衞生防護中心
Centre for Health Protection

# Scientific Committee on Vaccine Preventable Diseases

## Hepatitis A immunisation in high risk groups and outbreak situations

## I. Purpose

The purpose of this paper is to provide an update and proposed recommendation on immunisation for hepatitis A in high risk groups and outbreak situations.

## II. Background

2. Prior to the establishment of Centre for Health Protection (CHP), the then Scientific Working Group on Viral Hepatitis Prevention considered in 1997 that the role of mass immunisation for hepatitis A immunisation remained to be demonstrated and recommended that hepatitis A vaccination strategy be reviewed from time to time in line with international and local developments. The former Advisory Committee on Immunization has adopted this same position. It recommended that travelers visiting highly endemic places and food handlers might consider receiving hepatitis A vaccination for personal protection and minimization of the risk of spread respectively.

3. The Scientific Committee on Enteric Infections and Foodborne diseases (SCEIFD) has also studied the current local epidemiology of hepatitis A in their recent meetings in September 2005 & January 2006. Changes to the local epidemiology of hepatitis A was addressed in the discussion paper, noting that Hong Kong has shifted from an area of high endemicity to low/intermediate endemicity.[1] Data showed that Hong Kong had a declining incidence of hepatitis A over the past two decades and there was an increase in the age of the reported

cases. There was also right-shifting of the seroprevalence rates across the age cohorts. [2]

## III. Immunisation

4. Both active and passive immunisations are effective in preventing and controlling hepatitis A infection. Passive immunisation with human immunoglobulin is effective in providing short term (1 to 2 months) and long term (3 to 5 months) pre-exposure prophylaxis and is effective for post-exposure prophylaxis if given within 14 days of exposure.[3] Persons who have received a dose of hepatitis A vaccine at least 2 weeks before exposure to hepatitis A virus (HAV) do not need immunoglobulin.

5. Currently, there are several inactivated vaccines licensed and commercially available for active immunisation against hepatitis A. The vaccines are given parenterally as a 2-dose series, 6 to 18 months apart. None of the vaccines are licensed for use in those younger than one year. These vaccines have been demonstrated to be highly immunogenic. Nearly 100% adults will develop protective levels of antibody within one month after a single dose of vaccine. Field studies of protective efficacy have found cumulative rates of 95 to 100%. Kinetic models of antibody decay found that the duration of protection is likely to be at least 20 years, and possibly lifelong.[4] Universal childhood hepatitis A vaccination for children aged ≥ 1 year has recently been implemented in the US.[5] A combined vaccine for hepatitis A and hepatitis B is also available.

## IV. Overseas recommendations and strategies on different population groups

6. Recommendations on immunisation for hepatitis A from various authorities and countries are summarized in Annex I. Discussion on the various population groups are highlighted below:

### A. Persons with increased risk for severe adverse consequences

Persons with chronic liver diseases

7. Although not being at higher risk for acquiring hepatitis A, patients with chronic liver disease patients, including those with chronic hepatitis B or C infections, were identified as a risk group for developing fulminant hepatitic failure if super-infected with hepatitis A.[6,7] A review concluded that mortality due to hepatitis A infection in patients with preexisting chronic hepatitis B infection was significantly higher (5.6 to 29.0 times) and so was that in patients with other chronic liver diseases (23.0 times).[8] Increased morbidity was also observed in these groups.

8. Vaccination for patients with chronic liver diseases, including hepatitis B carriers were found to be both effective and safe. [9-11] Recommendation to this group is well accepted among various developed countries.[5,12-15]

## B. Groups at increased risk for acquiring hepatitis A

Persons with haemophilia or receiving plasma-derived replacement clotting factors

9. Hepatitis A outbreaks among haemophiliacs transfused with factors VIII/IX concentrates treated with the solvent/detergent (S/D) method have been reported previously. Clotting factors concentrates manufactured from large pool may be contaminated by HAV, even from a single highly viremic blood donor. The S/D procedure for virus inactivation in preparing the blood products has been shown to be ineffective against HAV and it has been proven that haemophiliacs treated with these products are at risk of acquiring HAV infection. [16,17]

