

## **TRAFFORD COUNCIL**

**Report to:** Health Scrutiny Committee  
**Date:** 20<sup>th</sup> November 2019  
**Report for:** Information  
**Report of:** Eleanor Roaf, Director of Public Health (Interim)

### **Report Title**

Uptake of Childhood Vaccinations

### **Summary**

The paper provides an update on uptake of childhood vaccinations in Trafford, with a particular focus on MMR. While our rates overall are better than the England average, we do have considerable variation across Trafford. Plans are in place to improve this and to ensure that we reach the 95% uptake of MMR immunisation required to give population level immunity

### **Recommendation(s)**

- That the Health Scrutiny Committee**
- i) notes the report and considers what further information it would like to receive on this topic
  - ii) provides its support to steps to be taken to promote positive messages about vaccination.

Contact person for access to background papers and further information:

Name: Helen Gollins, Deputy Director of Public Health (Interim)  
Extension: 4276

## **1. Background**

Vaccines are highly effective. They save lives, prevent serious complications, hospitalisation and disability in people of all ages. England is a world leader in childhood vaccinations, and all vaccines used in the UK are thoroughly tested, meet strict safety criteria and are carefully monitored after they are introduced into the national programme.. However, Public Health England (PHE) data show that, whilst coverage remains high, children's vaccine uptake has been slowly decreasing since 2012-13.

In this paper we will look at all childhood vaccinations but will have a particular focus on measles, as it is one of the most infectious diseases - it is estimated that there will be 15-20 further cases from any one index case<sup>1</sup>. In early 2019, there was an outbreak of measles in Greater Manchester with 47 confirmed cases of measles across 5 boroughs. Fortunately, there were no cases reported in Trafford but the GM outbreak has led us to review our systems and processes to improve our vaccine uptake.

Supporting our families, children and young people to make informed decisions that lead to receiving the complete childhood vaccine schedule is important for individual and wider community health and wellbeing.

This paper describes;

- the current schedule, including Trafford uptake using regional and national comparators, and trend over time.
- the current national and local context of vaccination uptake.
- the local approach to improving uptake.

The full childhood vaccine schedule is included in Appendix A.

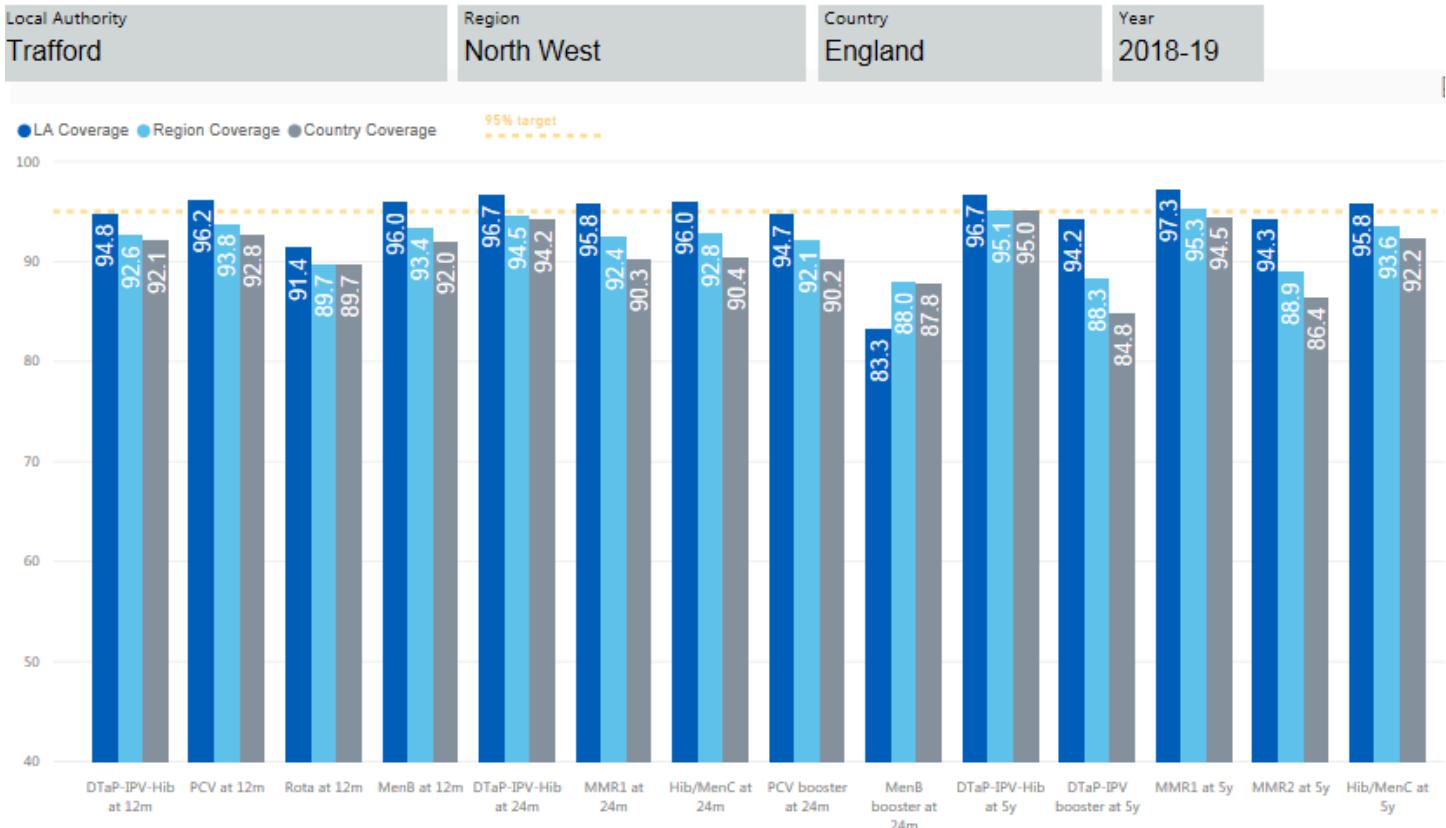
## **2. Childhood Vaccination uptake in Trafford**

