

Issue Date: [September 2009](#)

**Reducing differences in the  
uptake of immunisations  
(including targeted vaccines)  
among children and young  
people aged under 19 years**

**NICE public health guidance 21  
Reducing differences in the uptake of immunisations (including targeted vaccines) among children and young people aged under 19 years**

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- The NICE guidance (this document) which includes all the recommendations, details of how they were developed and evidence statements.
- A quick reference guide for professionals and the public.
- Supporting documents, including an evidence review and an economic analysis.

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## Introduction

The Department of Health (DH) asked the National Institute for Health and Clinical Excellence (NICE) to produce public health guidance on reducing differences in the uptake of immunisations, including targeted vaccinations, among children and young people aged under 19 years.

The guidance focuses on increasing immunisation uptake among children and young people aged under 19 years in groups and settings where immunisation coverage is low. It also focuses on improving uptake of the hepatitis B immunisation for babies born to mothers infected with hepatitis B.

It is for NHS and other commissioners, managers and professionals who have a direct or indirect role in, and responsibility for, the immunisation of children and young people. This includes those working in: children's services, local authorities, education and the wider public, private, voluntary and community sectors. It may also be of interest to parents, others with parental responsibility, all those who look after the health and wellbeing of children and young people and members of the public.

This guidance supports national policy and guidance from the Department of Health as set out in the 'Green book' (DH 2006) and on the NHS immunisation website ([www.immunisation.nhs.uk](http://www.immunisation.nhs.uk)).

The Public Health Interventions Advisory Committee (PHIAC) developed these recommendations on the basis of a review of the evidence, an economic analysis, expert advice, stakeholder comments and fieldwork.

Members of PHIAC are listed in appendix A. The methods used to develop the guidance are summarised in appendix B. Supporting documents used to prepare this document are listed in appendix E. Full details of the evidence collated, including fieldwork data and activities and stakeholder comments, are available on the NICE website, along with a list of the stakeholders involved and NICE's supporting process and methods manuals. The website address is [www.nice.org.uk](http://www.nice.org.uk)

This guidance was developed using the NICE public health intervention process.

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## 1 Recommendations

This is NICE's formal guidance on reducing differences in the uptake of immunisations, including targeted vaccinations, among children and young people aged under 19 years. When writing the recommendations, the Public Health Interventions Advisory Committee (PHIAC) (see appendix A) considered the evidence of effectiveness (including cost effectiveness, fieldwork data and comments from stakeholders). Full details are available at [www.nice.org.uk/PH21](http://www.nice.org.uk/PH21)

The evidence statements underpinning the recommendations are listed in appendix C.

The evidence review, supporting evidence statements and economic analysis are available at [www.nice.org.uk/PH21](http://www.nice.org.uk/PH21)

PHIAC considers that all the recommended measures are cost effective. For the research recommendations and gaps in research, see section 5 and appendix D respectively.

The guidance supports implementation of the vaccination courses as recommended by the Joint Committee on Vaccination and Immunisation and indicated in the 'Green book'<sup>1</sup>. It also supports timely vaccination according to the recommended schedule ([www.immunisation.nhs.uk](http://www.immunisation.nhs.uk)).

### ***Focus of the recommendations***

The guidance focuses on increasing immunisation uptake among groups and settings where coverage is low.

Recommendations 1 to 5 apply to all vaccinations for children from birth to 19 years.

Recommendation 6 focuses on the hepatitis B vaccination programme for infants, as an example of a programme targeted at particular groups. Specifically, it focuses on immunisation to prevent hepatitis B among babies

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<sup>1</sup> Department of Health (2006) Immunisation against infectious disease. London: Department of Health.

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and young children born to mothers who are chronically infected with the virus, or who have had acute hepatitis B infection during pregnancy. The hepatitis B programme for infants was chosen because some babies born to infected mothers (and their siblings) are not receiving the complete course at the right time. (For more details see sections 2 and 3.)

### ***Parental responsibility***

A person with parental responsibility may be a parent, step-parent or the parent's civil partner. In the case of looked after children, this responsibility may have been acquired by another adult or the local authority under the Children Act.

Those with parental responsibility do not necessarily need to be present when a vaccination is given, provided they have received information about it and then arranged for another person (for example, a grandparent or childminder) to attend with the child. For further information see chapter two of the 'Green book'<sup>2</sup>.

The term 'parent' is used throughout the recommendations to describe anyone with parental responsibility.

### ***Recommendation 1: immunisation programmes***

#### **Who is the target population?**

- Children and young people aged under 19 years, particularly those who may not have been immunised or may have only been partially immunised.
- Parents of children and young people aged under 19 years.

#### **Who should take action?**

- Commissioners, managers and coordinators in primary care trusts (PCTs), children's services, children's trusts, Sure Start children's centres and

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<sup>2</sup> Department of Health (2006) Immunisation against infectious disease. London: Department of Health.

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services for vulnerable groups (including those run by family nurse partnerships<sup>3</sup>).

- Health professionals responsible for children and young people's immunisation services including paediatricians, health visiting and school nursing teams, GPs and practice nurses.
- Directors of public health, immunisation coordinators and others who provide or commission immunisation services in PCTs and GP practices.
- Health protection specialists and immunisation leads in health protection units (HPUs).
- Children's service managers and nursing staff in hospital trusts, children's social care organisations and child and adolescent mental health services.

### **What action should they take?**

- Ensure Department of Health (DH) guidance and updates on immunisations (including official letters from the Chief Medical Officer, Chief Nursing Officer and Chief Pharmaceutical Officer) are disseminated to relevant professionals and implemented.
- Adopt a multifaceted, coordinated programme across different settings to increase timely immunisation among groups with low or partial uptake. The programme should form part of the local child health strategy and should include the following actions:
  - Monitor vaccination status as part of a wider assessment of children and young people's health.
  - Ensure there is an identified healthcare professional in the PCT and every GP practice who is responsible – and provides leadership – for the local childhood immunisation programme.
  - Ensure all staff involved in immunisation services have access to the 'Green book'<sup>4</sup>. Also ensure updates to the

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<sup>3</sup> Under the family nurse partnership programme, specially trained nurses visit some of the most vulnerable young mothers and their families at home, working with them from early pregnancy until the child is aged 2 years.

childhood immunisation programme and schedule are monitored and services adapted appropriately.

- Improve access to immunisation services. This could be achieved by extending clinic times, ensuring children and young people are seen promptly and by making sure clinics are child- and family-friendly.
- Ensure enough immunisation appointments are available so that all local children and young people can receive the recommended vaccinations on time.
- Send tailored invitations for immunisation. When a child or young person does not attend appointments, send tailored reminders and recall invitations and follow them up by telephone or text message.
- Provide parents and young people with tailored information, advice and support to ensure they know about the recommended routine childhood vaccinations and the benefits and risks. This should include details on the infections they prevent. Information should be provided in different formats, for example, for those whose first language is not English.
- Ensure parents and young people have an opportunity to discuss any concerns they might have about immunisation. This could either be in person or by telephone and could involve a GP, community paediatrician, health visitor, school nurse or practice nurse.
- Ensure young people fully understand what is involved in immunisation so that those who are aged under 16, but considered sufficiently capable, can give their consent to vaccinations, as advised in the ‘Green book’.
- Ensure young people and their parents know how to access immunisation services.

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<sup>4</sup> Department of Health (2006) Immunisation against infectious disease. London: Department of Health.

- Consider home visits to discuss immunisation with parents who have not responded to reminders, recall invitations or appointments. Offer to give their children vaccinations there and then (or arrange a convenient time in the future). Such visits could include groups that may not use primary care services, for example, travellers or asylum seekers.
- Check the immunisation status of children and young people at every appropriate opportunity. Checks should take place during appointments in primary care (for example, as part of a child health review), hospital in- or outpatient and accident and emergency departments, walk-in centres or minor injuries units. Use the personal child health record (PCHR, also known as the 'Red book') as appropriate. If any vaccinations are outstanding:
  - ◇ discuss them with the parent and, where appropriate, the young person. Where they have expressed concerns about immunisation and this is documented, these appointments should be used as an opportunity to have a further discussion
  - ◇ offer vaccinations by trained staff before they leave the premises, if appropriate. In such cases, notify the child or young person's GP, health visitor or local child health information department so that records can be updated
  - ◇ and, if immediate vaccination is not possible, refer them to services where they can receive any outstanding immunisations.

## ***Recommendation 2: information systems***

### **Who is the target population?**

- Children and young people aged under 19 years, particularly those who may not have been immunised or may have only been partially immunised.
- Parents of children and young people aged under 19 years.

### **Who should take action?**

- Those responsible for information services within PCTs, acute trusts and GP practices.
- Strategic health authority immunisation leads, PCT immunisation coordinators, directors of public health and community paediatricians.
- Health protection specialists and immunisation leads in health protection units.
- GPs, practice nurses, health visiting teams and those who commission or provide immunisation services.
- Independent and private sector providers of immunisation services.

### **What action should they take?**

- Ensure PCTs and GP practices have a structured, systematic method for recording, maintaining and transferring accurate information on the vaccination status of all children and young people. Vaccination information should be recorded in patient records, the personal child health record and the child health information system. The same data should be used when reporting vaccinations to the child health department and when submitting returns to the PCT for GP and practice payments. This will ensure records in both systems are reconciled and consistent.
- Encourage and enable private providers to give the relevant GP practice or PCT details of all vaccinations administered to children and young people, so they can be recorded in the appropriate information system.
- Record any factors which may make it less likely that a child or young person will be up-to-date with vaccinations in their patient records and the personal child health record. For example, note if children and young people are looked after, have special needs or have any contraindications to vaccination. Also note if the parents or young person have expressed concerns about vaccination.

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- Regularly update and maintain the databases for recording children and young people's immunisation status. For example, ensure records are transferred when a child or young person moves out of the area, ensure information is not duplicated and follow up on any missing data.
- Ensure up-to-date information on vaccination coverage is available and disseminated to all those responsible for the immunisation of children and young people. This includes those who are delivering the vaccinations.
- Use recorded information on immunisation, together with surveillance data on the incidence of infection, to inform local and joint strategic needs assessments and health equity audits. These data should also be used to support delivery of an immunisation programme for children and young people.
- Monitor the age composition of the practice population so that there is enough capacity to provide timely immunisations. Waiting lists are unacceptable.