10. Recommendation to vaccinate against HAV has been given to those persons with clotting factor disorders or haemophilia receiving plasma-derived replacement clotting factors in various countries.5,12-15 Nevertheless cases of hepatitis A in haemophiliacs due to the above have greatly reduced since the inactivation method has been improved through the addiction of terminal heating treatment, that is able to inactivate HAV, and the more frequent use of safer products made through genetic recombination techniques.[17]

Travelers to endemic areas

11. International travelers from low endemic countries traveling to high endemic areas are at increased risk of acquiring hepatitis A with an estimated incidence of 3 cases per 1,000 travelers per month of stay in developing countries, with up to 20 cases per 1,000 persons during Peace Corps-type missions.[16,18] The risk might be higher among travelers staying in areas with poor hygienic conditions, varies according to the region and the length of stay, and appears to be increased even among travelers who reported observing protective measures and staying in the urban areas or luxury hotels.[5]

12. Recommendation to vaccinate travelers to endemic countries is a common consensus among developed countries.[5,12-15]

Laboratory workers

13. In general, the chance of acquiring hepatitis A in the laboratories is considered as rare. A 2-year nationwide historical prospective study in Israel found that the standardized incidence ratio (SIR) was 3.75 among the group "therapist and medical technicians" with a total of 18 cases.[19] Nevertheless, vaccination against HAV is recommended for persons who work with HAV in a

research laboratory setting in some countries like the US and Canada.[5,12,13,15]

Zoo-keeper, veterinarians and researchers who handle nonhuman primates

14. Various monkey species are susceptible to HAV and it is well documented that the natural transmission of human HAV from experimentally infected animals to humans is possible. On the other hand, the susceptibility of humans to true simian HAV strains needed further exploration.[3,20] Vaccination to this group of personnel who handle nonhuman primates is generally recommended in overseas countires.[3, 5,12,13,15]

Homosexually active men

15. Hepatitis A outbreaks among men who have sex with men (MSM) have been reported in some countries. One study in the US found that case MSM patients reported contact with a person who had hepatitis A had an odds ratio of 6.15; 95% CI, 1.04–48.02. 21 Another study in Denmark revealed that high risk behaviours among the MSM cases as having sex with casual partners (OR 5.6, 95% CI 1.2-26.9) and having sex in gay saunas (OR 4.2, 95% CI 1.5-11.5). On the other hand, sex at private homes appeared to be protective (OR 0.2, 95% CI 0.1-0.7).22 The risk of acquiring hepatitis A is considered not linked to the homosexuality itself but to oral-anal sexual practices and sexual promiscuity.16 The emphasis on vaccinating MSM is placed on the high risk life style, i.e. engagement in oral-anal and unprotected sexual practices, and sexual promiscuity, rather than the homosexuality per se.[12]

Injecting drug users

16. Outbreaks of hepatitis A among injecting drug users have been reported worldwide.[23,24] A case-control study in Italy revealed that the only associated risk factor was contact (not related to injecting practices) with a jaundiced person (odds ratio: 5.8; 95% CI: 1.3–29.9).[24] Another case–control study in the UK showed that cases were more likely to report recipient sharing of needles/syringes (OR: 8.27, 95% CI: 1.68–40.57), and to have had injecting contact with someone who was jaundice (OR: 29.4, 95% CI: 3.18–271.44).[25] Cases were also more likely to report not washing their hands after using the toilet (OR:12.9, 95% CI: 1.58–105.89) or before preparing food (OR: 4.0, 95% CI: 1.01–15.8), and less likely to have washed their hands prior to preparing drugs (OR: 10.67, 95% CI: 2.14–53.07). A number of developed countries recommend hepatitis A vaccination for injecting drug users.[5,12-15]

HIV positive individuals

17. HIV infected persons may present with a prolonged duration and increased level of HAV viremia and more serious HAV-related liver abnormalities.[26] HAV load was higher in HIV-1 infected than in non–HIV infected patients ($P<0.001$). Duration of viremia in HIV-1 infected patients (median, 53 days) was significantly ($P<0.05$) longer than in non–HIV infected patients (median, 22 days). HIV-1 infected patients had lower elevations in alanine aminotransferase levels than did non–HIV infected patients ($P <0.01$)

but had higher elevations in alkaline phosphatase levels than did non–HIV-infected patients (P <0.001). Moreover, the increased duration of HAV viremia might cause a long-lasting outbreak of HAV infection in HIV-1–infected homosexual men.