Childhood vaccinations are commissioned by NHS England and are delivered by;

- primary care,
- Trafford's Children's Community Health Service including school nursing, and the specialist looked after children's nursing team, and
- Intrahealth, (school based flu immunisation).

'Herd immunity' is the uptake level that provides population protection and reduces the likelihood that an outbreak will occur. For highly contagious disease such as measles herd immunity is achieved at 90-95%, for less contagious diseases such as polio it is 80%.

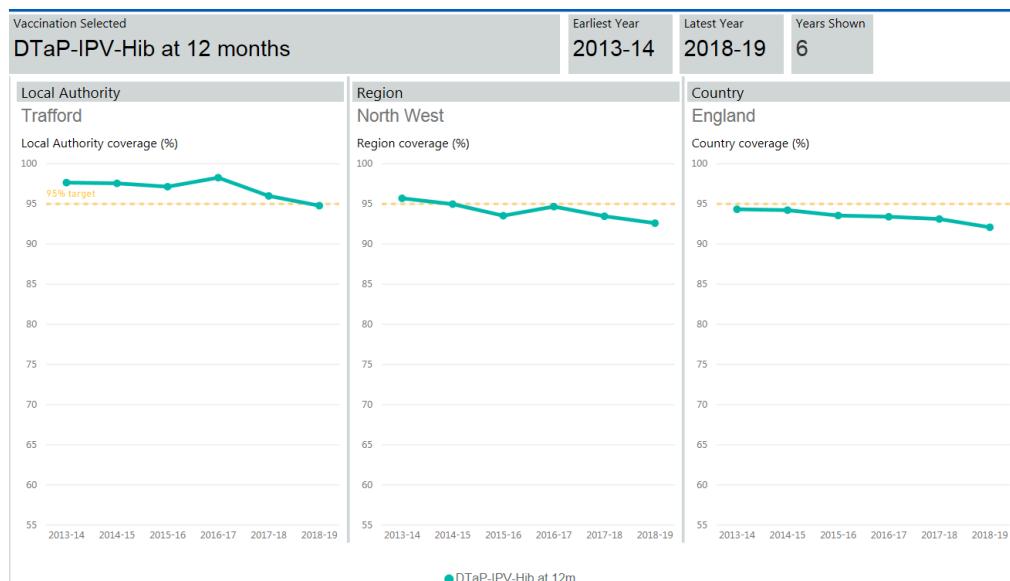
Figure 1 shows the vaccination coverage in Trafford in 2018-2019 for routine childhood vaccinations up to 5 years old. Trafford coverage is the dark blue bars, the NW is the light blue bar and the grey bar England.