### ***Recommendation 3: training***

#### **Who is the target population?**

Those who advise on and provide immunisation services including:

- GPs, health visitors, practice nurses, community nurses (including school nurses), midwives and nurses working in neonatal care, nurseries, child and adolescent mental health services, young offender institutions and secure units.
- PCT immunisation coordinators and public health professionals.
- Hospital and community paediatricians, nursing staff in hospital trusts and walk-in centres and pharmacists.
- NHS health trainers.
- NHS support staff, including clinic clerks and receptionists.

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- Managers of children's services and children's centres, social care workers (working with children) and those with parental responsibility for looked after children.

### **Who should take action?**

- Professional bodies, skills councils and other organisations responsible for setting competencies and developing continuing professional development programmes for health professionals.
- Health protection units.
- Employers and managers in PCTs and strategic health authorities, including GPs whose staff are involved in immunisation services.
- Private and independent sector providers of immunisation services for children and young people aged under 19 years.

### **What action should they take?**

- Ensure all staff involved in immunisation services are appropriately trained. Training should be regularly updated. It should be tailored to individual needs to ensure staff have the necessary skills and knowledge, for example, communications skills and the ability to answer questions about different vaccinations.
- Ensure health professionals who deliver vaccinations have received training that complies with the 'National minimum standard for immunisation training<sup>5</sup>'.
- Professional bodies should ensure health professionals working with children and young people have the appropriate knowledge and skills to give advice on the benefits and risks of immunisation. Specifically, they

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<sup>5</sup> Health Protection Agency et al. (2005a) National minimum standard for immunisation training [online]. Available from [www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb\\_C/1204100464376](http://www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb_C/1204100464376)

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should be well-versed in the core topics defined in the Health Protection Agency's 'Core curriculum for immunisation training'<sup>6</sup>.

- Ensure staff are appropriately trained to document vaccinations accurately in the correct records.

#### ***Recommendation 4: contribution of nurseries, schools, colleges of further education***

##### **Who is the target population?**

- Children and young people aged under 19 years attending nurseries, schools and colleges of further education, particularly those who may not have been immunised or may have only been partially immunised.
- Parents of children and young people aged under 19 years.

##### **Who should take action?**

- PCT directors of public health, immunisation coordinators and community paediatricians.
- Health visiting and school nursing teams, GPs and those involved in family nurse partnerships<sup>7</sup>.
- Head teachers, school governors and heads of further education colleges and pupil referral units.
- Nursery, pre-school and early years providers.
- Managers, nurses and early years support staff in Sure Start children's centres and children's services.

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<sup>6</sup>Health Protection Agency et al. (2005b) Core curriculum for immunisation training [online]. Available from [www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb\\_C/1204100466949?p=1153846674367](http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1204100466949?p=1153846674367)

<sup>7</sup>Under the family nurse partnership programme, specially trained nurses visit some of the most vulnerable young mothers and their families at home, working with them from early pregnancy until the child is aged 2 years.

### **What action should they take?**

- The Healthy Child team, led by a health visitor working with other practitioners, should check the immunisation record (including the personal child health record) of each child aged up to 5 years. They should carry out this check when the child joins a day nursery, nursery school, playgroup, Sure Start children's centre or when they start primary school. The check should be carried out in conjunction with childcare or education staff and the parents.
- School nursing teams, working with GP practices and schools, should check the vaccination status of children and young people when they transfer to a new school or college. Working with the PCT, they should also advise young people and their parents about the vaccinations recommended at secondary school age.
- If children and young people are not up-to-date with their vaccinations, school nursing teams, in conjunction with nurseries and schools, should explain to parents why immunisation is important. Information should be provided in an appropriate format (for example, as part of a question and answer session). School nursing teams should offer vaccinations to help them catch up, or refer them to other immunisation services.
- Head teachers, school governors, managers of children's services and PCT immunisation coordinators should work with parents to encourage schools to become venues for vaccinating local children. This would form part of the extended school role.

### ***Recommendation 5: targeting groups at risk of not being fully immunised***

#### **Who is the target population?**

- Children and young people aged under 19 years at risk of not being immunised or only being partially immunised.
- Parents of these children and young people.

### **Who should take action?**

- Commissioners, managers and coordinators of children's services in PCTs, children's trusts, Sure Start children's centres and immigration services.
- Health professionals responsible for children's immunisation services including directors of public health, paediatricians, GPs, practice nurses, school nursing teams, health visiting teams and those involved in family nurse partnerships<sup>8</sup>.
- Nurses working in child and adolescent mental health services, young offender institutions and secure units.
- Other health professionals who have contact with children and young people aged under 19 years.
- Immunisation coordinators and others who work in immunisation services within PCTs and GP practices.
- Managers of children's services and children's centres.
- Social care workers responsible for children and those with parental responsibility for looked after children.

### **What action should they take?**

- Improve access to immunisation services for those with transport, language or communication difficulties, and those with physical or learning disabilities. For example, provide longer appointment times, walk-in vaccination clinics, services offering extended hours and mobile or outreach services. The latter might include home visits or vaccinations at children's centres.
- Provide accurate, up-to-date information in a variety of formats on the benefits of immunisation against vaccine-preventable infections. This should be tailored for different communities and groups, according to local

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<sup>8</sup> Under the family nurse partnership programme, specially trained nurses visit some of the most vulnerable young mothers and their families at home, working with them from early pregnancy until the child is aged 2 years.

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circumstances. For example, offer translation services and provide information in multiple languages (this information is available from [www.immunisation.nhs.uk/Library/Publications/Translations](http://www.immunisation.nhs.uk/Library/Publications/Translations)).

- Consider using pharmacies, retail outlets, libraries and local community venues to promote and disseminate accurate, up-to-date information on childhood immunisation.
- Health professionals should check the immunisation history of new migrants, including asylum seekers, when they arrive in the country. They should discuss outstanding vaccinations with them and, if appropriate, their parents, and offer the necessary vaccinations administered by trained staff.
- Prison health services should check the immunisation history of young offenders. They should discuss any outstanding vaccinations with the young person and, if appropriate, their parents, and offer appropriate vaccines administered by trained staff.
- Check the immunisation status of looked after children during their initial health assessment, the annual review health assessment and statutory reviews. Ensure outstanding immunisations are addressed as part of the child's health plan. Offer opportunities to have any missed vaccinations, as appropriate, in discussion with the child or young person and those with parental responsibility for them.

### ***Recommendation 6: hepatitis B immunisation for infants***

#### **Who is the target population?**

- Children born to mothers who are hepatitis B-positive.
- Parents of children who are hepatitis B-positive.

### **Who should take action?**

- GPs, health visitors, midwives, neonatal and community paediatricians, nursery and neonatal nurses, support workers and those involved in family nurse partnerships<sup>9</sup>.
- PCT directors of public health and immunisation coordinators.
- Managers and family health and support teams in children's services.
- Managers, health professionals and early years support staff in Sure Start children's centres.
- Commissioners and providers of immunisation services.

### **What action should they take?**

- PCTs should have an identified person responsible for coordinating the local hepatitis B vaccination programme for babies at risk of hepatitis B infection. The person should also be responsible for scheduling and follow-up to ensure babies at risk are vaccinated at the right time. This may involve working within and across several PCT areas.
- A clear process for the local infant hepatitis B vaccination programme should be developed and implemented. Antenatal, postnatal, neonatal, paediatric, primary care and community support teams should communicate effectively and share information so that the children and families affected can be contacted and followed up.
- Babies born to hepatitis B-positive mothers should be given the first dose of the vaccine promptly, whether they are delivered in hospital or at home. They should then receive all other recommended doses, a blood test to

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<sup>9</sup> Under the family nurse partnership programme, specially trained nurses visit some of the most vulnerable young mothers and their families at home, working with them from early pregnancy until the child is aged 2 years.

check for infection and, where appropriate, hepatitis B immunoglobulin, in line with the 'Green book'<sup>10</sup>.

- Health professionals should record the mother's hepatitis B status in the personal child health record as soon as possible after birth, before the midwife hands over care of the baby to the health visitor. The mother's hepatitis B status should also be entered on the child's record in the local Child Health Information System.
- Health professionals should provide parents with information, advice and support on how to prevent the transmission of hepatitis B. They should emphasise the importance of ensuring babies complete the recommended vaccination course at the right time. In addition, they should assess whether or not the baby's siblings need to be immunised against hepatitis B or tested for infection and should offer them vaccinations and blood tests if necessary.
- Health professionals should ensure administered doses of hepatitis B vaccination are recorded in the patient records and the personal child health record.
- All the above actions should be integrated into the local care pathway for infant hepatitis B. (See also NICE clinical guideline 62 on antenatal care at [www.nice.org.uk/CG62](http://www.nice.org.uk/CG62)).

## 2 Public health need and practice

The government is committed to an effective childhood immunisation programme to reduce the incidence of childhood infections such as meningitis C and measles. This commitment is emphasised in the government strategy for children and young people's health (DH 2009a) and the 'National service framework for children, young people and maternity services' (DH 2004). A priority for primary care trusts (PCTs) is to increase the proportion of children who have received all their immunisations (DH 2008a; 2009b).

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<sup>10</sup> Department of Health (2006) Immunisation against infectious disease. London: Department of Health.

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The national childhood immunisation programme is offered routinely through primary care and other health services. However, differences in uptake persist and are associated with a range of social, demographic, maternal- and infant-related factors (Peckham et al. 1989; Samad et al. 2006).

Immunisation coverage varies within and between regions. In most regions except London, overall uptake of diphtheria, tetanus, pertussis, polio, haemophilus influenzae type B, meningitis C and pneumococcal vaccines is above 90%. (These are due to be completed by the time a child is aged 13 months.) However, first doses of measles mumps and rubella (MMR) vaccination levels are below 86% in England. Even lower levels are reported for second doses. Even where coverage appears to be high, there may still be groups of children who are at risk of acquiring vaccine-preventable infections.

### ***Groups at risk***

Evidence has shown that the following groups of children and young people are at risk of not being fully immunised:

- those who have missed previous vaccinations (whether as a result of parental choice or otherwise)
- looked after children
- those with physical or learning disabilities
- children of teenage or lone parents
- those not registered with a GP
- younger children from large families
- children who are hospitalised or have a chronic illness
- those from some minority ethnic groups
- those from non-English speaking families
- vulnerable children, such as those whose families are travellers, asylum seekers or are homeless.

(DH 2005; Hill et al. 2003; Peckham et al. 1989; Samad et al. 2006.)