18. On the other hand, the course of HIV infection may also be worsened by HAV infection.[27] Cases reports suggested that HAV could induce increased and prolonged HIV replication in vivo, which might not return to baseline following resumption of antiretroviral therapy.

19. Studies showed that hepatitis A vaccines were both safe and efficacious on HIV positive individuals.[27-30]

## C. Risk for hepatitis A in other groups and settings

Child care centres

20. The increased risk of contracting hepatitis A in child care centre staff is not well illustrated in the literature. The SIR was found to be 5.47 in a study in Israel in 1993-4.[19] However results from recent studies in the US and Canada were inconclusive. Higher attack rates were observed but confounding factors due to individual higher endmicity among the subpopulations could not be ruled out.[5,15,16,31,32]

Custodial institutions

21. Prisoners are believed to be high risk groups because of life style factors (IV drug addict, unsafe sex).[16] A higher seroprevalence among prisoners is associated with poor socioeconomic conditions among the prisoners. And prisons can be considered an environment in which many risk factors for hepatitis A join.

22. Vaccination against HAV is recommended for those who are at higher risk of contracting the disease or are prone to more severe outcomes, rather than as a routine to all prisoners.[33,34] Staff at the facilities are not considered as having increased risk of exposure due to their occupation.[35]

Institutions for persons with developmental disabilities

23. In the US previously, institutions for persons with developmental disabilities were sites of high HAV endemicity. However, as fewer children have been institutionalized and conditions within these institutions have improved, HAV incidence and prevalence have decreased significantly.[5]

24. The recommendation for hepatitis A vaccination for people and staff of disabled institutions is controversial among different countries.[5,12-15]

Sewage workers

25. Hepatitis A vaccination is recommended for sewage workers in

Australia and in the UK (those who are at high likelihood of regular direct contact with raw sewage).[13-15] It had been assumed that sewage workers are at increased risk of acquiring the infection than the general population because hepatitis A virus is excreted in stool and is likely to be encountered in water contaminated with faecal matters. There was a case report of three patients who were sewage workers possibly acquired hepatitis A infection in Canada.[36] Conflicting result was demonstrated by a 2-year nationwide historical prospective study in Israel in which there was no increased risk for sewage workers (SIR: 0.88) and stated that lower socioeconomic class might had been a confounding factor for this group.[19]

26. The evidence for vaccinating sewage workers for protecting the individuals or the community is not prominent.[5,16,37-39]

Food handlers

27. Food handlers could potentially play a dual role in the transmission chain of hepatitis A because (i) they can get infected with constant exposure to some contaminated food, or (ii) once they are infected, they can be the source of outbreaks.

28. In a nationwide historical prospective study of reported cases of hepatitis A in Israel from 1993 to 1994, food industry workers were found to have a standardized incident ratio (SIR) of 5.41 to other occupations.[19] However there were only nine persons in that study. A review stated that most food handlers were not at higher risk of hepatitis A because of their occupation, but rather they were mainly from the younger age group and lower socioeconomic class, who have a higher incidence of hepatitis A than does the rest of the population.[40]

29. The recommendations for vaccinating food handlers are more diverse and indistinct among various countries.[5,12-15] Vaccinating food handlers in hospitals was highlighted since they can initiate outbreaks among vulnerable populations if infected with HAV.[35]

## V. Local data among different population groups

30. Although local data is lacking, it is evident that super-infection of hepatitis A in hepatitis B carriers are at higher risk of mortality and morbidity. In view of the high endemicity of chronic hepatitis B infection in Hong Kong, local researchers have demonstrated the use of hepatitis A vaccines in Chinese patients with chronic hepatitis B infection was both efficacious and safe.[10,11]

31. On the other hand, local data is patchy regarding the risk of contracting hepatitis A among some of the population groups mentioned in previous sections.

32. A local study on the risk factors for hepatitis A in Hong Kong revealed that many patients had recent history of intake of shellfish (57%) or had traveled to endemic areas such as southern China and Thailand (14%) or to both (7%).[41] However, case-control studies are better to demonstrating an epidemiological association as both intake of shellfish and travel to these endemic areas are common practices for local people.