As can be seen above, Trafford does well on average vaccination coverage, with 8 out of 14 vaccination combinations having 95% or above coverage. This is important as it confers herd immunity on the population for those conditions. However despite this, there are clear areas where Trafford can improve.

### **Vaccine coverage close to 95%:**

*Diphtheria Tetanus Polio, Pertussis and Haemophilus influenza b (DTaP-IPV Hib)- at 12 months*



Whilst our coverage is better than both the NW and England, this is still below the 95% threshold. This reflects a downward trend over the past 2 years, which is similar to the regional and national picture.

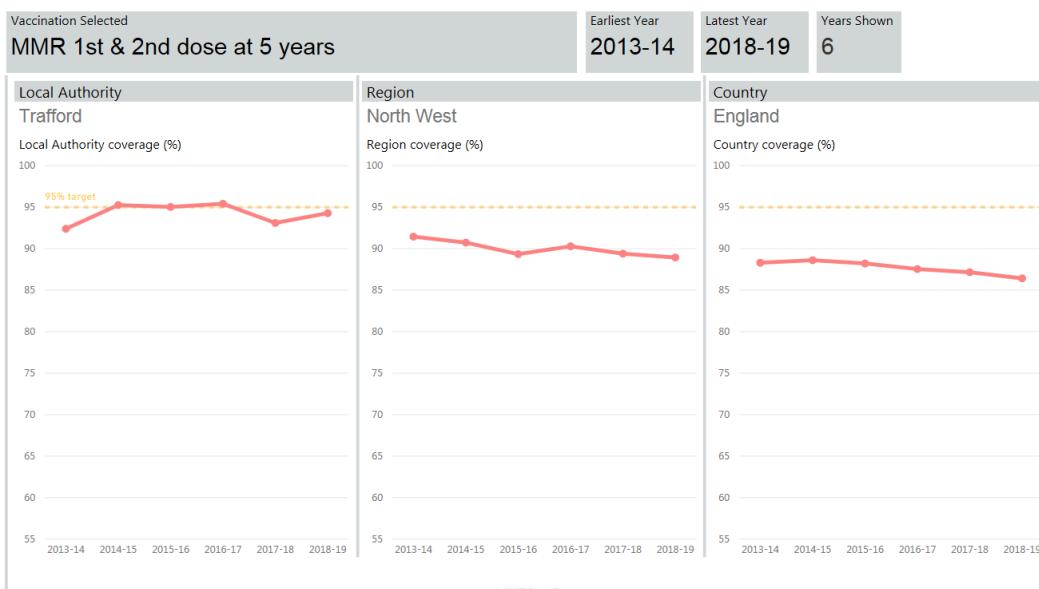
### DtAP-IPV booster at 5 years

This vaccine coverage is almost at the 95% level, and is much better than the regional and national average. As can be seen in the figure below this has improved since 2017-2018, and there has been little difference over the past 5 years. This is a much better picture than the national and regional figures for the same 5 year period.