In addition, some groups are less likely to have received certain vaccines. There is some evidence that uptake of MMR has declined at a greater rate

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among children of more highly educated parents and among those living in more affluent areas (Wright and Polack 2005). Pearce et al. (2008) found that maternal education to degree level was a risk factor for not receiving the MMR triple vaccine. A study of over a million children born in Scotland between 1987 and 2004 found that children of more affluent parents were generally either vaccinated with MMR on time or not at all. In contrast, late MMR vaccination was associated with socioeconomic disadvantage (Friederichs et al. 2006).

An estimated 3 million children aged 18 months to 18 years may have missed either their first or their second MMR vaccination (DH 2008b). The potential exposure of so many children and young people to the measles virus means that there is a risk of a large outbreak. As measles can lead to serious complications – and can even be fatal – PCTs have been supported and funded to help these children have the MMR vaccination during 2008/09 (DH 2008b).

### ***Infant hepatitis B vaccination***

Hepatitis B infection can be transmitted at birth to babies whose mothers are infected with the hepatitis B virus, so all pregnant women should be offered screening for hepatitis B during pregnancy (DH 2006).

If a pregnant woman has chronic hepatitis B infection, the baby should receive an initial dose of the vaccine within 24 hours of birth, with further doses at 1, 2 and 12 months. Some babies, who are particularly at risk, may also need hepatitis B immunoglobulin at birth (DH 2006).

Hepatitis B infection is relatively uncommon in the UK. The rates of chronic infection are higher among groups that have their origins in endemic countries. The incidence of infection is also higher among South Asian and African residents in England and Wales, particularly children (Giraudon et al. 2009; Hahné et al. 2004). Infection in children rarely leads to acute hepatitis; chronic infection is more common and, if untreated, it may result in cirrhosis or liver cancer, leading to liver failure and death.

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Although coverage for the birth dose of the hepatitis B vaccine appears to be high, subsequent vaccinations may be delayed or never received (Sloan et al. 2005). Routine coverage data suggests that coverage at age 12 months is 69%, with considerable variation between regions.

### **3 Considerations**

The Public Health Interventions Advisory Committee (PHIAC) took account of a number of factors and issues when developing the recommendations.

- 3.1 Childhood immunisation is an important part of the Healthy Child programme, formerly known as the Child Health Promotion programme. Children who are not up-to-date with vaccinations may also be behind on other Healthy Child programme activities – or may have other health needs. The parents (including those with parental responsibility) of these children and young people may need additional support, information and encouragement to ensure their children complete the vaccination programme.
- 3.2 The UK childhood immunisation schedule is timed to take into account when children are likely to come into contact with vaccine-preventable infections and when, physiologically, they can produce a protective immune response. It is still important to give vaccinations, even when there has been a delay. But the focus of this guidance is on ensuring children and young people receive them in line with the national recommended schedule.
- 3.3 There was little published evidence on information recording and monitoring systems. However, PHIAC considered that evidence from practice was a valid and appropriate basis for a recommendation. It also recognised the fundamental role that accurate records and effective information systems play in enabling services to identify and contact children and young people who may not be fully immunised.

- 3.4 Most published research on interventions to increase immunisation uptake is non-UK based. Nevertheless, PHIAC judged that some of the evidence was applicable to the UK.
- 3.5 Evidence from other countries suggests that legislation or a proof-of-immunisation requirement for entry to nursery or school does increase vaccine coverage. PHIAC noted that school entry offers an opportunity for checking immunisation status and to provide relevant advice and information. It believes this may be acceptable to parents, those with parental responsibility and schools. However, PHIAC considered that an over-reliance on school entry as a checkpoint for immunisation status could have an adverse impact on timely vaccination in the pre-school years.
- 3.6 PHIAC noted that research carried out around the time of the controversy over MMR may have been influenced by that controversy – and may become less relevant in the future. Research published in 1998 raised concerns about the safety of the MMR vaccine, suggesting a link with autism and certain bowel problems. As a result, some parents chose not to immunise their children, delayed the immunisation or only allowed their children to receive one of the two doses of the vaccine. Further extensive studies have found no evidence to link the vaccine to autism or chronic bowel conditions. However, despite advice from professionals and the DH, some parents remain concerned. The subsequent reduction in vaccination coverage in England has led to outbreaks of measles. More recently, MMR vaccination coverage has slowly begun to increase.
- 3.7 PHIAC acknowledged that there may be various reasons why children and young people might not be up-to-date with their vaccinations. Logistical difficulties associated with large families have been identified as one factor. Other children and young people may be at risk of missing vaccinations because they are not in contact with primary care services. These include those who are

homeless, asylum seekers and drug users (or whose parents are drug users). Children from minority ethnic groups and those whose first language is not English may also be more vulnerable, because services are not flexible enough and information is not provided in a language they understand. Some children from at-risk groups may be in contact with children's services and other health services – but not necessarily immunisation services. This includes young offenders, those in the care of child and adolescent mental health services and looked after children.

- 3.8 Vaccination against some infections can provide indirect benefits to people who are not immunised – so-called 'herd immunity'. The higher the proportion of the population who are vaccinated against an infection, the lower the proportion at risk of becoming infected (and the lower the chance of infection spreading within the population). People who have not been immunised (by choice or for medical reasons) and those in whom immunisation did not produce a protective immune response also benefit from this reduced transmission. Once the proportion of people vaccinated reaches a certain level, there may still be some onward transmission but no epidemics. This level varies for different infections, but it is over 95% coverage for measles. Even if vaccine coverage levels reach the level needed to prevent an epidemic, it is important to maintain these levels unless the infection has been eradicated globally. This is because an infected person may enter the country and could transmit the infection to susceptible people.
- 3.9 The human papillomavirus (HPV) immunisation programme for girls aged 12–13, and a catch-up programme for older girls and young women, was introduced in September 2008. PHIAC was unable to make specific recommendations related to HPV vaccination, as the UK programme was in its infancy.
- 3.10 Young people aged 16 and 17 years can be assumed to have the same capacity as an adult to consent to immunisations and do not

need parental consent, unless there is reason to believe that they do not have that capacity. Young people under the age of 16 can also give consent to immunisation if they fully understand what is proposed. PHIAC recognised that some practitioners, including teachers and social care workers, may not be aware of this. More detailed information about consent is available from the 'Green book' (DH 2006) and the DH website

([www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_4007005](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4007005)).

- 3.11 PHIAC recognised the importance of leadership from GPs and health visitors, working with a wide range of professionals and staff from different sectors, to provide effective immunisation services for all children and young people. GPs and health visitors can also provide important additional support to those working with children who are at increased risk of not being immunised and their families.
- 3.12 PHIAC noted that health visitors have the lead role in the delivery of the Healthy Child programme. The health visiting team is responsible for working with parents and families to ensure children aged under 5 years are offered – and are able to receive – all vaccinations, as specified in the immunisation schedule.
- 3.13 PHIAC recognised the importance of information sharing and communication between health and social care services to ensure looked after children's records are passed on if they move.
- 3.14 PHIAC focused on the infant hepatitis B vaccination programme because the earlier a child is infected the more likely they are to become a chronic carrier and develop cirrhosis and liver cancer. In addition, this programme is not well understood nor widely implemented. PHIAC did not consider the hepatitis B vaccination programme for any other age group.
- 3.15 Economic modelling was carried out for measles vaccination, as an important example of a universal vaccination in the UK. It was also

carried out for hepatitis B vaccination among at-risk neonates, as an important example of a targeted vaccination in the UK.

- 3.16 Economic modelling showed that, at current levels of immunisation, efforts to increase uptake of the measles vaccine were highly cost effective in groups with both high and low immunisation coverage. Increasing uptake among low-coverage groups was shown to be marginally more efficient than increasing uptake among high-coverage groups. (This is true if the cost per child were the same in each group.) It would also do more to reduce health inequalities. The modelling suggested that home visits (likely to be the most expensive means of increasing coverage by one percentage point) would be a cost effective use of NHS resources. The implication is that almost any method of increasing coverage would be cost effective. The model underestimated the cost effectiveness of the MMR vaccine because it did not ascribe any benefits to the concurrent prevention of mumps and rubella infection. (The vaccine offers simultaneous protection against three different infections.)
- 3.17 Economic modelling demonstrates that the current UK infant hepatitis B vaccination programme, whereby immunisation is targeted at babies of mothers who are hepatitis B-positive, is cost saving. The analysis suggests that considerable additional resources could be invested to improve timely uptake, and the programme would still be cost effective.

## **4 Implementation**

NICE guidance can help:

- NHS organisations, social care and children's services meet the requirements of the DH's 'Operating framework for 2008/09' and 'Operational plans 2008/09–2010/11'.
- NHS organisations, social care and children's services meet the requirements of the Department of Communities and Local Government's

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'The new performance framework for local authorities and local authority partnerships'.

- National and local organisations within the public sector meet government indicators and targets to improve health and reduce health inequalities.
- Local authorities fulfil their remit to promote the economic, social and environmental wellbeing of communities.
- Local NHS organisations, local authorities and other local public sector partners benefit from any identified cost savings, disinvestment opportunities or opportunities for re-directing resources.
- Provide a focus for multi-sector partnerships for health, such as local strategic partnerships.

NICE has developed tools to help organisations put this guidance into practice. For details see our website at [www.nice.org.uk/PH21](http://www.nice.org.uk/PH21)

## 5 Recommendations for research

PHIAC recommends that the following research questions should be addressed. It notes that 'effectiveness' in this context relates not only to the size of the effect, but also to cost effectiveness and duration of effect. It also takes into account any harmful or negative side effects.

1. What are the most effective and cost effective ways of increasing immunisation uptake among looked after children and young people and other population groups at risk of being only partially immunised or not immunised at all?
2. What are the most effective and cost effective ways of modifying services to increase vaccine uptake among children and young people, particularly those at risk of not being immunised, or of being only partially immunised? Does this vary by population subgroups? Examples might include home visits, changes in information provision and the

introduction of opportunities to discuss immunisation before vaccines are given.

3. What are the most effective and cost effective ways of providing parents of children and young people with information to encourage timely immunisation? Specifically, what are the most effective and cost effective ways of providing information to reach those who are particularly at risk of not being immunised or only partially immunised?
4. How effective – and how acceptable to the public – are quasi-mandatory and incentive schemes for immunisation? (Examples of the former are schemes linked to nursery or school entry.) What impact do such schemes have on the timely uptake of vaccinations?
5. Does giving incentives to immunisation providers increase immunisation rates in the UK? For example, how does community target setting, or changes in targets or payment systems, affect immunisation coverage?

