Measles and the importance of maintaining vaccination levels

Measles is one of the most infectious diseases and it kills about 800,000 people worldwide each year. In many industrialised countries its effects have been forgotten because the disease has almost disappeared. This, along with the controversies surrounding the MMR vaccine, has caused some people to refuse to vaccinate their children. Helen Bedford describes the potential harm that can result from this disease and the benefits of vaccination.

**Complications** Measles remains a significant cause of death among children globally. There are about 40 million cases of measles each year and 800,000 deaths worldwide, with half these deaths occurring in Africa alone (De Quadros, 2004).

Most of the evidence concerning the complications of measles has been gathered from the period before the introduction of measles vaccines when large epidemics occurred. Lately, data has been available from outbreaks among unvaccinated people in Europe and the US.

One of the largest sources of information is a study of the complications of measles among 55,589 cases in England and Wales in 1963. The overall complication rate was 6.7 per cent, and risks were higher in children less than one year old and in adults.

**Complications included:**
- Encephalitis affecting one in 1,000 cases;
- Respiratory complications affecting 38 per 1,000 cases;
- Twelve deaths (Miller, 1964);
- Convulsions (febrile and non-febrile) at a rate of about one in 200 (Miller, 1978).

Rarer complications include subacute sclerosing panencephalitis and idiopathic thrombocytopenic purpura.

**Subacute sclerosing panencephalitis (SSPE)** SSPE occurs some years after a measles infection. It is a progressive degenerative disorder of the central nervous system caused by reactivation of a defective form of the measles virus that lies dormant in brain tissue. The effects of this condition are similar to new variant Creutzfeldt-Jacob disease (Miller, 2002).

The risk of developing SSPE following measles is about four per 100,000 cases. It is 18 times more likely in children who had measles under the age of one year compared with those over the age of five years (Farrington, 1991). It is also about three times more likely in boys.

**Idiopathic thrombocytopenic purpura (ITP)** ITP is a disorder in which the patient has a low platelet count that results in problems with clotting. The exact incidence of ITP is not known although it is thought to affect about one in 5,000 cases (Strebel et al, 2004).

**Malnourished and immunocompromised patients** Measles can have serious consequences for people who are either malnourished or have a compromised immune system. Reports from four UK cancer centres between 1974 and 1984 identified that measles was associated with 15 out of 51 deaths in children in their first remission from leukaemia (Gray et al, 1987).

More recently, a London hospital reported that two children aged eight and 13 years who had renal transplants at the age of two years experienced measles-associated encephalitis. Both children had received one dose of MMR before their transplants but neither had been able to have a second dose (Kidd et al, 2003). It was reported in the news that both these children had been left with brain damage and physical impairments (The Sunday Times, 4 April, 2004).

**Management** Little can be done to alter the course of a measles infection once it is established, and treatment is essentially symptomatic.

After contact with an infected person the disease may be prevented by the administration of a vaccine that contains measles. This must be given within three days.

Human normal immunoglobulin (antibodies) may also...
Sources of information on measles

Information about measles in England and Wales is gathered routinely from a number of sources:
- Statutory notifications of clinically diagnosed cases to the Office of National Statistics (ONS);
- Reports of laboratory-confirmed cases from the Health Protection Agency (HPA);
- Since 1994, follow-up of notified cases with testing of oral fluid for measles immunoglobulin M (IgM) (antibodies).

It has been a statutory requirement for nearly 100 years for doctors to notify a proper officer of the local authority of cases of certain infectious diseases. The proper officer is usually the consultant in communicable disease control (CCDC). This notification ensures that there is a local investigation and action to control the disease.

Measles became a notifiable disease in 1940. The CCDC is required to report the numbers of cases of disease each week to the registrar general at the ONS. This whole process allows local as well as national disease surveillance to occur.

Data is published in various forms (McCormick, 1993). One of the main limitations of notification data is that some diseases are under-reported and it has been estimated that only 40 to 60 per cent of cases of measles were notified in the past (Clarkson and Fine, 1985). Notifications still provide very useful information on disease patterns over time.

Confirming measles

When a measles case is notified, a sample of oral fluid should be tested for measles IgM to confirm the disease. The sample should be collected within six weeks of the onset of the infection. It is returned to the specialist Enteric, Respiratory and Neurological Virus Laboratory (ERNVL) at the HPA.

All confirmed measles infections (whether by saliva testing or other method) are reported by laboratories in England and Wales to the Communicable Disease Surveillance Centre of the HPA (Ramsay et al, 2003).