### Measles Mumps and Rubella 2<sup>nd</sup> dose at 5 years

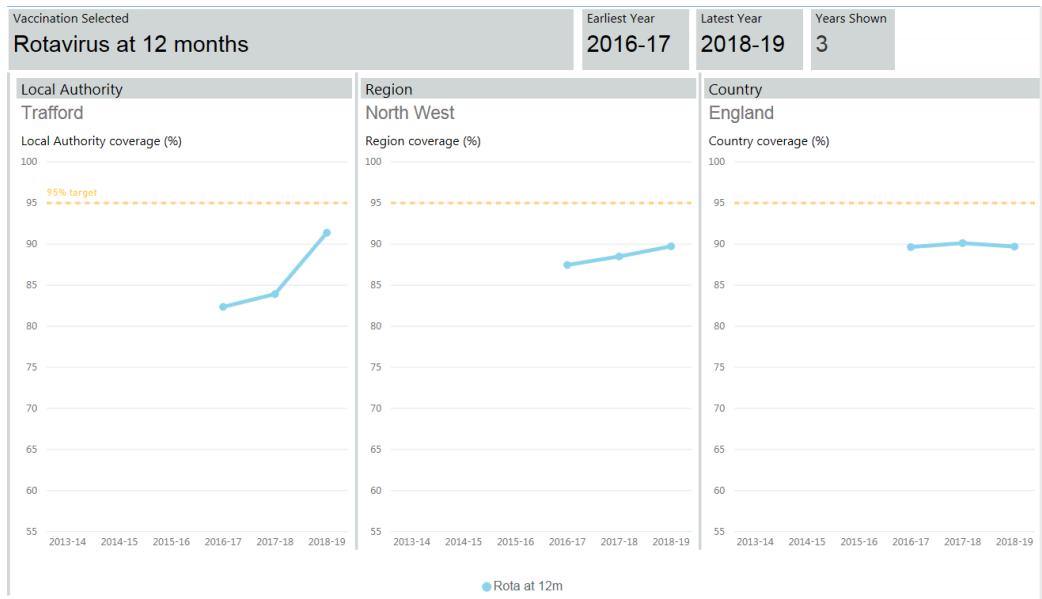
This vaccine is much better than the NW and England level, but still just below the 95% level. As can be seen below this has improved from 2017-2018, but on a background of a higher coverage level. This is different from the regional and national trend which has been steadily declining.



## Vaccine coverage significantly below the 95% target

### *Rotavirus at 12 months*

The rotavirus vaccine has a low coverage of 91.4%, which is far below the 95% target. It is slightly higher than the NW and England average. Figure 2 below shows the trend over time, which shows that coverage has improved over the past 3 years, and more quickly than in the NW or England.



### *Meningitis B booster at 24 months*

The Meningitis B booster has a particularly low coverage of 88.3%, which is lower than both regional and national average, but this may be due to data reporting issues and this is currently been looked into further. 2018/2019 is the first year there is data for the Meningitis B booster at 24 months so a trend cannot be analysed.

### **2.i. Inequalities in vaccination uptake**

Across Trafford there is variation in uptake of childhood vaccinations across groups and communities. Understanding this fully is difficult due to the availability of data and data quality at a localised level.

Trafford's public health team therefore supplement local information with national guidance and local evidence of inequalities from the Joint Strategic Needs Assessment to inform practice <sup>ii</sup>. The team is

also working closely with Primary Care and Child Community Health colleagues to improve data recording and reporting.

## **2.ii. Measles Mumps and Rubella Coverage**

Both mumps and measles are highly infectious, and while both are usually self-limiting illnesses, in some cases they can lead to serious complications, and a measles outbreak presents significant pressures across the wider health and social care system. Rubella is generally a less serious disease but can cause significant damage to the unborn child if contracted in pregnancy. The most effective way to control these diseases is two doses of the MMR vaccine. Infants receive the first dose within one month of their first birthday and at around 3 years 4 months. The MMR vaccination requires two doses as one dose only protects 90 out of 100 people.

Trafford does not currently reach the target of 95% population coverage for complete (ie two doses given) MMR vaccination. This means that we could be at risk of a local outbreak.

Using data extracted from 28 Trafford practices<sup>iii</sup>, average complete MMR coverage for 0-5 year olds is 83.7%, ranging from 68.9% to 93.7%. In numbers terms, 822 children eligible for their MMR are not fully protected, ranging from 4-70 children per practice.

For the older age group, 5-18 years, only 88.5% have a complete MMR, ranging from 55% to 92%. Again in numbers terms 2 529, 5-18years olds registered with a Trafford primary care practice are not fully protected, this ranges from 32 to 238 per practice.

We are also aware that the variation in uptake by practice means that, overall, we have lower uptake among our population in North Trafford than in South. This means that we have increased outbreak risk in the North of the borough, and we are working with practices to address this.

## **3. Key Issues for Health Scrutiny to consider**

### **3.i. Wider influences on vaccination uptake**

Nationally vaccine uptake has been declining since 2013-2014. There are numerous reasons for this decline. These include:

- Vaccine Hesitancy and Vaccine Denial

Vaccine hesitancy refers to the delay in acceptance, or refusal of vaccines, despite the availability of vaccine services, and it is named as one of the top ten threats to global public health in 2019 by the World Health Organization. Delaying vaccination can lead to increased risk of catching and spreading vaccine-preventable diseases in the population, and reduces herd immunity. Reasons for vaccine denial can include mistrust of the government, health experts and scientists; the spread of incorrect information via social media; vaccination programmes failing to change the perceptions of being unvaccinated and concerns around the effectiveness and safety of vaccinations.