More detail on the gaps in the evidence identified during development of this guidance is provided in appendix D.

## **6 Updating the recommendations**

This guidance will be updated as needed. Information on the progress of any update will be posted at [www.nice.org.uk/PH21](http://www.nice.org.uk/PH21)

## **7 Related NICE guidance**

### ***Published***

Antenatal care. NICE clinical guideline 62 (2008). Available from [www.nice.org.uk/CG62](http://www.nice.org.uk/CG62)

Behaviour change. NICE public health guidance 6 (2007). Available from [www.nice.org.uk/PH6](http://www.nice.org.uk/PH6)

Prevention of sexually transmitted infections and under 18 conceptions. NICE public health guidance 3 (2007). Available from [www.nice.org.uk/PH3](http://www.nice.org.uk/PH3)

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Postnatal care. NICE clinical guideline 37 (2006). Available from [www.nice.org.uk/CG37](http://www.nice.org.uk/CG37)

Clinical diagnosis and management of tuberculosis, and measures for its prevention and control. NICE clinical guideline 33 (2006). Available from [/www.nice.org.uk/CG33](http://www.nice.org.uk/CG33)

### ***Under development***

Bacterial meningitis and meningococcal septicaemia in children. NICE clinical guideline (publication expected June 2010)

Looked after children. NICE public health guidance (publication expected September 2010)

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Sloan D, Ramsay M, Prasad L et al. (2005) Prevention of perinatal transmission of hepatitis B to babies at high risk: an evaluation. *Vaccine* 23: 5500–8

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Wright JA, Polack C (2005) Understanding variation in measles-mumps-rubella immunization coverage: a population-based study. *European Journal of Public Health* 16: 137–42

## **Appendix A Membership of the Public Health Interventions Advisory Committee (PHIAC), the NICE project team and external contractors**

### ***Public Health Interventions Advisory Committee***

NICE has set up a standing committee, the Public Health Interventions Advisory Committee (PHIAC), which reviews the evidence and develops recommendations on public health interventions. Membership of PHIAC is multidisciplinary, comprising public health practitioners, clinicians (both specialists and generalists), local authority officers, teachers, social care professionals, representatives of the public, patients and/or carers, academics and technical experts as follows.

**Professor Sue Atkinson CBE** Independent Consultant and Visiting Professor, Department of Epidemiology and Public Health, University College London

**Mr John F Barker** Associate Foundation Stage Regional Adviser for the Parents as Partners in Early Learning Project, DfES National Strategies

**Professor Michael Bury** Emeritus Professor of Sociology, University of London. Honorary Professor of Sociology, University of Kent

**Professor K K Cheng** Professor of Epidemiology, University of Birmingham

**Ms Joanne Cooke** Programme Manager, Collaboration and Leadership in Applied Health Research and Care for South Yorkshire

**Dr Richard Cookson** Senior Lecturer, Department of Social Policy and Social Work, University of York

**Mr Philip Cutler** Forums Support Manager, Bradford Alliance on Community Care

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**Ms Lesley Michele de Meza** Personal, Social, Health and Economic (PSHE) Education Consultant, Trainer and Writer

**Professor Ruth Hall** Regional Director, Health Protection Agency, South West

**Ms Amanda Hoey** Director, Consumer Health Consulting Limited

**Mr Alasdair J Hogarth** Head Teacher, Archbishops School, Canterbury

**Mr Andrew Hopkin** Assistant Director, Local Environment, Derby City Council

**Dr Ann Hoskins** Director, Children, Young People and Maternity, NHS North West

**Ms Muriel James** Secretary, Northampton Healthy Communities Collaborative and the King Edward Road Surgery Patient Participation Group

**Dr Matt Kearney** General Practitioner, Castlefields, Runcorn. GP Public Health Practitioner, Knowsley PCT

**Ms Valerie King** Designated Nurse for Looked After Children, Northampton PCT, Daventry and South Northants PCT and Northampton General Hospital. Public Health Skills Development Nurse, Northampton PCT

**CHAIR Professor Catherine Law** Professor of Public Health and Epidemiology, UCL Institute of Child Health

**Mr David McDaid** Research Fellow, Department of Health and Social Care, London School of Economics and Political Science

**Mr Bren McInerney** Community Member

**Professor Susan Michie** Professor of Health Psychology, BPS Centre for Outcomes Research and Effectiveness, University College London

**Dr Stephen Morris** Professor of Health Economics, Department of Epidemiology and Public Health, University College London

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**Dr Adam Oliver** RCUK Senior Academic Fellow, Health Economics and Policy, London School of Economics

**Dr Mike Owen** General Practitioner, William Budd Health Centre, Bristol

**Dr Toby Prevost** Reader in Medical Statistics, Department of Public Health Sciences, King's College London

**Ms Jane Putsey** Lay Representative, Chair of Trustees of the Breastfeeding Network

**Dr Mike Rayner** Director, British Heart Foundation Health Promotion Research Group, Department of Public Health, University of Oxford

**Mr Dale Robinson** Chief Environmental Health Officer, South Cambridgeshire District Council

**Ms Joyce Rothschild** Children's Services Improvement Adviser, Solihull Metropolitan Borough Council

**Dr Tracey Sach** Senior Lecturer in Health Economics, University of East Anglia

**Professor Mark Sculpher** Professor of Health Economics, Centre for Health Economics, University of York

**Dr David Sloan** Retired Director of Public Health

**Dr Stephanie Taylor** Reader, Applied Research, Centre for Health Sciences, Barts and The London School of Medicine and Dentistry

**Dr Stephen Walters** Reader, Medical Statistics, University of Sheffield

**Dr Dagmar Zeuner** Joint Director of Public Health, Hammersmith and Fulham PCT

**Expert co-optees to PHIAC:**

**Dr Helen Bedford** Senior Lecturer in Children's Health, UCL Institute of Child Health, London

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**Dr David Elliman** Consultant Community Paediatrician, Great Ormond Street Hospital NHS Trust and Haringey Teaching PCT

**Professor Andrew Hall** Chairman, Joint Committee on Vaccination and Immunisation

**Dr Anthony Harnden** Lecturer in General Practice, Department of Primary Care, University of Oxford

**Dr Mary Ramsay** Consultant Epidemiologist, Health Protection Agency Centre for Infections

**Expert testimony to PHIAC:**

**Professor John Edmunds** Infectious Disease Epidemiology Unit, London School of Hygiene and Tropical Medicine

**Professor David Salisbury** Head of Immunisation, Department of Health

***NICE project team***

**Mike Kelly**

CPHE Director

**Tricia Younger**

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**Nichole Taske**

Analyst

**Kay Nolan**

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**Chris Carmona**

Analyst

**Patti White**

Analyst

NICE public health guidance 21 Reducing differences in the uptake of immunisations

**Alastair Fischer**

Technical Adviser (Health Economics)

***External contractors***

**Reviewers: effectiveness review**

Review 1: 'Review of the evidence of the effectiveness and cost effectiveness of interventions to address differences in the uptake of immunisations (including targeted vaccines) in people younger than 19 years' was carried out by the National Collaborating Centre for Women's and Children's Health. The principal authors were: Jane Tuckerman, Nina Balachander, Sharangini Rajesh, Ceri Oeppen, Anna Bancsi, Paul Jacklin, Jay Banerjee and Andrew Clegg.

**Reviewers: economic analysis**

Analysis one: 'The impact of increasing vaccine coverage on the distribution of disease: measles in the UK' was carried out by the London School of Hygiene and Tropical Medicine. The principal authors were: John Edmunds and Albert Jan Van Hoek (Health Protection Agency).

Analysis two: 'An exploration of the cost-effectiveness of interventions to reduce the difference in uptake of childhood immunisations in the UK using threshold analysis' was carried out by the National Collaborating Centre for Women's and Children's Health. The principal author was Paul Jacklin.

Analysis three: 'The estimated cost-effectiveness of vaccination in infants born to hepatitis B virus positive mothers' was carried out by the London School of Hygiene and Tropical Medicine. The principal authors were: John Edmunds and Mary Ramsay.

**Fieldwork**

The fieldwork report, 'Reducing differences in the uptake of immunisations (including targeted vaccines) in children and young people aged under 19 years' was carried out by Greenstreet Berman Ltd.

## **Appendix B Summary of the methods used to develop this guidance**

### ***Introduction***

The review and economic analysis include full details of the methods used to select the evidence (including search strategies), assess its quality and summarise it.

The minutes of the PHIAC meetings provide further detail about the Committee's interpretation of the evidence and development of the recommendations.

All supporting documents are listed in appendix E and are available at [www.nice.org.uk/PH21](http://www.nice.org.uk/PH21)

### ***Guidance development***

The stages involved in developing public health intervention guidance are outlined in the box below.

1. Draft scope released for consultation
2. Stakeholder meeting about the draft scope
3. Stakeholder comments used to revise the scope
4. Final scope and responses to comments published on website
5. Evidence review(s) and economic analysis undertaken
6. Evidence and economic analysis released for consultation
7. Comments and additional material submitted by stakeholders
8. Review of additional material submitted by stakeholders (screened against inclusion criteria used in review/s)
9. Evidence and economic analysis submitted to PHIAC
10. PHIAC produces draft recommendations
11. Draft guidance released for consultation and for field testing
12. PHIAC amends recommendations
13. Final guidance published on website
14. Responses to comments published on website

### ***Key questions***

The key questions were established as part of the scope. They formed the starting point for the reviews of evidence and were used by PHIAC to help develop the recommendations. The overarching questions were:

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What interventions are effective and cost effective at reducing differences in immunisation uptake in children and young people 19 years or younger?

What are the views and experiences of parents and carers, those receiving and those delivering either immunisations themselves or interventions to increase uptake of immunisations in the UK to children and young people 19 years or younger?

### ***Reviewing the evidence of effectiveness***

A review of effectiveness was conducted for each intervention that reduces differences in immunisation uptake.

