

Prevention of Hepatitis A Infection

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Hepatitis A is an acute, usually self-limiting disease of the liver caused by hepatitis A virus (HAV), a genus of picorna virus family. It is a small, 27-nm cubically symmetrical RNA virus. No chronicity was reported with this infection. Most cases present with self limiting acute hepatitis picture; however, occasional cases with cholestatic and relapsing form and rarely fulminant hepatitis have been reported. With development of safe and effective vaccine, this infection can be prevented.

Epidemiology and Modes of Transmission

This infection is a worldwide public health problem particularly in many developing countries, and in areas where the infection pattern is changing from hyperendemic to hypoendemic. HAV is transmitted from person to person, primarily by the fecal-oral route; however, rarely posttransfusion cases were reported also. The socioeconomic development of different parts of the world affects the incidence of hepatitis A. The prevalence of anti-HAV antibodies (which is the hallmark of HAV exposure) in the general population varies from 15% to 100% in different parts of the world. Age of exposure determines the presentation of the disease; subclinical or asymptomatic disease usually occurs in young children whereas symptomatic disease occurs more commonly among adults. In 80-95% of cases in children < 5 years old, the infection is subclinical while in 75-90% of adults it causes icteric or anicteric disease. Complications increase significantly in adults with mortality rate of up to 2.1% in patients more than 40 years. Infections with HAV don't cause chronic disease and induces lifelong immunity^(1, 2).

The disease can be presented in sporadic, small outbreaks and small and large epidemic forms. In

many different parts of the world, hepatitis A antibody prevalence has considerably declined among the children and adolescents. These data probably reflect the remarkable improvement of hygienic conditions and of effective health education. An increase in the number of susceptible populations could result in outbreaks and become a problem in the future, particularly in schools, nurseries, day care centers, other communities and among high risk groups. Mostly, hepatitis A occurs in the context of community-wide epidemics during which infection is transmitted from person to person by the fecal-oral route. Community-wide epidemics have been difficult to control. The most likely mode of transmission will depend on the HAV endemicity in each area.

In areas with very high and high endemicity, the modes of transmission are person to person, through contaminated food and water, and outbreaks. In areas with intermediate endemicity, infection transmits through person-to-person, outbreaks and through contaminated food or water. In low and very low endemicity areas, common source outbreaks, exposure during travel to high endemicity areas, and uncommon sources are the most common routes of disease transmission⁽³⁾.

Although the HAV infection is a worldwide public health predicament, the problem is more prominent in developing countries, in areas where they are changing from hyperendemic to

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hypoendemic pattern causes important problems. Improvements of hygienic conditions and of effective health education can cause an increase in the number of susceptible populations which could result in an outbreak and become a problem in many developed countries especially in schools, day care centers and among high risk groups. A recent report from South Korea showed that outbreaks of hepatitis A have a shift from childhood to adolescents and young adults, with 2 cases of acute liver failure reported in one outbreak. In this study, 334 infants, children and adolescents less than 20 years of age living in rural areas were evaluated for anti-HAV immune status. In comparison with previous reports of sero-prevalence rates, their data confirmed a dramatic drop in seroprevalence rates among children and adolescents less than 20 years of age living in rural areas, from over 63.8% two decades ago to 4.6% in 1996. They suggested immunizing children with HAV vaccine as a routine schedule should also be considered in Korea, but they suggested estimation and proving the cost-effectiveness of the vaccine⁽⁴⁾.

Reports from our country are varied, which seems different from previous perspective of universal HAV infection in the childhood; for example in a report from Shiraz city in south of Iran, the rate of seroprevalence was 68% among 15-year-olds, and correlated with mean number of household members⁽⁵⁾. In another report from Tehran, the capital of Iran, the rate of exposure was 22.3% among school children⁽⁶⁾ while a study from Delhi reported it 93.2%⁽⁷⁾. In a study from our center, the prevalence of HAV antibody in patients with chronic liver disease with mean age of 36.2 years was 98%, and patients with negative titers were generally younger with mean age of 21.0⁽⁸⁾.

High Risk Groups

The most common reported risk factors for HAV infection in a study were personal contact with a hepatitis A case (26%), employment or attendance at a day care center (14%), history of injecting drug use (11%), history of recent international travel (4%), and association with a suspected food or waterborne outbreak (3%), and in 42% of cases no known risk factor for infection was detected⁽⁹⁾. The following groups are at the highest risk for contracting hepatitis A infection: household and sexual contacts of infected individuals; persons, especially children, living in regions with high rates of hepatitis A; persons traveling to countries where hepatitis A is common; men who have sex with men and injecting and non-injecting drug abusers. Child

care centers play an important role in sustaining the community-wide hepatitis A epidemics and up to 34% of reported cases were associated with contact with child care centers in some reports. People with direct contact with child care were 6 times more likely to acquire hepatitis A compared with people who did not⁽¹⁰⁾.