Vaccine hesitancy is a spectrum, ranging from those who are individually hesitant at one end, to those who are vocal vaccine deniers at the other. There is a very low chance of changing the minds of those who are vocal vaccine deniers, however, having supportive discussions and

listening to the concerns of people who are hesitant or delaying vaccination can lead them to accepting vaccination.

- MMR Controversy

A 1998 study published by Wakefield et al. purported to identify a link between the MMR vaccination and autism. The study was found to be fraudulent, was redacted from the publication, and the author was struck off by the General Medical Council and can no longer work as a doctor in the UK<sup>iv</sup>. More recent studies have failed to find any link between the MMR vaccine and autism<sup>v</sup>. The MMR vaccine is both safe and effective, but the controversy (and especially the media reporting of it) has led to ongoing concerns amongst some parents.

- Vaccines can make the child ill

This is a major concern for parents, but most vaccines are tolerated very well. The most common side effects of vaccinations include a sore arm, lump at the site of injection, or a mild fever. Certain vaccinations may also have specific side effects, for example, parents are advised to give three doses of liquid paracetamol following the MenB vaccine to prevent fever, and the MMR vaccine can cause a measles-like rash or mumps-like swollen glands<sup>vi</sup>.

- Long term effects

There have been some concerns reported about the potentially increased risk of developing Guillan-Barre following flu or HPV vaccination. Guillan-Barre is a condition where the body's immune system mistakenly attacks nerve cells, which stops them from working correctly. This can cause symptoms such as weakness and numbness. In most cases, Guillan-Barre occurs as a result of an infection, but there have historically been links between some vaccinations (such as the swine flu vaccine delivered in 1976) and slightly increased prevalence of the disorder, which can cause people to worry.

However, research has found that the risk of developing Guillan-Barre following a vaccination is incredibly small and the chances of developing the condition from an infection such as flu are much greater<sup>vii</sup>.

- Anaphylaxis

Some children may have allergic reactions to some of the additives in vaccinations (such as egg, gelatine, and antibiotics such as Neomycin). Very rarely, allergic reactions to vaccines can cause a life-threatening response known as anaphylaxis, and this occurs 1-2 times for every million vaccines given<sup>viii</sup>. Staff who administer vaccinations are trained to deal with this. Parents of children with known allergies such as egg or gelatine should speak with a GP or Nurse prior to receiving vaccinations.

- Gelatine and Faith Groups

Both Fluenz Tetra® (the nasal spray given to children to prevent flu) and MMR VaxPro® (to protect against measles, mumps and rubella), contain gelatine from pigs<sup>ix</sup>. This is to protect the live virus against effects from changes in temperature<sup>x</sup>. An alternative vaccine, called Priorix®, is available to protect against measles, mumps and rubella and does not contain gelatine. Families can request this vaccination, but it may need to be ordered specially. There is

currently no alternative for the nasal flu spray that does not contain gelatine for healthy children, but children who are at a higher risk from flu due to a health condition may be eligible for an alternative vaccination (injection).

Trafford residents from Muslim and Jewish faith groups may be concerned about the presences of porcine gelatine in these injections. To provide guidance, a representative from the Kashrus and Medicines Information Service has advised that according to Jewish laws, there is no problem with porcine-derived ingredients in medication that is taken non-orally, so the nasal spray and injection would be permitted<sup>xii</sup>. The Muslim Council of Britain has taken the view that medications containing porcine gelatine are not permitted unless lives are at risk and there are no alternatives, and so have recommended that individuals consult with health practitioners in order to make an informed decision<sup>xiii</sup>. PHE still recommend the nasal spray for children because compared to the alternative injected vaccine, the nasal spray is more effective and lasts longer, may offer protection against slightly different types of flu virus, and is easier to administer and less painful than an injection<sup>xiv</sup>.