### **Identifying the evidence**

The following databases were searched for published literature (1 January 1988 to 31 March 2008):

- ASSIA
- Campbell Collaboration
- CINAHL
- Cochrane Library (Cochrane Database of Systematic Reviews and Database of Abstracts of Reviews of Effectiveness [DARE])
- Embase
- Eppi-centre databases
- ERIC
- Medline
- PsycINFO
- Sociological Abstracts

The review team contacted relevant external people for additional information and also searched the following websites for relevant studies:

- CDC
- American Academy of Pediatrics
- Canadian Coalition for Immunization awareness and Promotion
- Canadian Pediatric Society

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- Department of Health
- DIPEX: personal experiences of health and illness
- European Centre for Disease Prevention and Control
- Eurosurveillance
- Evidence for Social Policy and Practice Co-ordinating Centre
- Health Evidence Bulletins Wales
- Health Protection Agency
- Health Protection Scotland
- Immunisation advisory centre
- Immunise Australia
- Intute (previously OMNI)
- National Centre for Immunisation Research and Surveillance
- NHS Quality Improvement Scotland
- NHS Wales
- Public Health Organization of Canada
- Scottish Intercollegiate Guidelines Network (SIGN)
- US Centers for Disease Control and Prevention
- Vaccine Education Center, Philadelphia Children's Hospital
- World Health Organization

Further details of the databases, search terms and strategies are included in the review reports.

### **Selection criteria**

Qualitative studies were included in the effectiveness review if:

- they took place in the UK
- they reported on the knowledge, attitudes, values and beliefs relating to immunisations for children and young people under 19 years
- they reported on immunisation uptake rates in people under 19.

Quantitative and economic studies were included in the effectiveness review if they reported on interventions that seek to reduce differences in the uptake of

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universal or targeted vaccination programmes for children and young people under 19 years.

Studies were excluded if they:

- were published in a language other than English
- were conducted in developing countries
- reported interventions that sought to reduce differences in the uptake of immunisations in people aged 19 or older
- explored the setting of national immunisation strategies, policies, priorities and targets
- targeted vaccination of young people at occupational risk of infection (for example, vaccination of healthcare workers for hepatitis B and varicella)
- targeted vaccination of children and young people travelling to countries with increased prevalence of infectious agents (for example, vaccination for typhoid, rabies or tick-borne encephalitis)
- targeted vaccination of children and young people who were clinically at risk of infection with a vaccine-preventable disease as a result of an underlying condition (for example, vaccination of asplenic or immunocompromised people for pneumococcal or Haemophilus influenzae type b infections)
- aimed to increase uptake of single vaccines for measles, mumps and rubella
- did not report findings from primary research (for example, were secondary reviews of the literature)
- were published before 1988
- were published as abstracts only or were not held by the British Library.

The evidence in this review was subject to further analysis and revision. This revision was carried out by NICE.

The revised analysis excluded studies if they were not transferrable to the UK context. It also excluded studies if they:

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- involved the provision of free vaccines either alone or as part of a health insurance package
- involved immunisation-linked, provider payments on a capitation or fee-for-service basis
- reported baseline coverage levels of less than 70% (with the exception of MMR coverage)
- presented post-intervention and control (no-intervention) levels less than 70% (however, if multiple vaccines or age groups were considered and at least one baseline level was greater than 70%, then the study was included)
- aimed to increase uptake of human papillomavirus vaccine.

### **Quality appraisal**

Included papers were assessed for methodological rigour and quality using the NICE methodology checklist, as set out in the NICE technical manual 'Methods for the development of NICE public health guidance' (see appendix E). Each study was graded (++, +, –) to reflect the risk of potential bias arising from its design and execution.

### ***Study quality***

- ++ All or most of the methodology checklist criteria have been fulfilled. Where they have not been fulfilled, the conclusions are thought very unlikely to alter.
- + Some of the methodology checklist criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are thought unlikely to alter the conclusions.
- Few or no methodology checklist criteria have been fulfilled. The conclusions of the study are thought likely or very likely to alter.

### **Summarising the evidence and making evidence statements**

The review data was summarised in the revised analysis and in evidence tables.

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The findings from the revised analysis were synthesised and used as the basis for a number of evidence statements relating to each key question. The evidence statements were prepared by NICE. The statements reflect their judgement of the strength (quantity, type and quality) of evidence and its applicability to the populations and settings in the scope.

### ***Economic analysis***

The economic analysis consisted of a review of economic evaluations and a cost-effectiveness analysis which consisted of three economic models.

#### **Review of economic evaluations**

The following databases were searched for the period from 1 January 1988 to 31 March 2008:

- Health Economics Evaluation Database(HEED)
- Econlit (1969–March 2008)
- Health Technology Assessment
- NHS Economic Evaluation Database (NHS EED).

#### **Cost-effectiveness analysis**

An economic model for measles was constructed ‘The impact of increasing vaccine coverage on the distribution of disease: measles in the UK’. Further results are reported in: ‘An exploration of the cost-effectiveness of interventions to reduce the difference in uptake of childhood immunisations in the UK using threshold analysis’.

Additional economic modelling was undertaken to produce: ‘The estimated cost-effectiveness of vaccination in infants born to hepatitis-B-virus-positive mothers’. The three economic modelling reports are available on the NICE website at: [www.nice.org.uk/PH21](http://www.nice.org.uk/PH21)

### ***Fieldwork***

Fieldwork was carried out to evaluate how relevant and useful NICE's recommendations are for practitioners and how feasible it would be to put them into practice. It was conducted with practitioners and commissioners

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who are involved in immunisation within primary care, public health and children's services in the NHS.

The fieldwork comprised two studies commissioned to ensure ample geographical coverage:

- Seven workshops carried out in Birmingham, Brighton, London and Manchester with a range of practitioners including immunisation coordinators, nurses, paediatricians, GPs and directors of public health.
- Thirty telephone interviews with a range of professionals including practice nurses and managers, community and neonatal paediatricians and those involved in PCT information services.

The main issues arising from the two studies are set out in appendix C under 'Fieldwork findings'. The full fieldwork report, 'Reducing differences in the uptake of immunisations (including targeted vaccines) in children and young people aged under 19 years' is available at [www.nice.org.uk/PH21](http://www.nice.org.uk/PH21)

### ***How PHIAC formulated the recommendations***

At its meetings in October 2008, January, March and June 2009, PHIAC considered the evidence of effectiveness and the revised analysis, plus the cost effectiveness to determine:

- whether there was sufficient evidence (in terms of quantity, quality and applicability) to form a judgement
- whether, on balance, the evidence demonstrates that the intervention is effective, ineffective or equivocal
- where there is an effect, the typical size of effect.

PHIAC developed draft recommendations through informal consensus, based on the following criteria.

- Strength (quality and quantity) of evidence of effectiveness and its applicability to the populations/settings referred to in the scope.
- Effect size and potential impact on the target population's health.

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- Impact on inequalities in health between different groups of the population.
- Cost effectiveness (for the NHS and other public sector organisations).
- Balance of risks and benefits.
- Ease of implementation and any anticipated changes in practice.

Where possible, recommendations were linked to an evidence statement(s) (see appendix C for details). Where a recommendation was inferred from the evidence, this was indicated by the reference 'IDE' (inference derived from the evidence).

The draft guidance, including the recommendations, was released for consultation in May 2009. At its meeting in June 2009, PHIAC amended the guidance in light of comments from stakeholders, experts and the fieldwork. The guidance was signed off by the NICE Guidance Executive in August 2009.

## Appendix C The evidence

This appendix lists evidence statements from the revised analysis of the review of effectiveness (see appendix A and B) and links them to the relevant recommendations. The evidence statements are presented here without references – these can be found in the full review (see appendix E for details). It also sets out a brief summary of findings from the economic analysis and the fieldwork

**Evidence statement 7** indicates that the linked statement is numbered 7 in the revised review of effectiveness.

The review, economic analysis and fieldwork report are available at [www.nice.org.uk/PH21](http://www.nice.org.uk/PH21) Where a recommendation is not directly taken from the evidence statements, but is inferred from the evidence, this is indicated by **IDE** (inference derived from the evidence) below.

**Recommendation 1:** evidence statements 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 38, 39, 40, 41, 47, 48, 49, 51, 52, 55, 61; IDE

**Recommendation 2:** IDE

**Recommendation 3:** evidence statements 25, 26, 27, 28; IDE

**Recommendation 4:** evidence statements 20, 41; IDE

**Recommendation 5:** evidence statements 16, 43, 48, 49, 51

**Recommendation 6:** 66; IDE

### ***Evidence statements***

#### **Evidence Statement 5**

There is mixed evidence from three RCT's, all from the USA, as to the effectiveness at increasing immunisation uptake of reminder/recall interventions targeting families of low socioeconomic status. One RCT ([++] N=601 [n is the number of participants]) found that reminder postcards in advance of appointments with follow-up postcards and phone calls if the

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appointment is missed significantly increased the number of infants up-to-date with immunisations compared with families that only received a single reminder postcard if they failed to keep the appointment. The second RCT ([+] N=1273) found that although postcard and telephone reminders in advance of an appointment significantly increased vaccination coverage in infants who were not up-to-date at baseline compared with families who didn't receive a reminder, there was no significant difference in overall vaccination coverage rates between reminder and control groups. Finally, one RCT ([-] N=222) found that although more children of families who received a computer-generated phone message in advance of an appointment were vaccinated within 1 month of being due compared with families who didn't receive a reminder, the difference was not significant.

### **Evidence Statement 6**

There is mixed evidence from three studies from the USA: two RCTs (both -) and one non-randomised controlled trial (nRCT) (+) as to the effectiveness of universal reminder/recall interventions for children aged under 2 years. Two studies found that compared with children who received no contact, reminders comprising either mailed postcards or computer-generated telephone messages in advance of appointments increased uptake of DTP (RCT [-] N=1138) and DTP, OPV, Hib, and MMR (n-RCT[+] N=213). Conversely, one RCT found that letters comprising either a health message or a message reminding parents that vaccination is compulsory under state law had no significant impact on vaccine coverage at 7 months compared with a control group that received no reminder/recall letters ( [-] N=1351).

### **Evidence statement 7**

There is evidence from one RCT ([++] n=169) from Australia that a home vaccination service for children who were behind on the recommended immunisation schedule (DTP/OPV/Hib or MMR) significantly improved vaccination coverage compared with children who did not receive a home-based vaccination service.

### **Evidence statement 8**

There is evidence from one BA study ([+] n=1075) from the USA that a community-based outreach programme comprising home visits to a large public housing development to identify children and pregnant women significantly improved children's vaccination coverage in this population.

There is evidence from one RCT ([+] n=220) from the USA that a community-based outreach programme comprising seven home visits during the baby's first 15 months of life together with advice and support for mothers is as effective at ensuring age-appropriate immunisations regardless of whether it is delivered on a one-to-one basis or a group basis. (See also evidence statement 45.)

