25	$P = .65$	19.25	$P < .01$
Village doctor certificate	No (52)	4.33	$t = .54$	17.60	$t = -4.14$
	Yes (208)	4.16	$P = .59$	19.10	$P < .01$
Years in practice	> 17 (143)	4.06	$t = -1.22$	18.46	$t = -.252$
	> 16 (117)	4.36	$P = .23$	19.21	$P = .01$
First-rate station	No (171)	4.08	$t = .66$	18.61	$t = -1.72$
	Yes (89)	4.25	$P = .51$	19.16	$P = .09$

<sup>a</sup>Total number of injections that would be administered in seven hypothetical cases.  
<sup>b</sup>From a total score of 24.

cates that they have met the national standard for medical knowledge at this level. The mean number of years in practice was 16.2. About one third (34.2%) of the doctors reported that their health station was classified as "first-rate," indicating that it has three rooms, a certified village doctor, a female practitioner, all designated essential drugs, and all national regulations for rural health care.

## Results

### Sterilization Practices

Most of the doctors (98.1%) reported never using the same needle to inject two patients without sterilizing it. However, only 23.5% reported that they were always able to adhere to the national guideline of "one person, one needle and syringe," probably because syringes are often separated from the needle and reused without sterilization. With respect to methods of sterilization, 59.6% reported sterilizing needles with a pressure cooker and 38.5% reported boiling needles. Eleven doctors (4.2%) reported boiling needles for an insufficient length of time (5–15 minutes). Only one doctor reported using a chemical method of sterilization and four (1.5%) reported washing needles with boiled water. Thus, of 260 health stations, the head doctor at 15 (5.8%) reported an inadequate method of sterilization.

Sterilization of acupuncture needles poses a much greater problem, because they are damaged when brought to high temperatures. National guidelines call for

sterilization with glutaraldehyde. Yet of the 76% of doctors who reported that acupuncture is practiced "sometimes" or "often" at their health station, 91.4% sterilized needles with alcohol, which does not reliably destroy HBV. Chemical or other methods of sterilization that do not conform to the national guidelines were reported by 8.6% of the doctors.

### Injection Frequency

Subjects were presented with the symptoms and diagnoses for seven hypothetical cases, all of which could be treated with oral medication. The seven cases were upper respiratory infection in a 1-year-old (with fever, congestion, and light cough); mumps in a 2-year-old; nutritional microcytic anemia in a 4-year-old; thiamine deficiency in a middle-aged farmer; early pregnancy in a married woman of unspecified age; echovirus-caused diarrhea in a 2-year-old; and acute conjunctivitis in a patient of unspecified age. The respondents were asked to list the medications and methods of delivery they would use.

For all seven cases together, a mean of 4.19 injections would have been administered (SD = 2.00). Table 1 presents the percentage of respondents who would administer one or more medications by injection and the percentage of all medications used that the respondents would administer by injection. There were no statistically significant bivariate associations between the total number of injections administered for all seven cases and various characteristics of the respondent

and the health station. Table 2 presents the mean number of injections that would be given for the upper and lower (or yes/no) level of each variable.

The doctors were also asked about patients' preferences for methods of drug delivery and the profitability of prescribing oral medications vs giving injections. Most (89.2%) said that patients prefer oral medications. However, when asked what type of drug delivery parents prefer for infants, the reported preferences were oral medications, 28.5%; injections, 21.5%; and both, 49.2%. These responses were grouped into two categories: oral vs injections or both. In three of the four hypothetical conditions dealing with small children, a greater percentage of doctors who felt parents preferred injections or both would administer injections than would doctors who felt parents preferred oral medications: 1-year-old with respiratory infection (68% vs 49%), 4-year-old with anemia (56% vs 47%) and 2-year-old with echovirus-caused diarrhea (46% vs 37%). This difference was statistically significant only in the first case ( $\chi^2 = 8.5, P < .01$ ). With respect to profitability, 91.9% of the subjects reported that it was more profitable for them to administer the same medication by injection than orally.

### Vaccination and HBV Testing

Only 11.2% of the doctors reported that most pregnant women in their village are tested for HBV; 60.8% reported that none are tested. The most common reason for women's not receiving the test, given by 58.5% of the doctors, was that the test cannot be performed by the township hospital (58.5%); 34.6% reported that women do not want to be tested, and only 3.1% reported that doctors do not recommend the test.

Vaccination of infants was slightly more common than prenatal testing: 16.2% of the doctors reported that most infants are vaccinated and 48.1% reported that almost none are vaccinated. Of the doctors from first-rate health stations, 64% reported that "most" or "a few" infants are vaccinated, compared with 46% of those from stations that are not first-rate ( $\chi^2 = 8.05, P = .02$ ). The reasons given for nonimmunization were unavailability of the vaccine (68.1%) and cost (24.6%).