## **4. Trafford Improvement Approach**

### **4.i. Response to Measles Risk**

In response to the GM Measles outbreak earlier this year, Trafford established a multi-agency Measles preparedness group. Actions from this group included;

- ensuring communications from PHE were actioned by practices.
- targeted support to practices with low uptake, this includes specialist practice visits from the Greater Manchester Screening and Immunisation Team (GMSIP).
- exploring the feasibility of Trafford Health Care delivering additional nurse led clinics to improve access to MMR across the borough.
- increasing the uptake of MMR among our Looked After Children and Children in Need population through our Specialist Nurse for Children in Care working with parents and guardians.
- Trafford's Communities and Partnership Team increasing awareness of the importance of vaccination, especially amongst our populations where uptake has traditionally been lower than 95%.
- awareness raising with front line workforce who have contact with children and young people.

Finally a childhood vaccine quality improvement communication will be shared with practices by the end of November; this includes information about the practical steps that can be taken to increase uptake.

A review of MMR uptake across practices will be completed in January 2020.

### **4.ii. Vaccine and Immunisation Assurance Group**

A Public Health led, multi-agency Vaccine and Immunisation Assurance Group has been established. The purpose of the group is to have oversight of the delivery of the routine vaccination schedule, identify elements for improvement and provide a coordinated response to any incidents. This group is accountable to the Health Protection Forum and membership includes the GM Screening and Immunisations Team, MFT Community Health Services, Trafford NHS CCG and the Communities

and Partnerships team. Outputs from the group will include a vaccine uptake monitoring dashboard, and an improvement plan.

## **5. Key Questions for Health Scrutiny to consider**

- How can we work together to increase vaccine acceptability and reduce vaccine hesitancy?

Improving vaccine uptake will in part be down to the steps that the NHS (and particularly primary care) can take to improve their systems to ensure that there is sufficient capacity in vaccination clinics and that children are invited in a timely manner. However, there are also steps that partners can take to promote messages about the importance and safety of vaccination throughout the borough.

## **6. Links to Corporate Priorities**

Childhood immunisation uptake is related to the Trafford Council's corporate priorities relating to Children and Young People, Health and Wellbeing and Targeted Groups.

## Appendix

Routine childhood immunisations			Autumn 2019	
When	Diseases protected against	Vaccine given and trade name	Usual site	
Eight weeks old	Diphtheria, tetanus, pertussis (whooping cough), polio, <i>Haemophilus influenzae</i> type b (Hib) and hepatitis B	DTaP/IPV/Hib/HepB	Infanrix hexa	Thigh
	Meningococcal group B (MenB)	MenB	Bexsero	Left thigh
	Rotavirus gastroenteritis	Rotavirus	Rotarix	By mouth
Twelve weeks old	Pneumococcal (13 serotypes)	PCV	Prevenar 13	Thigh
	Diphtheria, tetanus, pertussis, polio, Hib and hepatitis B	DTaP/IPV/Hib/HepB	Infanrix hexa	Thigh
	Rotavirus	Rotavirus	Rotarix	By mouth
Sixteen weeks old	Diphtheria, tetanus, pertussis, polio, Hib and hepatitis B	DTaP/IPV/Hib/HepB	Infanrix hexa	Thigh
	MenB	MenB	Bexsero	Left thigh
	Pneumococcal (13 serotypes)	PCV	Prevenar 13	Thigh
One year old (on or after the child's first birthday)	Hib and MenC	Hib/MenC	Menitorix	Upper arm/thigh
	Pneumococcal	PCV booster	Prevenar 13	Upper arm/thigh
	Measles, mumps and rubella (German measles)	MMR	MMR VaxPRO <sup>2</sup> or Priorix	Upper arm/thigh
	MenB	MenB booster	Bexsero	Left thigh
Eligible paediatric age group <sup>1</sup>	Influenza (each year from September)	Live attenuated influenza vaccine LAIV <sup>2,3</sup>	Fluenz Tetra <sup>2,3</sup>	Both nostrils
Three years four months old or soon after	Diphtheria, tetanus, pertussis and polio	DTaP/IPV	Infanrix IPV or Repevax	Upper arm
	Measles, mumps and rubella	MMR (check first dose given)	MMR VaxPRO <sup>2</sup> or Priorix	Upper arm
Boys and girls aged twelve to thirteen years	Cancers caused by human papillomavirus (HPV) types 16 and 18 (and genital warts caused by types 6 and 11)	HPV (two doses 6-24 months apart)	Gardasil	Upper arm
Fourteen years old (school year 9)	Tetanus, diphtheria and polio	Td/IPV (check MMR status)	Revaxis	Upper arm
	Meningococcal groups A, C, W and Y disease	MenACWY	Nimenrix or Menveo	Upper arm