### **Evidence statement 10**

There is evidence from one RCT from the USA reported in two articles ([+] and [-] n=102) to suggest that an intervention targeting pregnant adolescents which incorporated intensive home visits (approximately 17 antenatal and postnatal visits) extended from pregnancy to 1 year postpartum significantly improved vaccination uptake at age 12 months compared with a control group that received one or two visits. Evaluation of the programme at 24 months postpartum found that the intervention group was less likely than the control group to be up-to-date with immunisations, although more than 40% of participants had been lost to follow-up by 24 months, limiting the reliability of this finding.

### **Evidence statement 11**

There is evidence from one RCT ([++] n=152) from Australia to suggest that regular home visits up to 6 months postpartum by midwives to new mothers who were illicit drug users did not significantly increase age-appropriate vaccination rates of newborns at 2, 4 or 6 months compared with a control group who received telephone contact at 2 months and a home visit at 6 months. Vaccination rates at 2 and 4 months were higher (although not significantly) in the intervention group compared with control.

## **Evidence statement 12**

Conceptions of the severity of vaccine-preventable diseases: There is evidence from a focus group study with 66 parents (+) and an interview study with 22 parents (++) that many parents lacked knowledge about immunisations and vaccine-preventable diseases, their incidence in the UK and their severity.

There is evidence from 20 surveys of mothers of children aged under 3 years (n=15,000) carried out over a 10-year period from 1991 to 2001 (+) that the perceived severity of vaccine-preventable diseases has changed over time, with the perceived severity of some diseases having decreased (diphtheria, pertussis and polio), increased (meningitis C), remained stable (tetanus and mumps), or varied (Hib, measles and rubella).

There is conflicting evidence as to the relationship between how severe vaccine-preventable diseases are perceived to be by parents and the likelihood of their children having completed their immunisations. A postal survey of 44 parents (-) suggested that parents of children with incomplete immunisations were less likely to see childhood diseases as being severe. Conversely, an interview study with 759 parents (-) found that there were few differences between the beliefs of parents who had and had not had their children immunised regarding incidence and severity of vaccine-preventable diseases.

There was evidence from two qualitative studies with parents living in inner-city settings to suggest that vaccine-preventable childhood diseases were perceived to be severe or serious. One interview and focus group study with 21 Somali, Pakistani and African-Caribbean mothers (+) found that the severity and incidence of childhood diseases was perceived as high. Likewise, a survey of orthodox Jewish parents (n=67) in London found that most parents perceived vaccine-preventable diseases such as measles as being very serious or serious (+).

However, three studies found that there were mixed views on how serious different vaccine-preventable diseases were perceived to be. One recent

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interview study undertaken in October and November 2006 with mothers of children aged under 3 years (n=1016) found that meningitis was perceived as being the most severe disease, while measles, mumps and rubella were seen as being the least severe (++) . One questionnaire study with 68 parents in an inner-city setting (+) found that meningitis was perceived to be the most serious disease, with pertussis, diphtheria and measles being perceived as serious or very serious and rubella being perceived as mild. One interview study with 13 parents in an inner-city setting (-) found that diphtheria, tetanus and polio were perceived as serious, whilst measles, mumps and rubella were perceived as mild.

There is evidence from one focus group study (++) with 25 orthodox Jewish mothers and 10 local healthcare workers from an orthodox Jewish community in North East London found that the separation of the community from outside influence led to feelings of safety and a lack of need for the BCG vaccination, a situation that local healthcare providers occasionally supported, although this was not done consistently.

### **Evidence statement 13**

Misconceptions about the safety of vaccines: There is evidence from one study comprising 20 surveys of mothers of children aged under 3 years carried out over 10 years ([+] n=15,000) that most mothers (more than 90%) trust the safety of immunisations. However, there is evidence from five studies that some mothers and parents consider the risks of vaccines to be greater than the risks of acquiring vaccine-preventable diseases ([++] n=18,488; [-] n=87; [+] n=68; [-] n=29; [-] n=13).

There is evidence to suggest that a range of perceived risks of immunisation may influence some parental decisions to delay or avoid immunisations for their children, as suggested by a postal questionnaire with 87 parents (-), a nationally representative interview survey with 18,488 mothers (++) , and a postal survey of 44 parents (-). A fear of vaccines being contraindicated for existing medical conditions such as eczema was indicated by some parents (proportion not stated) in an interview study with 759 parents (-). Concerns

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about combined antigens putting too much stress on a baby's immune system were identified by three studies ([+] n=72; [++] n=22; [-] n=44).

There is evidence from one survey (n=NR) that reported that one in three parents of children aged 0–2 years worry about the effect of multiple vaccines and too many vaccinations on the child. One in three parents had some concern over the immunisation process, with the principle concerns being around a lack of information and worries about the effect on the child, but also concern about the way health professionals carry out immunisation appointments (a perceived lack of empathy, concern and time, in particular[-]).

There is evidence from an interview study with 10 orthodox Jewish mothers (-) that mothers' fears of adverse reactions to vaccines were a reason for low uptake. A multi-method study with 21 Somali, Pakistani and African-Caribbean mothers (+) indicated that none of the mothers knew anyone who had suffered an adverse reaction to immunisation and all were positive about immunisation.

A study which included focus groups with health professionals (-) found that health professionals thought that parents' fears of side effects were a reason for low uptake and that in close-knit communities negative reports about immunisation were perpetuated.

Some studies indicated that parents making the decision to immunise their children weighed up the risks and benefits of immunisation as they perceived them, as illustrated in a postal questionnaire with 87 parents (-), an interview study with 13 parents in an inner-city setting (-), a questionnaire study with 68 parents in an inner-city setting (+) and an interview study with 19 mothers and 10 health professionals (-). However, the decision-making process is complicated and different parents in different studies raised differing perceptions of risks and benefits.

#### **Evidence statement 14**

Information sources: Evidence from 20 surveys carried out over 10 years involving 15,000 mothers (+) suggests that the majority of parents discuss

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immunisation with a health professional before uptake. However, the same study and an interview study with 759 parents (-) found that a substantial minority did not. There is also evidence from two studies to suggest that some health professionals would like more time to discuss immunisation with parents and that some health professionals worried about 'overloading' parents with information particularly if it might cause otherwise compliant parents not to immunise their children ([+] n=22 health visitors; [+] n=58 primary healthcare professionals).

There is evidence from five studies which suggest that parents find health professionals, NHS literature, friends and the media (including television and the Internet) to be important sources of information on immunisation ([+] n=859 parents; [+] n=278 parents and n=322 health professionals; [-] n=44 parents; [-] n=NR; [-] n=759).

### **Evidence statement 15**

Satisfaction with information sources: There is evidence from two UK postal surveys that found that although the majority of parents (70%) were satisfied with information on immunisation, parents of fully immunised children were more likely to be satisfied with available information than parents whose children were unimmunised or only partially immunised ([+] n=859 parents of children aged 18–24 months; [-] n=20 parents). However, there is also evidence from one study from Scotland that found that an investigation of parents' beliefs indicated dissatisfaction with the information provided by NHS leaflets and professionals ([+] n=278 parents).

There is evidence from an interview study with 13 parents in an inner-city setting who had chosen not to immunise their children (-), and a questionnaire study with 68 parents in an inner-city setting with children with incomplete immunisation (+) to suggest that some parents mistrusted the information provided (proportion not reported in the first study, 28% in the second study), because they perceived that the information exaggerated the efficacy of vaccines and did not adequately acknowledge the potential side effects of vaccines.

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A postal questionnaire including 278 parents in Scotland (+) found that parents of children with incomplete immunisations were more likely to rely on information from the media (including the Internet) and friends and were less likely to have discussed immunisation with a health professional, compared with parents with completely immunised children. Similar results were found by a postal survey of 44 parents (24 of whom had completely immunised children and 20 of whom had partially or unimmunised children [-]).

A postal questionnaire study of 859 parents reported that there were mixed views on the preferred timing of information (for example, either before the baby's birth, at the first health visitor's visit or at the 6–8 week postnatal check[+]).

### **Evidence statement 16**

Tailoring information to population subgroups: Three studies (two [+] and one [-]) indicated a need to tailor immunisation information to particular groups. There is evidence from a multi-method study with 21 Somali, Pakistani and African-Caribbean mothers (+) and an interview study with 22 health visitors (+) that there are concerns about the accessibility of immunisation literature (whether translated or not), particularly for migrants with low levels of literacy. Concerns were also raised by African-Caribbean mothers in one study (+) who were dissatisfied with the lack of ethnic minority representations in literature on immunisation. Two studies, one interview study with orthodox Jewish mothers (n=10) in London (-) and another focus group study with 25 orthodox Jewish mothers and 10 local healthcare workers from an orthodox Jewish community in North East London (++) found that the research participants felt 'cut off' from the media as a source of information and instead relied on sources of information within their social networks.

### **Evidence statement 20**

There is evidence from an interview study with head teachers (n=31), school nurses (n=12) and parents (of n=1411 children) in inner-city London (+) that the majority of head teachers would be in favour of asking about immunisation

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status on school entry, and would be prepared to recommend that parents had their children fully immunised before school entry.

### **Evidence statement 25**

Poor knowledge of the benefits and risks of vaccines: There is evidence from one questionnaire study with 174 health professionals in Liverpool (-) and one postal questionnaire including 116 health visitors and practice nurses in Scotland (+) to suggest that there are mixed views from health professionals about what constitutes a contraindication to some vaccines.

There is evidence from one questionnaire study (-) of health professionals (n=120; midwives, nurses, allied professionals and doctors) from an acute hospital in England that found that less than 50% could accurately identify which babies should receive a neonatal BCG vaccine.

There is evidence from one recent survey (n=NR) of GPs (31% response rate), health visitors (63%) and practice nurses (63%) that found one-third of health professionals who stated concerns about immunisation reported their main concern as being that babies were given too many immunisations (-). Similar concerns were reported in a postal questionnaire of 116 health visitors and practice nurses in Scotland (+) that found that several health professionals (n=NR) were concerned about the ability of babies' immune systems to cope with vaccines. Other concerns raised by health professionals included difficulties with the practicalities of administering the number of vaccinations in the current schedule, the complexity of and changes to the schedule, and difficulties with keeping up-to-date (-).

There is evidence from one questionnaire study (-) that found that health professionals (health visitors, school nurses and clinical medical officers) judged that different vaccines offered different levels of protection with pertussis and measles vaccines being given lower scores than others. The study also found that more health professionals thought it very important to prevent diphtheria, tetanus, pertussis and polio, but fewer thought measles prevention to be very important.