Incidence of measles

Before the introduction of a vaccine, epidemics of measles occurred every two to three years. Fig 3 shows measles notifications from 1950 to 2002. In an average epidemic year there were more than 500,000 notified cases in England and Wales, with a peak of 763,531 notifications and 152 deaths in 1961.

Measles is highly infectious and in communities where immunisation is not available almost all children acquire the infection before the age of 15 years.

Impact of vaccination

The introduction and widespread use of measles vaccine has had a significant impact on the incidence of measles. The measles vaccine was first introduced in the UK in 1968
Herd immunity  Because measles is so infectious, a high level of immunity is needed before herd immunity can be attained. Herd immunity occurs when a certain percentage of a population is vaccinated and the spread of the disease is effectively stopped. To reach this level of protection, about 85 per cent of preschool children should be immune (for this to happen 90–95 per cent need to be immunised with at least one dose of vaccine). The figures for immunisation of primary and secondary school children are 90 per cent and 95 per cent respectively. The current rates in the UK, and particularly in London, are well below this, with some areas only achieving between 60 and 70 per cent.

Recent outbreaks of measles Since 1999 there have been outbreaks of measles in Europe, including Italy (2002), The Netherlands (1999–2000), the Republic of Ireland (2000) and England. These have all been associated with low vaccine coverage that:
- Never reached optimum levels (Italy and the Republic of Ireland);
- Was related to a specific population group (The Netherlands);
- Has declined because of adverse publicity over the safety of MMR vaccine (England).

These outbreaks serve as a potent reminder both of
Since 2000, the childhood immunisation programme. Information, part of the Department of Health's Public health initiatives et al, 2004). Autism (DeStefano and Thompson, 2004; McCormick evidence that the MMR vaccine does not cause development of autism and bowel problems in children (Wakefield, 1998). Research has since been conducted to explore this link and there is convincing association between the MMR vaccine and the endemic) disease (Jansen et al, 2003). Mathematical modelling has shown that if the current low level of MMR coverage persists in the UK, measles outbreaks in England have been reported. These have been the result of the low uptake of the measles vaccine in some communities (Morgan et al, 2003; Hanratty et al, 2000). Uptake overall has fallen from 92 per cent in 1995 to 80 per cent in 2003, with lower uptake in some areas, notably London. Mathematical modelling has shown that if the current low level of MMR coverage persists in the UK, measles will re-establish itself as a frequently occurring (endemic) disease (Jansen et al, 2003). The decline in the uptake of the vaccine is the result of publicity surrounding a paper that suggested an association between the MMR vaccine and the development of autism and bowel problems in children (Wakefield, 1998). Research has since been conducted to explore this link and there is convincing evidence that the MMR vaccine does not cause autism (DeStefano and Thompson, 2004; McCormick et al, 2004).

Public health initiatives NHS Immunisation Information, part of the Department of Health’s communicable disease team, is responsible for promoting and providing information about the childhood immunisation programme.

This includes: placing advertisements in a variety of media including TV, leaflets translated into different languages; and factsheets.

Additional resources have been developed specifically focusing on the vaccine in response to the negative publicity over the triple vaccine. An MMR website has been set up that provides the public with clear factual information and a facility for asking questions (www.mmrthefacts.nhs.uk).

NHSS Immunisation Information also provides central support for the training of health professions. This national service has been augmented by local developments.

Since 1991, HPE has conducted regular surveys of parental knowledge and attitudes to immunisation. This information shows that most mothers seek advice from health professionals when deciding whether or not to have their children immunised (Ramsay et al, 2002).

Local initiatives In Wales an initiative has been developed to assist health professionals in advising parents. It is recognised that parents place value on the advice of health professionals. It is also acknowledged that it can be difficult in a busy clinic to get all the relevant facts and present them to parents in a professional manner.

It was felt that existing resources are not easy to use in this situation and a tool was developed to facilitate discussion. The MMR mythbuster pack examines the 10 most common myths in an easy to digest form. The pack was distributed to all practices in Wales early in 2001 (Roberts, 2001)

In 2002, the 20 health authorities with the lowest uptake of MMR vaccine were asked by the Department of Health to produce an action plan for increasing vaccine uptake locally. Central funding was provided to cover the costs of the proposed initiatives. These included training health professionals, providing them with local information on vaccine uptake and disease prevalence, providing events for parents, and working with local media.

Conclusion Measles is a potentially serious illness, even in industrialised countries. It is important that high levels of vaccination are achieved and sustained. Health professionals, in particular nurses, have an important role to play in this and it is essential that they keep up to date with the evidence. This will enable them to advise parents effectively when they request information about MMR vaccine and to offer reassurance to allay fears over the most recent scare story.