1. See Green book chapter 19 or visit [www.gov.uk/government/publications/influenza-the-green-book-chapter-19](http://www.gov.uk/government/publications/influenza-the-green-book-chapter-19) or [www.nhs.uk/conditions/vaccinations/child-flu-vaccine/](http://www.nhs.uk/conditions/vaccinations/child-flu-vaccine/)

2. Contains porcine gelatine.

3. If LAIV (live attenuated influenza vaccine) is contraindicated and the child is in a clinical risk group, use inactivated flu vaccine.

## Selective childhood immunisation programmes

Target group	Age and schedule	Disease	Vaccines required
Babies born to hepatitis B infected mothers	At birth, four weeks and 12 months old <sup>1,2</sup>	Hepatitis B	Hepatitis B (Engerix B/HBvaxPRO)
Infants in areas of the country with TB incidence >= 40/100,000	At birth	Tuberculosis	BCG
Infants with a parent or grandparent born in a high incidence country <sup>3</sup>	At birth	Tuberculosis	BCG
At risk children	From 6 months to 17 years of age	Influenza	LAIV or inactivated flu vaccine if contraindicated to LAIV or under 2 years of age
Pregnant women	During flu season At any stage of pregnancy	Influenza	Inactivated flu vaccine
Pregnant women	From 16 weeks gestation	Pertussis	dTaP/IPV (Boostrix-IPV or Repevax)

1. Take blood for HBsAg at 12 months to exclude infection.

2. In addition hexavalent vaccine (Infanrix hexa) is given at 8, 12 and 16 weeks.

3. Where the annual incidence of TB is >= 40/100,000 – see [www.gov.uk/government/publications/tuberculosis-tb-by-country-rates-per-100000-people](http://www.gov.uk/government/publications/tuberculosis-tb-by-country-rates-per-100000-people)

## **Schedule of Vaccinations<sup>xiv</sup>**

### **6-in-1**

The 6-in-1 vaccine protects babies against diphtheria, hepatitis B, haemophilus influenzae type B, polio, tetanus, and whooping cough. To provide strong protection, babies need 3 doses of this vaccination. The dose is usually given at 8-weeks, 12 weeks, and 16 weeks of age. Prior to 2017, this vaccination didn't include Hepatitis B, and was known as the 5 in 1 vaccine.

### **Pneumococcal PCV**

The pneumococcal PCV vaccine helps to protect against a bacterial infection which can cause pneumonia and meningitis. Babies need to be given 3 doses of this vaccination to get the highest level of protection, and these are given at 8 weeks, weeks 16 weeks and one year of age. (This vaccination is also offered to older people once they have reached age 65).

### **Rotavirus**

The rotavirus vaccine protects against infection that causes diarrhoea, tummy ache and vomiting in children. This is given as 2 doses, for babies aged 8 weeks and 12 weeks old. This vaccine is very effective at reducing cases of stomach upset caused by rotavirus and since the introduction of the vaccination in 2013 rotavirus cases have reduced by nearly 70%<sup>xv</sup>.

### **Meningitis B**

The Men B vaccine protects against a type of bacteria (meningococcal group B) which are responsible for 9 in 10 cases of meningococcal infections, such as meningitis and sepsis, in young children. Again, this is given as 3 doses, at 8 weeks, 16 weeks and 1 year of age.

Trafford has a higher level of coverage than the average for the North West and England. Coverage of the 6-in-1 vaccine and the MenB vaccine at 12 months are above the target of 95%, however there is a drop in coverage at 24 months.

### **HiB/Men C**

The Hib/MenC vaccine is given at 1 year of age as a single dose. This vaccination helps to protect against haemophilus influenzae type B (Hib) and meningitis C, both of which are bacterial infections that can cause meningitis and septicaemia.

### **Influenza**

The influenza or flu vaccination is offered to all children aged 2 to 11 years (via nasal spray) and children aged 2 to 17 with long term conditions (via injection). It is important to vaccinate children, both to protect them, and as the flu can lead to complications such as bronchitis and pneumonia, and children can often spread the disease to older, more vulnerable, relatives. The vaccination must be given every year as the virus mutates very quickly, and the vaccine is developed to protect against the predicted active strains each winter.