### **Evidence statement 26**

Health professionals views on immunisation education and training: There is evidence from two surveys from the UK that found that most health professionals (including health visitors and practice nurses) surveyed would like further education or training on immunisation ([-] n=174; [+] n=116). Recent evidence from one survey (n=NR) of GPs (31% response rate), health visitors (63%) and practice nurses (63%) found that compared with GPs, health visitors and practice nurses were more likely to be aware of immunisation training (89% of health visitors versus 94% of practice nurses versus 49% of GPs) and their local immunisation coordinator (89% of health visitors versus 94% of practice nurses versus 49% of GPs). The study also found that health visitors and practice nurses were more likely to have attended 1–2 sessions of immunisation training in the preceding 2 years than were GPs (69% of health visitors versus 72% of practice nurses versus 64% of GPs; p value not reported; [-]).

### **Evidence statement 27**

Information sources for health professionals: There is evidence from two surveys that found that DH publications (including the 'Green book' and Chief Medical Officer letters or updates) and NHS information and publications are important and frequently used sources of information for GPs, health visitors and practice nurses (one [-] and one [+]). One study reported that in addition to being the most frequently used source of information, DH/NHS information and publications were the most useful source of information. The DH website was mentioned most frequently (21% of GPs versus 46% of health visitors versus 36% of practice nurses). The NHS Immunisation Information website was the second most commonly mentioned Internet site (6% of GPs versus 23% of health visitors versus 18% of practice nurses). GPs continued to be least likely to use the 'Green book' often (39%) with greater use among health visitors (of whom 46% used it often) and practice nurses (with 71% using it often and 25% using it very often).

There is evidence from one recent survey that found that health professionals' (including GPs, health visitors and practice nurses) preferred format for the

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DH 'Green book' was hard copy (around 30% in each group), with very few preferring an Internet-only version (-).

There is evidence from one recent survey that found that other sources of information on immunisation used by health professionals included medical and nursing journals, the media (for example, television, radio and newspapers), trust and professional body guidelines and the Internet. Among health visitors and practice nurses there appeared to be widespread use of a large variety of information sources, with GPs generally using a more restricted range of materials (-).

### **Evidence statement 28**

There is evidence from four UK studies (one ITS [+] and three BA [-]) that education and training for health professionals (including midwives, health visitors, GPs and paediatricians) in the implementation of targeted neonatal BCG vaccination policies (comprising identification and referral of at-risk neonates; administration of the BCG vaccine, identification of contraindications etc) was effective at increasing the proportion of at-risk neonates that received timely vaccination (Gill and Scott, 1998; one ITS [+] and three BA [-];).

### **Evidence statement 38**

There is evidence from a focus group study of 48 parents which found that some (not further quantified) parents felt that opportunistic immunisation of children in accident and emergency departments, or during a hospital admission, was both inappropriate and distressing (+).

### **Evidence statement 39**

There is strong evidence from seven studies from the UK (one BA [-] and one BA [+]), USA (one RCT [+]; one BA [++]; one BA [+]; one cohort [-]), and Australia (one BA [+]), that hospital-based opportunistic immunisation strategies are effective for increasing uptake of recommended vaccinations in children admitted to hospital. One RCT ([+] n=1835) from the USA found that fewer children remained under-immunised after discharge if the hospital had either sent a letter to primary care providers notifying them of under-

immunisation status or had vaccinated before discharge compared with no intervention, although the difference was not significant. Two BA studies from the USA found that hospital-based vaccination of children (aged 0–2 years) who were either under-immunised or from predominantly low-income families significantly increased the proportion of children who were age-appropriately immunised (BA [++] n=2006) and reduced the number of missed opportunities for vaccination (BA [-] n=1163).

One BA ([+] n=866) from Australia found that after introduction of an opportunistic vaccination strategy that comprised training of health professionals and vaccination of under-immunised children, the number of vaccinations provided significantly increased in paediatric wards, but not emergency departments. Two studies from the UK found that some children were successfully brought up-to-date with the recommended vaccination schedule after hospital-based immunisation (BA [+] n=56; and BA [-] n=1000). although one study found that some carers refused, preferring to have vaccinations administered by their primary care provider. Finally, one cohort study ([–] n=1301) from the USA found that the proportion of pre-school children not up-to-date with the recommended immunisation schedule on admission to the emergency department significantly decreased on discharge after hospital-based vaccination. However, by 6 months, there was no significant difference in the proportion of children up-to-date on discharge compared with that on hospital admission.

#### **Evidence statement 40**

There is evidence from two studies from Australia and Switzerland (one NRCT [-] and one NRCT [+]) that delivery of a verbal reminder to parents of children identified on admission to hospital as being not up-to-date with the recommended immunisation schedule with or without a follow-up letter sent to the child's primary care provider, was effective at encouraging vaccination within 30 days compared with children whose parents were not given a reminder (NRCT [+] n=430; NRCT [-] n=54).

#### **Evidence statement 41**

There is evidence from an interview study with head teachers (n=31), school nurses (n= 12) and parents (of 1411 children) in inner-city London (+) that although most parents (69%) whose children were not fully immunised were in favour of opportunistic school-based immunisations (for example, at the school health interview), there were mixed views among school nurses and head teachers. Findings from a postal survey of 24 school nurses in Oxfordshire found that where school-based immunisations had taken place they had greatly increased school nurses' workload (-).

There is evidence from a questionnaire that sought to identify lessons for future practice, training needs, operational planning and resource management of school nurses (throughout England; response rate 57.6%) after undertaking a nationwide rubella and measles immunisation programme for children aged 5–16 years ([-] n=288). The study found that: the timing of the campaign was not ideal for school nurses with the dates coinciding with the beginning of school holidays, a time when most school nurses do not work; 75% felt confident in undertaking immunisations but a few nurses who did not have access to training admitted to lacking confidence; the majority (95%) found the campaign tiring and many put in extra time that was not remunerated; 92% of nurses had found the campaign a challenge and stimulating and most (96%) enjoyed working in a team (those that worked within a team structure felt more confident and enjoyed the camaraderie).

There is evidence from a semi-structured focus group study involving parents (n= 39) and pupils (n=50) in Glasgow (++) that explored immunisation in general and universal hepatitis B vaccination. It found that most parents agreed with vaccinations being delivered at school, and felt that their children thought likewise. A minority of pupils and parents perceived a lack of privacy and embarrassment to be barriers to vaccination in school. Pupils liked receiving vaccine at school because they felt supported by their peers.

**Evidence statement 43**

There is evidence from one ITS (+) from the UK that offering hepatitis B vaccination to all injecting drug users (aged 16–20 years) who were inmates of youth offender institutions and prisons, significantly increased uptake.

**Evidence statement 47**

There is strong evidence from 10 studies to suggest that targeted multicomponent community-based interventions are effective at increasing uptake of childhood immunisations.

Four RCTs (three [+] and one [-]) and four BA studies (one [+] and three [-]) found that multicomponent community-based interventions targeting children at risk of low immunisation uptake (for example, already behind in their vaccinations or from low-income or black and minority ethnic group families) increased the number of children who were up-to-date with the recommended vaccination series or who received vaccinations, at least in the short term (6 months to 1 year) compared with children who did not receive community-based outreach. Although intervention components varied between studies they generally comprised: home visits; advice and support for parents; local media campaigns and networking with local organisations; vaccination-specific components such as referral and reminders of upcoming vaccinations; working with parents to ensure they understood the immunisation schedule, reduced their misconceptions about vaccinations or encouraging them to be proactive and request immunisations from their providers; direct contact with the family's immunisation providers; immunising in other settings such as hospitals and immunisation-linked incentives.

One cluster RCT ([+] n=286) found that a multicomponent community-based intervention comprising home visits, parent-baby developmental play groups, parent support groups and monthly support calls, targeting children from black, low-income families, significantly improved uptake of immunisations to age 9 months compared with children receiving standard social services. Although there was no significant difference in completion of primary

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immunisation series at 12 months, drop out was greater than 50%, limiting reliability of this finding.

One NRCT ([+] n=1,508) compared a media-based education and outreach campaign to encourage Vietnamese American parents to have their children vaccinated with hepatitis B vaccine with a community mobilisation strategy undertaken by a Vietnamese American community-based organisation that developed an action plan of activities and timeline with the goal of improving vaccination rates. It found that both strategies significantly increased uptake of hepatitis B vaccine compared with a control group that did not receive any intervention.

However, there is mixed evidence on the long-term effectiveness of community-based outreach interventions at increasing immunisation uptake. One RCT ([+] n=232) followed up children for 7 years and found there was no significant difference between intervention and control groups in the proportion of children that had received MMR or the school booster, although subsequent children of mothers in the intervention group were significantly more likely to have completed polio and Hib immunisations compared with subsequent children of mothers in the control group.

Two RCTs (1 [+] and 1 [-]) found that universal multicomponent community-based interventions which comprised postnatal home visits in addition to parental advice and support (RCT [+] n=439) or postcard or telephone reminders for parents to attend for vaccinations and a number of provider-based interventions (RCT [-] n=3015) significantly improved up-to-date vaccination coverage rates compared with no intervention.

#### **Evidence statement 48**

Barriers to immunisation uptake: A nationally representative interview survey with 18,488 mothers found that parents of partially immunised children were likely to refer to practical or logistical problems with getting to immunisation clinics as reasons for incomplete immunisation (++).

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An interview study with parents of 1411 children in inner-city London found that recent immigration was a practical barrier to immunisation, although the study did not elaborate on the types of barriers caused by immigration (+).

### **Evidence statement 49**

Parental and health professional views on interventions to reduce barriers to immunisation uptake: There was evidence from two studies, one postal survey of health professionals (including school nurses, clinical medical officers and health visitors) and one focus group study (involving health visitors and parents), that identified a number of practical suggestions for improving immunisation uptake. These included: mobile or home-based immunisation; incentives for parents to bring their children for immunisation; special clinics solely for immunisation; general improvements to the immunisation service ([-] n=174 health professionals), and varying clinic timing ([-] n=15 health visitors and parents). Only 6–9% of professionals supported compulsory immunisation.

An interview study with 759 parents found that 25% of them would prefer immunisation in the home by a health visitor (-). Another interview study of 22 parents indicated that parents had a preference for a flexible system for immunisation appointments (++).