33. Another recent study showed that some demographic groups were associated with positive serology, which include age above 30, born outside Hong Kong and labour work people.[42]

34. Locally, there has not been any hepatitis A outbreak among MSM reported to the Department of Health for the past 10 years. There is no local data on the risk of hepatitis A infection among MSM in comparison with the general population. In Hong Kong, data is lacking concerning hepatitis A seroprevalence among injecting drug users as compared with the general population.

35. Moreover, there are no local serological survey results on the seroprevalence of hepatitis A among MSM, injecting drug users, child care centre staff, residents of custodial care and disabled institutions, and sewage workers.

36. Amongst statutory notifications of hepatitis A, less than 2% of cases reported from 2003 to 2004 belonged to each of the following groups: staff and attendees/residents of child care centres, kindergarten, staff and institutions; health care workers; food handlers; and patients with chronic liver diseases.[43]

## VI. Outbreak situations

37. Both passive immunisation with immunoglobulin (IG) and active immunisation with hepatitis A vaccines, or a combination of two have been featured in the control of hepatitis A infection in post-exposure prophylaxis in outbreaks.[3-5,12-15]

38. There have been no trials directly comparing the efficacy of hepatitis A vaccine alone and IG in the management of contacts of cases. IG is preferred when protection is required in a shorter time than it takes for a protective antibody response to the vaccine. Vaccine and IG may be given at the same time but in different sites when both rapid and prolonged protection is required. A single dose of monovalent hepatitis A vaccine will provide more rapid protection than the combined preparations where more than one dose is required.[13]

39. Post-exposure prophylaxis with aggressive use of

immunoglobulin has been shown to be effective in limiting transmission to the close contacts in outbreaks in closed institutions.[14] It should be given within 2 weeks of exposure. It has the advantage of being able to be given to infants less than one year old and to immunocompromised individuals or people contraindicated to HAV vaccine.

40. Although there are controversies on the use of hepatitis A vaccines in outbreak control due to limited studies, reports had shown success when the vaccine was started early in the course of an outbreak and provided that high vaccine coverage could be achieved.[5,44-46] HAV vaccines are recommended by the UK, Australia and Canada in postexposure prophylaxis in outbreak situations but not licensed for use as post-exposure prophylaxis in the US. Moreover, HAV vaccine is increasingly being used for post-exposure prophylaxis of contacts in place of immunoglobulin in the UK, because of concerns about use of human blood products and transmission of prions and other agents.[15]

41. In most overseas countries with low endemicity of hepatitis A, post-exposure prophylaxis with either IG or hepatitis A vaccine is generally recommended for close contacts of hepatitis A patients, as well as outbreaks in closed institutions or populations, like MSM and injection drug users. On the other hand, hepatitis A vaccine and immunoglobulin are not indicated for contacts in the usual office, school or factory settings.[5]

42. There was some local experience with immunoglobulin in outbreak control which was shown to be successful in an outbreak of hepatitis A affecting both patients and staff in a mental hospital in 1999/2000.[47]

43. On the other hand, the role for routine vaccination/IG administration in sporadic cases of hepatitis A as a standard public health practice is much less strong. According to local surveillance data from 2003 to 2005, only three cases out of a total of 290 notified hepatitis A cases might be preventable if post-exposure prophylaxis had been given.[43]

## VII. Recommendations for hepatitis A vaccination as pre-exposure prophylaxis

44. The following logic is adopted for framing recommendations in connection with hepatitis A vaccination in different population groups. Firstly, persons who suffer from medical conditions which predispose them to more severe morbidity and mortality from hepatitis A infection are recommended to have hepatitis A vaccination for personal protection. Secondly, groups for which there is local evidence of higher infection risk (with or without evidence from overseas studies) are recommended to have hepatitis A vaccination for personal protection. Thirdly, for groups which have good overseas evidence for higher infection risk but lack local substantive data, we recommend relevant

local studies be conducted to provide the needed local data.

45. Based on the above, the following groups are recommended to have hepatitis A vaccination for personal protection:

Persons with chronic liver disease
Persons with clotting factors disorders receiving plasma-derived replacement clotting factors
Travelers to endemic areas

46. Local studies are called for the following groups to better characterize the recommendation for hepatitis A vaccination:

Laboratory workers who perform research work on HAV or research personnel who handle non-human primates
Persons engaged in life-style risks of infection (e.g., injecting drug use and MSM)
Persons who are HIV positive
Residents and staff in institutions for persons with developmental disabilities
Food handlers

47. The role of mass immunisation for hepatitis A immunisation (e.g., inclusion of hepatitis A vaccine into the local routine childhood immunisation programme) remains to be demonstrated by local health economic analysis such as cost-effectiveness studies.