Preventive Strategies

For as long as two weeks before jaundice the virus sheds in stool, so the virus can be transmitted before the diagnosis of hepatitis. Therefore, isolation of patients can't prevent the transmission of infection. This fact should be considered also that the virus is resistant to heat, ether or acid and can be inactivated only by formalin (1 in 400 at 37 Centigrade for 72 hours), chloride (1 p.p.m for 30 minutes) or by microwaving⁽³⁾.

The major routs of disease prevention in susceptible persons are:

- 1- Personal hygiene, especially hand washing by the patient, household and those who care for the patient during the acute stage of disease. Good hygiene, especially hand-washing, may be the most important element in the control of hepatitis A infection. The household contacts of the hepatitis patient who are particularly at increased risk of acquiring infection are all people who live in the same house and share the same toilet with the patient, people who take care of an HAV-infected child, and sexual partners of the patient⁽¹¹⁾.
- 2- Passive immunoprophylaxis through the injection of human immune serum globulin (HISG) especially from blood donors from hyperendemic countries. Use of standard immune globulin during hepatitis A outbreaks demonstrated about 85% efficacy in post-exposure prophylaxis when given within 14 days after exposure⁽¹²⁾.

Passive immunity which is produced by means of immunoglobulin is short lived and should be repeated if exposure continues. For this reason, injection of immunoglobulin is replaced with vaccine in controlling the large community outbreaks. HISG can be used in family members of the infected patient within two weeks after exposure. There are some reports which showed the injection of HISG can't control the outbreaks of HAV infection. In a study from a developing country, the administration of immunoglobulin was ineffective for complete prevention of HAV infection during an outbreak in a village and only after mass vaccination of the exposed cases, the rate of HAV infection

declined significantly⁽¹³⁾.

Sonder GJ, *et al.* evaluated the HAV control policy by passive immunization with immune globulin and hygienic precautions for household contacts in the Netherlands. Of 1242 contacts of 569 HAV patients, more than 50% (n = 672) were found to be HAV immune. 409 susceptible contacts received immune globulin; with 186 (45%) returning for retesting 6 weeks later, 64 cases (34%) were infected, but only 12 had symptoms. They concluded immune globulin does not protect all household contacts from HAV infection; however, it attenuates symptoms and effectively reduces further HAV transmission⁽¹⁴⁾. In another outbreak of hepatitis A infection among children attending village primary school hygiene in UK, injection of immunoglobulin to household contacts could not prevent the infection and after implementation of HAV vaccination for susceptible cases the outbreak controlled⁽¹⁵⁾.

Because immunoglobulin has limited time of protection and its maintaining in stocks for use in the population in a large scale is difficult, this form of therapy has a limited use and is only used in the small scale for household contacts of the infected individual. Another important consideration for using immunoglobulin is the decreased concentration of anti-HAV antibody in the general population and ultimately in blood donor sera which is the main source of immunoglobulin production especially when obtained from hypoendemic countries. However, there is no direct comparison between vaccine and immune globulin during outbreaks of HAV infection⁽²⁾.

Human serum immunoglobulin (HSIG) should be offered in addition or in preference to vaccine for contacts, particularly for those at risk of adverse outcome of HAV infection. Individuals at particular risk of an adverse outcome to infection include those more than 50 years old, with liver cirrhosis of any cause, or with pre-existing hepatitis B or C virus infection. In addition, HAV vaccine can be used to prevent infection for travelers to countries where HAV infection is a risk⁽¹⁶⁾. Multiple studies found the vaccine is more effective than post-exposure immunoglobulin in interrupting the epidemic in the community⁽¹⁷⁾.