There is evidence from an interview study with 10 orthodox Jewish mothers (-) and a questionnaire study with 67 orthodox Jewish parents (+) that identified a number of interventions such as reducing clinic waiting times, improving play facilities in clinics and reducing overcrowding in waiting rooms that may help to improve immunisation uptake, many of which sought to address practical barriers such as having to care for large families and multiple competing demands on time.

### **Evidence statement 51**

There is evidence from two studies (one cluster RCT [+] and one ITS [-]) that targeted multicomponent programmes based on enhancing access to vaccination services in combination with reminder/recall interventions is effective at increasing uptake of immunisations. The first study (cluster RCT [-]

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n=2665) found that an intervention based on reminder/recall in addition to home visits and transportation to the clinic for children of low-income families in need of vaccinations was effective at increasing the proportion of babies up-to-date with immunisations compared with children receiving no contact ([+] n=2665). The second study (ITS [-] n=3184) found that a programme comprising a community-wide reminder/recall and outreach system in which children behind in their immunisations received reminder/recall (telephone, postcard, or letter) with increasing intensity for children who were further behind in immunisations, and home visits for those where all previous strategies had failed, significantly increased immunisation rates in city and suburban settings from baseline after 3 years. After 6 years the increase was no longer statistically significant.

### **Evidence statement 52**

There is evidence from one BA study ([++] n=464) from Ireland that a targeted multicomponent provider-based intervention comprising: checking of practice immunisation records and implementation of opportunistic immunisations; sending postal reminders to non-vaccinated children and providing monthly written feedback of uptake figures to all practice staff, significantly increased uptake after the postal reminders were sent of DTP and Hib among children aged more than 6 months living in a deprived area.

### **Evidence statement 55**

Differences in knowledge and beliefs across different ethnic groups: There is evidence from a study that used mixed methods (quantitative analysis and focus groups with 37 mothers) in Brent, North West London and found a significant relationship between uptake of the first dose of MMR vaccine and ethnicity. Uptake of the first dose of MMR vaccine was highest among children from Indian backgrounds followed by African-Caribbean children and lastly white children (++).

Among people of Asian origin, immunisation was seen as beneficial, possibly influencing their uptake; these people followed their cultural tradition of consulting their elders, especially their mothers-in-law, for advice about

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immunisation. Asian mothers were also more likely to consult their GPs for advice and were most trusting of such advice. Conversely, African-Caribbean and white mothers were more likely to question pro-MMR vaccination advice given by healthcare professionals (++).

Differences in knowledge and beliefs across different socio-economic groups: There is evidence from a recent interview study undertaken in October and November 2006 with mothers of children aged under 3 years (n=1016) that found that mothers from lower socioeconomic groups were significantly more likely to consider the MMR vaccine as being completely safe compared with mothers from higher socioeconomic groups. Furthermore, the study found that before 2002, a greater proportion of mothers from higher socioeconomic groups considered the MMR vaccine to pose a greater risk than diseases it protected against than did mothers from lower socioeconomic groups, although the gap had narrowed in subsequent years and by 2006 the proportion was 14% in both groups (++).

#### **Evidence statement 61**

There is evidence from one recent cluster RCT ([+] n=142) from the UK that found that children were significantly more likely to have been vaccinated with MMR if their parents had received the NHS Health Scotland information leaflet 'MMR – your questions answered' and were also invited to attend a parent-led intervention, a one-off, 2-hour parent meeting (consisting of information giving and a question and answer session), a support network and enablement, compared with parents that received only standard information.

#### **Evidence statement 66**

There is mixed evidence from two cohort studies (one [+] and one [-]) and two ITS studies (both [-]) to suggest that neonatal hepatitis B immunisation strategies centred around early identification of hepatitis B positive mothers and initiation of the vaccination schedule in hospital can increase neonatal hepatitis B vaccination coverage. The first cohort study ([+] n=265) from the UK found that a hospital-based service in which an immunisation clinic was held in the hospital at the same time as the neonatal follow-up clinic led to

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higher levels of vaccination compared with a neighbouring area with no hospital intervention. The second cohort study ([-] n=832), in which HBsAg-positive mothers were contacted by phone, letter or home visit and counselled about the risks of transmission and importance of screening household contacts found that babies were significantly more likely to complete the hepatitis B vaccination series if the first dose was given in hospital. However, one poor-quality study (ITS [-] n=323) found that a comprehensive immunisation strategy where the first dose of hepatitis B vaccine was given in hospital and a GP was nominated to continue the vaccination schedule did not increase the proportion of eligible babies receiving the recommended three doses of the vaccine.

One study from Italy (ITS [-] n=NR) reported that over a 4-year period the proportion of eligible babies immunised against hepatitis B increased significantly following introduction of a policy to administer intramuscular hepatitis B immunoglobulin within 24 hours of birth and the first dose of hepatitis B vaccine within 7 days of birth.

Finally, one cohort study in Australia ([-] n=658) found that extension of an existing neonatal hepatitis B vaccination policy (covering neonates born to mothers who carried HBV) to include neonates born to mothers from high-risk countries (including Vietnam), irrespective of the mother's hepatitis B status significantly increased hepatitis B vaccine coverage rates, although the applicability of this study to the UK context may be limited.

### ***Cost-effectiveness evidence***

At current levels of coverage, immunisation against measles is estimated to save the NHS money (that is, the money saved as a result of not having to treat a case of measles more than pays for the immunisation). This is likely to be true even when taking into account the cost of home visits targeting children who have not been immunised. (It would only cost money if the refusal rates were very high.) The level of vaccine coverage required against measles is higher than for other universal vaccinations, such as mumps and

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rubella. It follows that immunisation against these infections would be cost saving in almost all circumstances, as it is given as a combined vaccine.

Currently, the targeted immunisation programme to reduce the incidence of infant hepatitis B is estimated to be cost saving, where it costs less than about £30 per injection. It would still be cost effective (but not cost saving) if the administration costs were up to several hundred pounds.

### ***Fieldwork findings***

Fieldwork aimed to test the relevance, usefulness and the feasibility of putting the recommendations into practice. PHIAC considered the findings when developing the final recommendations. For details, go to the fieldwork section in appendix B and 'Reducing differences in the uptake of immunisations (including targeted vaccines) in children and young people aged under 19 years' at [www.nice.org.uk/PH21](http://www.nice.org.uk/PH21)

Fieldwork participants who have a direct or indirect role in the delivery of immunisation programmes for children and young people were very positive about the recommendations. If implemented, they felt that they could help reduce differences in the uptake of immunisations.

Many participants felt that the recommendations would raise the profile of immunisation, particularly in primary care settings and, potentially, could be effective in areas where immunisation uptake is low. Information systems were thought to be integral to implementing the guidance successfully.

The recommendations were seen to reinforce government policy on immunisation, particularly in relation to:

- completion of the appropriate immunisation schedule
- timely vaccination
- the lead role of health visitors, working with other frontline practitioners and with parents and families to improve the health and development of children under the age of 5 years

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- the role of children's centres and family nurse partnerships in promoting the health of children from the most disadvantaged families.

Although neither practitioners nor commissioners felt the recommendations offered a new approach, they agreed that the measures had not been implemented universally. They believed this could be achieved if there was:

- a robust information system on immunisation, based on good quality data
- collaborative working between professional groups and services that have a role in the immunisation of children and young people
- greater access to good quality training for all those working to improve the uptake of immunisations, so that they can confidently communicate the benefits (and how safe the vaccines are) to parents and young people.

## Appendix D Gaps in the evidence

PHIAC identified a number of gaps in the evidence relating to the interventions under examination, based on an assessment of the evidence, stakeholder and expert comments and fieldwork. These gaps are set out below.

1. There is a lack of UK evidence on the effectiveness and cost-effectiveness of different interventions aimed at increasing immunisation uptake among children and young people aged under 19 years, particularly among those who may not have been immunised or only partially immunised.
2. There is a lack of UK evidence on the differential effect of universal interventions to increase immunisation uptake across different groups.
3. There is a lack of UK evidence on the effectiveness and cost-effectiveness of interventions aimed at increasing uptake of the school leavers' booster vaccination.
4. There is a lack of UK evidence to determine whether removal of the barriers to accessing immunisation services increases immunisation uptake among children and young people aged under 19 years. Information is particularly lacking in relation to population subgroups at increased risk of not being immunised or only being partially immunised.
5. There is a lack of UK evidence to judge whether or not interventions to increase uptake of immunisations in children and young people aged under 19 have any unintended or negative effects. For example, on how repeat reminders to those who do not want their child immunised may affect their relationship with the GP.
6. There is a lack of evidence on the differential effect of using different professionals (such as nurses, GPs and other practitioners) to increase immunisation uptake among children and young people aged under 19 years. In particular, there is a lack of evidence on how this affects

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subgroups at increased risk of not being immunised or only being partially immunised.

The Committee made five recommendations for research. These are listed in section 5.

## Appendix E Supporting documents

Supporting documents are available at [www.nice.org.uk/PH21](http://www.nice.org.uk/PH21) These include the following.

- Reviews of effectiveness:
  - ‘Review of the evidence of the effectiveness and cost effectiveness of interventions to address differences in the uptake of immunisations (including targeted vaccines) in people younger than 19 years’
  - ‘Revised analysis of the evidence of interventions to reduce differences in immunisation uptake (including targeted vaccines) in people younger than 19 years’.
- Economic analysis:
  - Analysis one: ‘The impact of increasing vaccine coverage on the distribution of disease: measles in the UK’
  - Analysis two: ‘An exploration of the cost effectiveness of interventions to reduce the difference in uptake of childhood immunisations in the UK using threshold analysis’
  - Analysis three: ‘The estimated cost effectiveness of vaccination in infants born to hepatitis B virus positive mothers’.
- Fieldwork report: ‘Reducing differences in the uptake of immunisations (including targeted vaccines) in children and young people aged under 19 years’.
- A quick reference guide for professionals whose remit includes public health and for interested members of the public. This is also available from NICE publications (0845 003 7783 or email [publications@nice.org.uk](mailto:publications@nice.org.uk) – quote reference number N1986).

For information on how NICE public health guidance is developed, see:

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- 'Methods for development of NICE public health guidance (second edition, 2009)' available from [www.nice.org.uk/phmethods](http://www.nice.org.uk/phmethods)
- 'The NICE public health guidance development process: An overview for stakeholders including public health practitioners, policy makers and the public (second edition, 2009)' available from [www.nice.org.uk/phprocess](http://www.nice.org.uk/phprocess)