## VIII. Recommendations for post-exposure prophylaxis in outbreak situation

48. Depending on the epidemiological profile and setting of the outbreak, post-exposure prophylaxis can be recommended when a hepatitis A outbreak occurs in a closed institution. Either hepatitis A vaccine or immunoglobulin can be considered as appropriate to the outbreak situation.

49. The effectiveness of routine post-exposure prophylaxis for contacts of local sporadic hepatitis A cases as a public health measure is not proven, but this may be recommended on ground of personal protection. Observance of hygienic measures, especially those pertaining to oral-faecal transmission of hepatitis A, needs to be emphasised for contacts of hepatitis A patients.

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## Reference:


1. Scientific Committee on Enteric Infections and Foodborne disease, Centre for Health Protection, Department of Health, Hong Kong. Changing Epidemiology of Hepatitis A in Hong Kong and Implications on Control Strategies.

3. Department of Communicable Disease Surveillance and Response, World Health Organization. 2000. Hepatitis A. WHO/CDS/CSR/EDC/2000.7

4. World Health Organization. Hepatitis A vaccines: WHO position paper. *Weekly Epidemiology Record*. 2000;75: 38-44

5. Centers for Disease Control and Prevention, US. Advisory Committee on Immunization Practices Membership List. Prevention of Hepatitis A Through Active or Passive Immunization: Recommendations of the Advisory Committee on Immunization Practices. MMWR 2006;55 (RR-7): 1-23

6. Reiss G, Keeffe EB. Review article: hepatitis vaccination in patients with chronic liver disease. Aliment Pharmacol Ther 2004;19:715-727.

7. Almasio PL, Amoroso P. HAV infection in chronic liver disease: a rationale for vaccination. Vaccine 2003;21:2228-41.

8. Keeffe EB. Acute hepatitis A and B in patients with chronic liver disease: prevention through vaccination. Am J Med 2005;118(10A):21S-27S.

9. Keeffe EB, Iwarson S, McMahon BJ, Lindsay KL, Koff RS, Manns M, Baumgarten R, Wiese M, Fourneau M, Safary A, Clemens R, Krause DS. Safety and immunogenicity of hepatitis A vaccine in patients with chronic liver disease. Hepatology 1998;27:881-6

10. Tsang SWC, Sung JJY. Inactivated hepatitis A vaccine in Chinese patients with chronic hepatitis B infection. Aliment Pharmacol Ther 1999;13:1445-1449.

11. Sung JJY. Epidemiology of hepatitis A in Asia and experience with the HAV vaccine in Hong Kong. J Viral Hepat 2000;7(suppl 1):27-28.

12. Health Canada, Canada. Immunization Guide 6th edition. 2002

13. Department of Health, UK. Immunisation against Infectious Disease: Chapter 18: Hepatitis A (replacement chapter, DRAFT). November 2005. Accessed on March 20, 2006 at http://www.dh.gov.uk/assetRoot/04/12/32/31/04123231.pdf

14. National Health & Medical Research Council, Australia. The Australian Immunisation Handbook. 8th edition. 2003;192-202.

15. Crowcroft NS, Walsh B, Davison KL, Gungabissoon U; PHLS Advisory Committee on Vaccination and Immunisation. Guidelines for the control of hepatitis A virus infection. Commun Dis Public Health 2001;4:213-27

16. Franco E, Giambi C, Ialacci R, Coppola RC, Zanetti AR. Risk groups for hepatitis A virus infection. Vaccine 2003;21:2224-33.

17. Mah MW, Royce RA, Rathouz PJ, et al. Prevalence of hepatitis A antibodies in hemophiliacs: preliminary results from the Southeastern Delta Hepatitis Study. Vox Sang 1994;67(suppl 1):21-2

18. Steffen R. Changing travel-related global epidemiology of hepatitis A. Am J Med 2005;118(10A):46S-49S.

19. Lerman Y, Chodik G, Aloni H, Ribak J, Ashkenazi S. Occupations at increased risk of hepatitis A: a 2-year nationwide historical prospective study. Am J Epidemiol. 1999;150:312-20.