Persons who have been exposed recently to hepatitis A virus and who have not previously received hepatitis A vaccine should be given a single intramuscular dose of immune globulin (0.02 ml per kg) as soon as possible within two weeks after exposure. Persons who have received one dose of the vaccine at least one month before exposure to the virus do not need immune globulin. Serologic

confirmation of hepatitis A virus infection of index patients is recommended before post-exposure treatment of contacts. If vaccination is recommended for a person being given immune globulin, they can be given simultaneously at separate anatomic injection sites. Use of the vaccine alone is not recommended for post-exposure prophylaxis. Immune globulin should be administered to previously unvaccinated persons in the following situations:

- A- Close Personal Contact: household and sexual contacts, persons who have shared illegal drugs with the confirmed carrier and persons with other types of ongoing close personal contact, such as regular babysitters.
- B- Day Care Centers: employees and attendees of day care centers or homes if at least one case of hepatitis A is recognized in children or employees, or infection is recognized in two or more households of those who attend the center. In centers that do not provide care to children who wear diapers, immune globulin should only be given to classroom contacts of an index-case patient. If an outbreak occurs, administration of immune globulin should be considered for members of households that have children in diapers.
- C- Common-Source Exposure: when a food handler is infected with hepatitis A virus, immune globulin should be given to other food handlers at the same establishment. Because common-source transmission to patrons is unlikely, administration of immune globulin to patrons is usually not recommended. Administration to patrons may be considered if the food handler directly handled uncooked foods or foods after cooking and had diarrhea or poor hygienic practices, and patrons can be identified and treated within two weeks after the exposure. In the event of common-source outbreak, immune globulin should not be given to exposed persons after cases have begun to occur because the two-week period during which immune globulin is effective will have been exceeded.
- D- Schools, Hospitals and Work Settings: if a single case of infection occurs in a school, hospital or work setting and the source of infection is outside of that setting, immune globulin is not routinely indicated. Instead, careful hygienic practices should be emphasized. Immune globulin should be given to persons who have close contact with index patients if an epidemiologic investigation indicates that transmission of the virus has

occurred among students in a school, or among patients and staff in a hospital⁽¹⁸⁾.

- 3- Active immunoprophylaxis by injection of hepatitis A vaccines which have proven to be safe and efficacious in many countries for primary prevention. The goals of hepatitis A immunization are to protect persons from infection, reduce the incidence of disease by preventing transmission and ultimately eliminating transmission of infection because immunity seems to be long-lasting. Widespread routine vaccination of children is needed to achieve a sustained reduction of hepatitis A in national level. Surveillance and seroepidemiological data are important in determining optimal hepatitis A vaccine strategies. Vaccination represents an important method for prevention of hepatitis A transmission especially in high risk situation such as in day care centers⁽¹⁹⁾.

The cost of vaccine and the epidemiological status of the population should be considered for the active immunoprophylaxis particularly in developing countries. In these countries, reducing the usage of vaccine to one single dose and thus lowering the price would facilitate the implementation of mass vaccination and thus contribute to the control and possibly to the eventual eradication of the disease⁽²⁰⁾.

The four available HAV vaccines and their

characteristics are collected in Table 1.

Experiences with HAV Vaccination in Outbreak Settings

With improvements in sanitary conditions and escaping young children and adolescents from infection, the rate of infection in adults increased during recent decades. In developing and developed countries where the rate of infection has decreased in children, the adults and adolescents are more prone to acute infection. The severity of infection will cause more morbidity, mortality and health burden in these areas. In a recent report from Japan, while the rate of infection decreased during past decade, the rate of severe cases has increased. By comparing the reported outbreak of 1998-1999 with that of 1987-1988, secondary familial infection significantly decreased in the recent outbreak, and patients in the more recent outbreak were 7 years older than those in the previous outbreak. Severe-type hepatitis and fulminant hepatitis occurred in 5 patients (12.5%) in the recent outbreak, but in only 2 patients (2.0%) in the past outbreak. So they suggested vaccination of susceptible persons against hepatitis A virus in Japan especially during HAV outbreaks⁽²²⁾. Prikazsky V and colleagues reported good efficacy and more effectiveness of HAV vaccine alone than that of immunoglobulin for secondary prophylaxis of exposed cases in community outbreaks. The same was reported in another study

Table 1: The available HAV vaccines

Vaccine	Antigen*	Volume	Schedule (Booster)	Age**
AVAXIM™	160 antigen units HAV	0.5	0, (6 to 12 months)	>= 12 years
EPAXAL BERNA®	Minimum 500 radioimmunoassay units HAV	0.5	0, (12 months)	>= 1 year
HAVRIX™ 1440	1,440 ELISA units HAV	1.0	0, (6 to 12 months)	>= 19 years
HAVRIX™ 720 Junior	720 ELISA units HAV	0.5	0, (6 to 12 months)	1 to 18 years
TWINRIX™	720 ELISA units HAV 20 µg HBsAg	1.0	0, 1, 6 months	>= 19 years
TWINRIX™ Junior	360 ELISA units HAV 10 µg HBsAg	0.5	0, 1, 6 months	1 to 18 years
VAQTA®	50 U HAV	1.0	0, (6 months)	>= 18 years
VAQTA® Paediatric/ Adolescent	25 U HAV	0.5	0, (6 to 18 months)	2 to 17 years

*There is no international standard for HAV antigen measurement. Each manufacturer uses its own units of measurement.