### Knowledge of HBV

Knowledge of modes of HBV transmission was high. More than 90% knew that HBV could be transmitted by needles, acupuncture, blood products, dental

equipment, shared toothbrushes, mouth-to-mouth feeding of infants, and other contacts within the family. Similarly, 90% or more knew that HBV could not be contracted from being out in the sun or catching a chill. Although 87.3% knew that HBV could be sexually transmitted, only 38.5% believed that condoms would prevent transmission. Incorrect responses appeared to be related to confusion with the fecal-oral transmission of hepatitis A. Sixty to sixty-three percent believed that not washing hands after going to the bathroom and eating off dirty dishes could transmit HBV; 36.2% believed that hepatitis B could be contracted by eating spoiled food. Knowledge of the consequences and prevalence of HBV infection was not high: 43.1% did not know that HBV causes liver cancer, and 23.5% believed that hepatitis B is easily cured. Only 24.2% correctly identified the percentage of carriers as 10% to 30%; 41.2% underestimated the rate at 1% to 10%, and 32.3% overestimated the rate at more than 50%.

Table 2 presents the bivariate relationships between total knowledge scores (the sum of 24 true/false items) and various respondent characteristics. Although having more education, having more years in practice, having the village doctor certificate, and being older were all associated with higher knowledge scores, the actual differences in scores were very small. Together these four variables explained only 11.0% of the variation in the total knowledge score in a multiple linear regression model ( $F = 7.85, P < .01$ ), and the village doctor certificate alone accounted for 6.2%.

To determine how knowledge of hepatitis B might be put into practice, we asked the respondents to write down the advice they would give to an HBV carrier. Although our intent was to elicit advice to an asymptomatic carrier, the responses suggest that the question was interpreted to refer to a person with acute HBV infection. Table 3 presents the responses given by 5% or more of the respondents, divided into two categories: those that relate to preventing the transmission of HBV to others and those that relate to improving the health of the carrier/patient. Because of the possible misinterpretation, we restrict our comments to the former subset of responses.

Although the true/false items revealed high knowledge of the modes of transmission of HBV, this knowledge was not employed when formulating advice. The most effective measure, vaccination, was men-

TABLE 3—Advice Given to a Hypothetical Hepatitis B Carrier/Patient by 5% or More of Respondents

Advice	%
To prevent transmission	
Separate/do not share toothbrush, eating utensils	84.6
Sterilize, use chlorine bleach for excrement	36.2
Do not go to public places (bathroom, theater, restaurant)	21.9
Vaccinate against hepatitis B virus	8.5
Wash hands after going to the bathroom	5.0
To improve health of carrier/patient	
See doctor/have blood tests/get proper treatment	47.7
Rest/avoid overworking	33.8
Pay attention to nutrition	25.8
Do not eat fatty foods	6.9
Abstain from alcohol or tobacco	6.9
Exercise	5.8

tioned by only 8.5% of the respondents. Furthermore, only nine doctors (3.5%) would caution a carrier against donating blood. One said that women carriers should not become pregnant, one mentioned use of condoms, and four cautioned against sexual activity. The high percentage of respondents (36.2%) who suggested sterilizing excrement again suggests confusion of hepatitis B with hepatitis A.

### Discussion

Our self-report data indicate widespread inadequacy of sterilization of acupuncture needles and syringes, but not hypodermic needles. However, because acupuncture is rarely practiced on young children, it may not contribute greatly to the rate of chronic HBV infection. Similarly, the contribution of syringe reuse to total HBV carriage is unknown. However, studies demonstrating the resilience of HBV and the facility with which contamination can occur<sup>13,14</sup> suggest that a much more thorough, observational study of medical practices in rural areas is needed. Needles, for example, can easily be contaminated after sterilization.

Our findings of frequent injection use corroborate previous observations in both China<sup>15,16</sup> and other developing countries.<sup>17</sup> The use of injections was not associated with specific characteristics of the doctor or health station; however, doctors were more likely to treat children with injections if they believed the parents

preferred injections. Efforts to reduce the use of injections must focus simultaneously on patients' expectations and providers' practices to address the complex interaction that shapes treatment practices.

Reported levels of hepatitis B vaccination were higher than expected: 16.2% of the village doctors reported that most infants are vaccinated. China is currently in the process of expanding production of the hepatitis B vaccine to increase availability and reduce costs. If these efforts are successful, it is likely that many more parents will be willing to purchase the vaccine for their newborns. Further research into the methods of vaccine delivery and parental knowledge and attitudes is needed for the expansion of immunization coverage.

Doctors at the village level appear to have a good understanding of the transmission of hepatitis B, although there is some confusion with hepatitis A. Not surprisingly, doctors who have not obtained the village doctor certificate appear to have the greatest need for further education about hepatitis B. Otherwise, we did not find any other predictors of practical significance. The lack of useful advice given to a hypothetical carrier/patient suggests that information on HBV has been memorized but not put into practice.

Village doctors are trained through study and practicum, primarily at the township level. Although they participate in regular in-service training, there is little supervision of their activities in their own villages. Our findings suggest that although this system has been reasonably successful with respect to knowledge of hepatitis B, it

has not adequately addressed the area of practice. Further training in counseling of HBV carriers and a review of treatment practices should be conducted in conjunction with hepatitis B control efforts. □

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