20. Robertson BH. Viral hepatitis and primates: historical and molecular analysis of human and nonhuman primate hepatitis A, B, and the GB-related viruses. J Viral Hepat 2001;8:233-42

21. Cotter SM, Sansom S, Long T, Koch E, Kellerman S, Smith F, Averhoff F, Bell BP. Outbreak of hepatitis A among men who have sex with men: implications for hepatitis A vaccination strategies. J Infect Dis 2003;18:1235-40

22. Mazick A, Howitz M, Rex S, Jensen IP, Weis N, Katzenstein TL, Haff J, Molbak K. Hepatitis A outbreak among MSM linked to casual sex and gay saunas in Copenhagen, Denmark. Euro Surveill 2005;10:111-4

23. Perrett K, Granerod J, Crowcroft N, Carlisle R. Changing epidemiology of hepatitis A: should we be doing more to vaccinate injecting drug users? Commun Dis Public Health 2003;6:97-100

24. Spada E, Genovese D, Tosti ME, Mariano A, Cuccuini M, Proietti L, Giuli CD, Lavagna A, Crapa GE, Morace G, Taffon S, Mele A, Rezza G,

Rapicetta M. An outbreak of hepatitis A virus infection with a high case-fatality rate among injecting drug users. J Hepatol 2005;43:958-64

25. Roy K, Howie H, Sweeney C, Parry J, Molyneaux P, Goldberg D, Taylor A. Hepatitis A virus and injecting drug misuse in Aberdeen, Scotland: a case-control study. J Viral Hepat 2004 May;11(3):277-82

26. Ida S, Tachikawa N, Nakajima A, Daikoku M, Yano M, Kikuchi Y, Yasuoka A, Kimura S, Oka S. Influence of human immunodeficiency virus type 1 infection on acute hepatitis A virus infection. Clin Infect 2002;34:379-85

27. Laurence JC. Hepatitis A and B immunizations of individuals infected with human immunodeficiency virus. Am J Med. 2005;118(Suppl 10A):75S-83S

28. Weissman S, Feucht C, Moore BA. Response to hepatitis A vaccine in HIV-positive patients. J Viral Hepat 2006;13:81-6.

29. Shire NJ, Welge JA, Sherman KE. Efficacy of inactivated hepatitis A vaccine in HIV-infected patients: a hierarchical bayesian meta-analysis. Vaccine 2006 16;24:272-9

30. Kaplan JE, Masur H, Holmes KK. 2002 USPHS/IDSA guidelines for the prevention of opportunistic infections in persons infected with human immunodeficiency virus. MMWR 2002;51:RR8

31. Muecke CJ, Beliveau C, Rahme E, Soto JC, Gyorkos TW. Hepatitis A seroprevalence and risk factors among day-care educators. Clin Invest Med. 2004;27:259-64

32. Venczel LV, Desai MM, Vertz PD, England B, Hutin YJ, Shapiro CN, Bell BP. The role of child care in a community-wide outbreak of hepatitis A. Pediatrics 2001;108:E78

33. Centers for Disease Control and Prevention, US. Prevention and Control of Infections with Hepatitis Viruses in Correctional Settings. MMWR 2003;52: RR1

34. Federal Bureau of Prisons, US. Federal Bureau of Prisons - Clinical Practice Guidelines: Guidelines for the Prevention and Treatment of Viral Hepatitis. 2005 October.

35. Keeffe EB. Occupational Risk for Hepatitis A: A Literature-based Analysis. J Clin Gastroenterol 2004;38:440-448

36. De Serres G, Laliberte D. Hepatitis A among workers from a waste water treatment plant during a small community outbreak. Occup Environ Med 1997;54:60-2.

37. Hofmann F, Wehrle G, Berthold H, Koster D. Hepatitis A as an occupational hazard. Vaccine 1992;10(Suppl 1):S82-4

38. Glas C, Hotz P, Steffen R. Hepatitis A in workers exposed to sewage: a systematic review. Occup Environ Med 2001;58:762-8.

39. Tooher R, Griffin T, Shute E, Maddern G. Vaccinations for waste-handling workers. A review of the literature. Waste Manag Res. 2005;23:79-86.