**Ages for which the vaccine is licensed.

Adapted from reference number 21.

from France, as well^(23, 24).

HAV vaccine preferably should be used within 7 days from onset of illness in the primary case to be more effective for preventing secondary cases and outbreaks⁽²⁵⁾. The use of hepatitis A vaccine contributed to the early extinction of an outbreak in Tuscany of Italy because no further cases were notified in the area thereafter⁽²⁶⁾. Another study from Madrid suggested vaccination for close contacts of all the children, whether symptomatic or not, especially parents and siblings⁽²⁷⁾.

The average cost (direct and indirect) per case of HAV vaccination has been calculated 2,683 dollars in a study from USA which should be considered in implementation of HAV vaccination in outbreaks, so vaccination of certain high-risk populations may be cost-efficient⁽²⁸⁾.

Vaccination in the setting of developed countries such as Italy has been described in three scenarios: in outbreaks occurring in small closed communities such as a nursery or a primary school, vaccination of family members and school personnel living or working in close proximity to the index case as well as classmates is recommended; in outbreaks in communities of limited dimensions such as small towns or villages also vaccination of secondary transmission within the community particularly more susceptible age groups such as children and adolescents is recommended; and when epidemics occur in large open community settings at regular intervals, the only practicable alternative strategy is vaccination of close family contacts of acute cases and implementing other health control measures⁽²⁹⁾.

In areas where hepatitis A is highly endemic, such as in Sao Paulo, Brazil, (with 100% and 40.3% exposure in lower and middle socioeconomic level children aged 2-11 years, respectively) the immunogenicity and safety of (HAV) strain GBM vaccine among 40 children attending a day care center in Sao Paulo were evaluated which revealed protective levels of antibodies in serum of all cases after two inoculations. In an outbreak which occurred in the day care center, 9 of the 27 control

subjects developed hepatitis, but none of the vaccinated subjects developed signs or symptoms of hepatitis. So the vaccine is safe and effective in areas of high prevalence and also clearly benefits children in high-risk areas⁽³⁰⁾.

In a report from China, the efficacy of emergency immunization to abort hepatitis A outbreak in a village with a domestic live attenuated hepatitis vaccine was evaluated, which didn't provide post-exposure protection against infection of hepatitis A during the outbreak⁽³¹⁾.

In another report from a refugee camp in Croatia, implementation of HAV vaccination in 34 susceptible children of 1 to 15 years of age without antibody to HAV infection active immunization was a successful means of stopping an outbreak of hepatitis A⁽³²⁾.

The recent development of a safe, effective vaccine against HAV, and reassessment of the public health importance and priority of HAV in developing countries such as India were evaluated. Studies have indicated that virtually all children are infected with HAV by 10-15 years of age, but the force of transmission is significantly lower in the upper socioeconomic strata. In general, HAV is not as serious a public health problem as hepatitis B, C, and E in such countries and more information is needed, however, on the severity of HAV infection in special categories of the community such as chronic carriers of hepatitis B and C. Given the high cost of HAV immunization about US\$20 per pediatric dose, any decision on HAV immunization as a public health intervention should be postponed until epidemiologic data on HAV and other infectious diseases in these countries have been assembled⁽³³⁾.

In another study from India, anti-HAV serology was detected in blood samples of 499 children between the ages of three days and six years, where significant positive correlation was noted between exposure and age ($P < 0.01$). Exposure to HAV was 28.9% soon after the waning of maternal antibodies in 13 to 15-month-old group which increased to 52.5% by two years of age and 90.9% by 6 years. They suggested, in addition to other preventive

measures, the vaccination of Indian children by 9-10 months of age when the maternal antibodies disappear, if children are to be vaccinated against hepatitis A⁽³⁴⁾.

For control of HAV outbreaks, the following points should be considered:

1- HAV cases should be detected rapidly so contacts can receive the vaccine within 7 days of exposure. Due to bother of taking blood samples from children, some authors recommended other methods of detecting the antibodies to HAV. Salivary antibody surveys in conjunction with vaccination against hepatitis A should provide a cost-effective method for control of future outbreaks⁽³⁵⁾.

Recently, Bonanni P and coworkers have reported two outbreaks of hepatitis A in a maternal school and a day care center in Florence, Italy, which in both cases, hepatitis A vaccination of contacts started with some delay in the first outbreak, and performed in 3 days in the other. In the first outbreak, 37 cases of acute hepatitis were found, but only three cases occurred overall in the other outbreak starting in the day care center, where >80% of infants, children and personnel were immunized. They suggested that a rapid vaccination of school and family contacts of hepatitis A cases after the first case of diagnosed HAV plays an important role to shortening of the outbreak duration⁽³⁶⁾.

David AM and colleagues recommended an urgent systematic approach to outbreak control in many South-East Asian countries, which improved hygiene standards and socio-economic conditions leading to reduction in exposure to the hepatitis A virus (HAV) in childhood, and therefore persistence of circulating HAV in the community and outbreaks, especially in adolescents and adults. The Steering Committee for Prevention and Control of Infectious Diseases compared the reports on recent hepatitis A outbreaks in South-East Asian countries and the existing plans for controlling these outbreaks with several North American and European countries, and they proposed a six step program for outbreak control which includes initiation, planning, set-up, implementation, vaccination of at-risk populations and evaluation. They suggested formation of an outbreak management team, and implementing necessary interventions and educating the people. The most important step in this program will be vaccination of family members and close contacts⁽³⁷⁾.

2- The coverage of those persons at higher risk is a crucial point for the success of vaccination during outbreaks. In a study from USA, the most

common reported risk factors for HAV infection were personal contact with a hepatitis A case (26%), employment or attendance at a day care center (14%), history of injecting drug use (11%), history of recent international travel (4%), and association with a suspected food or waterborne outbreak (3%), and in 42% of cases no known risk factor for infection was detected⁽⁹⁾.

The results of Smith PF and colleagues detected that the presence of children 3-5 years old in family (household contact) was the most important factor for recurrent hepatitis A outbreaks in a Hasidic Jewish community. They suggested hepatitis A vaccination of 3-5 year olds can protect this age group and might prevent outbreaks in the community⁽³⁸⁾.

HAV may occur more often and severe in IV drug abusers and/or inner-city hostel residents. In a study from UK, successful use of vaccination to control an outbreak of HAV and to prevent transmission to the wider population was done. HCV co-infection increased the severity of HAV illness⁽³⁹⁾.

3- The 'number needed to treat' with prophylaxis to prevent one case depends on the prevalence of susceptibility, secondary attack rate following exposure, effectiveness of intervention and the rate of clinical disease in the age group exposed. This figure will be less than 20 in adults (less than 10 if secondary attack rate is \geq 20) but this number in children is greater⁽⁴⁰⁾.

In another study by Saggiocca L and coworkers, the efficacy of HAV vaccination was evaluated, and they concluded that 18 individuals needed to be vaccinated to prevent one secondary infection⁽⁴¹⁾.

Practical Recommendations for Vaccination in Outbreak Settings

When deciding to vaccinate for outbreak control, we should consider the characteristics of hepatitis A epidemiology in the community and existing hepatitis A vaccination programs.⁽¹⁸⁾

A- Communities with high rates of HAV infection

For outbreaks in communities with high rates of HAV infection, routine vaccination programs should achieve at least 70% vaccination coverage of preschool and school-age children. In communities with less than 70% coverage, intensified and accelerated vaccination efforts should be implemented. The upper age for vaccination of older, previously unvaccinated children should be determined using age-specific rates of hepatitis A or seroprevalence data, if available, but will usually be between 10 and 15 years of age. To prevent future

Table 2: Practical recommendations for prevention of HAV in different parts of the world (4)

Epidemic status	Countries	The modes of transmission	The average age of HAV infection	Recommendations for outbreak control
High or very high	Africa, parts of South America, the Middle East, South-East Asia	Person to person, Through contaminated food and water, Outbreaks	Under 5 in very high endemicity areas Between 5-14 years in high endemicity areas	1-Routine vaccination. 2- Intensified and accelerated vaccination if <70% vaccination coverage of preschool and school-age children. 3- The upper age for vaccination of unvaccinated children 10 -15 years of age. 4- Ongoing vaccination of young children as soon as the outbreak has subsided.
Intermediate	Southern Europe, Eastern Europe, some regions of the Middle East	Through person-to-person, Outbreaks and through contaminated food or water.	Between 5-24 years.	1-Routine vaccination 2- Accelerated vaccinations in outbreaks 3- Ongoing vaccination of children. 4- Outbreak-control vaccination programs, depends on the feasibility of rapidly vaccinating the target population, and the cost.
Low or very low	Australia, USA, Western Europe, Northern Europe, Japan	Common source outbreaks. Travel to high endemicity areas. Uncommon sources are the most common routes of disease transmission.	Average age of infection is 5-40 in low endemicity areas. More than 40 years in very low endemicity areas.	1-Communitywide outbreaks are uncommon. 2- Epidemiologic characteristics of the outbreak 3- Initiating and sustaining routine vaccination in adults. 4- In outbreaks among children, ongoing routine vaccination recommended.