40. Fiore AE. Hepatitis A Transmitted by Food. Clin Infect Dis 2004;38:705-715

41. Chau TN, Lai ST, Lai JY, Yuen H. Acute viral hepatitis in Hong Kong: a study of recent incidences. HKMJ 1997; 3:261-6.

42. Wong KH, Liu YM, Ng PSP, Young BWY, Lee SS. Epidemiology of Hepatitis A and Hepatitis E Infection and Their Determinants in Adult Chinese Community in Hong Kong. J Med Virol 2004;72:538-544

43. Surveillance and Epidemiology Branch, Centre for Health Protection. Unpublished data.

44. National Advisory Committee on Immunization (NACI), Canada. Supplementary Statement on Hepatitis A Vaccine (ACS-4). CCDR 2000;26:12-18

45. Craig AS, Sockwell DC, Schaffner W, Moore WL Jr, Skinner JT, Williams IT, Shaw FE, Shapiro CN, Bell BP. Use of hepatitis A vaccine in a community-wide outbreak of hepatitis A. Clin Infect Dis 1998;27:531-5

46. Zamir C, Rishpon S, Zamir D, Leventhal A, Rimon N, Ben-Porath E. Control of a community-wide outbreak of hepatitis A by mass vaccination with inactivated hepatitis A vaccine. Eur J Clin Microbiol Infect Dis 2001;20:185-7

47. Lam MK, Kwan LC, Tham MK. Review of Notifiable Infectious Diseases in 1999. Public Health and Epidemiology Bulletin 2000;9:16-22.

Annex I

## Recommendation on hepatitis A immunisation among different authorities and countries

| Authority / Country | Recommendation on hepatitis A immunisation |
|---|---|
| WHO[4] | *A) Vaccination may be recommended for the following high risk groups in countries with low endemicity:*<br>homosexual men<br>injection-drug users<br>travelers to high risk areas<br>certain ethnic or religious groups<br>Remarks: In *highly endemic areas*, exposure to HAV is almost universal before the age of 10 years and HAV is a minor public health problem.<br>*B) Outbreak situation:*<br>depend on the epidemiology of hepatitis A in the community, the feasibility of rapidly implementing a widespread vaccination programme<br>most successful in small, self-contained communities, when vaccination is started early in the course of outbreak, and when high coverage of multiple-age cohorts is achieved. |
| USA [5] | *(A) Pre-exposure protection against HAV infection:*<br>*(i) Children*<br>All children should receive hepatitis A vaccine at age 1 year (i.e., 12-23 months).<br>Continue existing hepatitis A vaccination programs for children aged 2–18 years in some communities with new efforts focused on routine vaccination of children aged 1 year.<br>In areas without existing hepatitis A vaccination programs, catch-up vaccination of unvaccinated children aged 2–18 years can be considered.<br>*(ii) Persons at increased risk for hepatitis A infection*<br>Persons traveling to or working in countries that have high or intermediate endemicity of infection.<br>Men who have sex with men (MSM) |

| Authority / Country | Recommendation on hepatitis A immunisation |
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| | Users of injection and noninjection drugs<br>Persons who have occupational risk for infection<br>Persons who have clotting-factor disorders<br>*(iii) Persons with chronic liver disease*<br>*(B) Outbreak situations*<br>General considerations:<br>(i) Hepatitis A vaccination may be considered depending on:<br>characteristics of hepatitis A epidemiology in the community<br>existing vaccination programme<br>feasibility of rapidly vaccinating the target population, and<br>programme cost<br>(ii) Immunoglobulin (IG) should be administered to previously unvaccinated persons<br>Specific situations:<br>(iii) Close personal contact<br>IG given to household and sexual contacts<br>IG and vaccine to sharers of illicit drugs<br>(iv) Child care centres<br>IG to all previously unvaccinated staff and attendees of child care centres or homes if (1) one or more of hepatitis A are recognized in children or employees or (2) cases are recognized in two or more households of centre attendees<br>IG to classroom contacts of index patient ONLY if children wear diapers<br>IG considered for household members when children in diapers<br>Vaccination may be administered simultaneously<br>(v) Common-source exposure<br>IG given to other food handlers at the same establishment if one food handler was diagnosed hepatitis A |

| Authority / Country | Recommendation on hepatitis A immunisation |
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| | IG to patrons typically NOT indicated but may be considered if (1) during the time when the food handler was likely to be infectious, the food handler both directly handled uncooked foods or foods after cooking and had diarrhoea or poor hygiene practices, and (2) patrons can be identified and treated ≤2 weeks after the exposure<br>(vi) Schools, hospitals and work settings<br>IG not routinely indicated when a single case occurs in an elementary or secondary school, an office, or other work settings, and the source of infection is outside the school or work setting<br>IG should not be routinely administered to hospital staff when a hepatitis A patient is admitted<br>IG administered to persons who have close contact with index patients if epidemiologic investigation indicates HAV transmission has occurred among students in a school or among patients or between patients and staff in a hospital |
| Canada[12] | *(A) People who should be routinely vaccinated or considered for vaccination*<br>Residents of communities that have high endemic rates of HAV<br>*(B) Individuals at increased risk of infection*<br>Travelers to countries where hepatitis A is endemic<br>Members of armed forces, emergency relief workers and others likely to be posted abroad at short notice to areas with high rates of HAV infection<br>People with life-style risks of infection, e.g., oral or intravenous illicit drug users and men having sexual contact with men<br>People with hemophilia A or B receiving plasma-derived replacement clotting factors<br>Zoo-keepers, veterinarians and researchers who handle non-human primates<br>Workers involved in research on hepatitis A virus or production of hepatitis A vaccine who may be exposed to HAV<br>*(C) People with chronic liver disease*<br>*(D) Outbreaks situation*<br>Residents of communities that are at risk of HAV outbreaks<br>Residents and staff of institutions for the developmentally challenged in which there is evidence of sustained HAV transmission<br>Inmates of correctional facilities in which there is evidence of sustained HAV transmission |

| Authority / Country | Recommendation on hepatitis A immunisation |
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| | *(E) Any persons who wishes to decrease his or her risk of acquiring HAV* |
| UK[13,15] | *(A) Groups recommended to receive pre-exposure vaccination*<br>Travellers and those going to reside abroad<br>Patients with chronic liver disease<br>Patients with haemophilia<br>Men who have sex with men (MSM)<br>Injecting drug users<br>Individuals at occupational risk:<br>(i) Laboratory workers<br>(ii) Staff of large residential institutions<br>(iii) Sewerage workers<br>(iv) Workers with primates<br>Hepatitis A vaccination may be considered under certain circumstances for:<br>(i) Food packagers and handlers<br>(ii) Staff in day-care facilities<br>(iii) Healthcare workers<br>*(B) Post-exposure immunisation*<br>Contacts of cases of hepatitis A infections<br>(i) Hepatitis A vaccine should be given to previously unvaccinated contacts of cases of hepatitis A with onset of jaundice within the last week.<br>(ii) When the interval is longer, human normal immunoglobulin (HNIG) should be used, particularly for older people, given the greater severity of disease in this age group.<br>Outbreaks<br>(i) Active immunisation with monovalent hepatitis A vaccine provides longer duration of protection, and will be more |

| Authority / Country | Recommendation on hepatitis A immunisation |
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| | effective in prolonged outbreaks, such as may occur in homosexuals or injecting drug users, where transmissions may continue after the protective effects of HNIG have ceased. |
| Australia[14] | *(A) People who should be routinely vaccinated or considered for vaccination*<br>All Aboriginal and Torres Strait Islander children between 18 month and 6 years in north Queensland<br>*(B) Individuals at increased risk of infection*<br>Travelers to endemic areas<br>Those working in rural and remote Indigenous communities<br>Child day-care and pre-school personnel<br>The intellectually disabled and their carers<br>Sewage workers<br>Men who have sex with men<br>Injecting drug users<br>*(C)Patients with chronic liver diseases*<br>*(D) Outbreaks*<br>Prompt and liberal administration of normal human immunoglobulin (NHIG) has been shown to interrupt outbreaks of hepatitis A in well-defined communities e.g. child day-care centres, and in close communities e.g., religious communities.<br>Provided that vaccination is started early in the course of an outbreak and provided that high vaccine ocverage can be achieved, hepatitis A vaccination can also interrupt outbreaks in well-defined communities e.g., rural and religious communities<br>Neither HNIG nor hepatitis A vaccine have been demonstrated to effectively interrupt transmission of HAV in large community-wide outbreaks. |