outbreaks, ongoing vaccination of young children should be maintained as soon as the outbreak has subsided.

B- Communities with intermediate rates of HAV infection

For outbreaks in communities with intermediate rates of HAV infection, routine vaccination is recommended. If routine childhood vaccination has not been implemented, this should be initiated as recommended. Accelerated vaccination may be considered as an additional measure to control outbreaks. Because these communities are often located in large cities or counties, widespread vaccination might not be feasible. Outbreaks in these communities often involve children and adults; local surveillance and epidemiologic data should be used to define populations or areas within the community that have the highest rates of disease. Whether to initiate outbreak-control vaccination programs; the feasibility of rapidly vaccinating the target population of children, adolescents and adults; and the cost of such programs should be considered.

Because the results of vaccination programs to control hepatitis A outbreaks in communities that have intermediate rates of disease have been

variable, evaluation of the effectiveness should be an essential element of programs in these settings. In all of these communities, ongoing vaccination of children should be sustained to maintain high levels of immunity and prevent future epidemics.

C- Communities with low rates of HAV infection

Communitywide outbreaks are uncommon in areas with low rates of HAV infection. If outbreaks occur, the response should be based on an examination of the epidemiologic characteristics of the outbreak. Because vaccination programs to control outbreaks among adults in high-risk groups have been difficult to implement, efforts to control and prevent outbreaks should focus on initiating and sustaining routine vaccination. For outbreaks among children, implementing programs similar to those recommended for intermediate rate communities can be considered. If outbreaks among children occur, implementation of programs similar to those recommended for intermediate-rate communities can be considered, including ongoing routine vaccination of children.

D- Outbreaks in other settings

When outbreaks occur in day care settings, aggressive use of immune globulin should limit transmission of the virus. When outbreaks occur in

hospitals, institutions and schools, the use of immune globulin is recommended for persons in close contact with infected patients. Vaccination of employees who work in areas where state and local health authorities or private employers determine that vaccination is cost-effective should be considered. The practical recommendations for different communities are collected in Table 2.

Conclusions

- 1- Multiple clinical trials of HAV vaccine used for post-exposure prophylaxis during outbreaks proved more effective than immunoglobulin in controlling the infection.
- 2- In communities experiencing recurrent epidemics of HAV infection, the use of single vaccination seems also justified for the prevention of secondary cases and consequent acceptable cost-effectiveness profile.
- 3- In areas where hepatitis A represents a public health problem, the implementation of routine vaccination of children and/or adolescents seems, in the long run, to be the most reasonable way to put outbreaks under control.
- 4- During HAV outbreaks in the community, the following actions should be taken to control the infection:
 - A- Rapid identification of the source, determination of mode of transmission, whether person-to-person or by common vector (vehicle) and elimination of common sources of infection.
 - B- Identification of the people who are at risk of infection and need vaccination.
 - C- Gathering the information about the ongoing infection, the way of spread and the possibility of prevention by vaccination and by good hygiene practices.
 - D- Rapid administration of the first vaccine dose to the target population. Passive immunization provides temporary protection, but it is not effective in controlling HAV at a community level. Hepatitis A vaccination has been shown to be effective in controlling outbreaks of infection in communities that have high or intermediate rates of infection provided a sufficient percentage of the target population is reached.
 - E- Maintenance of records of vaccinated people
 - F- Review of the process as the initial number of cases, number of immunised/target population, time to control the outbreak, number of cases in vaccinees and their timing, and number of boosters.
 - G- Surveillance and control procedures which

should be done include:

- +Providing safe drinking water and proper disposal of sanitary waste
- +Monitoring water beds where shellfish are harvested
- +Monitoring disease incidence
- +Determining sources of infection
- +Identifying contacts of case-patients for post-exposure prophylaxis
- +Detecting outbreaks

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