### **MMR**

The MMR vaccine protects against three diseases; measles, mumps, and rubella. In order for this vaccine to be effective, two doses need to be given. These are usually given at around 1 year of age, and at around 40 months of age, but if someone is not vaccinated at this age, catch up doses can be given at any age throughout life.

#### **4-in-1**

The 4-in-1 pre-school booster vaccination is designed to improve protection against diphtheria, polio, whooping cough and tetanus. It is given to children who are aged 3 years and 4 months.

Coverage of the MMR first dose and Hib/MenC vaccination at 5 years are above the target of 95%.

#### **HPV**

At age 12 to 13, from this year, both girls and boys will be offered the first dose of the HPV vaccination. The second dose is usually given 6 to 12 months after the first. The HPV vaccination protects against strains of the human papillomavirus that are commonly transmitted between people, and have been linked to cervical, oral and anal cancer, as well as genital warts. People who were eligible to receive the HPV vaccination at school but missed it are able to receive the injection up to age 25 on the NHS. Men who have sex with men (up to and including the age of 45) are also eligible to receive the HPV vaccination from sexual health clinics.

#### **3-in-1 and MenACWY**

At 14 years of age, children are offered the 3-in-1 teenage booster, and the MenACWY vaccination. The 3-in-1 booster is important for increasing protection against tetanus, diphtheria and polio. The MenACWY vaccination protects against four strains of bacteria that can cause meningitis and septicaemia. Alongside both doses of the MMR vaccine, it is important that students going to university have received the MenACWY vaccination, as this is a higher risk location for spread of the disease. Adults aged up to 25 are eligible to receive the MenACWY vaccination on the NHS. Once people have received 5 doses of tetanus vaccination, they should have lifelong immunity

## **References**

<sup>i</sup> Public Health England (2017). *PHE Measles Guidance 2017* [Available at [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/637338/PHE\\_Measles\\_guidance\\_August\\_2017.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/637338/PHE_Measles_guidance_August_2017.pdf)]

<sup>ii</sup> Trafford Council (2019) *Joint Strategic Needs Assessment* [Available at <http://www.traffordjsna.org.uk/Trafford-JSNA.aspx>]

<sup>iii</sup> Trafford CCG (2019) MMR vaccination data extracted from Trafford practices, 25/04/19

<sup>iv</sup> Deer, B. (2011). *How the case against the MMR vaccine was fixed*. BMJ, 342, pp.c5347-c5347. [Available at <https://www.bmjjournals.org/content/342/bmj.c5347>]

<sup>v</sup> nhs.uk (2019) 'No link between MMR and autism,' major study finds [Available at <https://www.nhs.uk/news/medication/no-link-between-mmr-and-autism-major-study-finds/>]

<sup>vi</sup> NHS (2015) *What to expect after vaccinations* [Available at [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/448789/8584-what-to-expect-after-vaccination-2015-2P-A5-02-web.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/448789/8584-what-to-expect-after-vaccination-2015-2P-A5-02-web.pdf)]

<sup>vii</sup> nhs.uk (2019) *Causes - Guillain-Barré syndrome* [Available at <https://www.nhs.uk/conditions/guillain-barre-syndrome/causes/>]

- 
- viii American Academy of Allergy, Asthma and Immunology (2015) *What is the risk of anaphylaxis after vaccination in children and adults?* [Available at <https://www.aaaai.org/global/latest-research-summaries/Current-JACI-Research/What-is-the-risk-of-anaphylaxis-after-vaccination>]
- ix Public Health England (2019) *Vaccines and porcine gelatine* [Available at [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/824013/PHE\\_vaccines\\_porcine\\_gelatine.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/824013/PHE_vaccines_porcine_gelatine.pdf)]
- x Vaccine knowledge project (2019) *Gelatine in the flu vaccine* [Available at <http://vk.ovg.ox.ac.uk/vaccine-ingredients#gelatine>]
- xi The Jewish Chronicle (2013) *Fluenz flu vaccine containing pork product is kosher* [Available at <https://www.thejc.com/news/uk-news/fluenz-flu-vaccine-containing-pork-product-is-kosher-1.49557>]
- xii The Muslim Council of Britain (2019) *Position on Flu Vaccines* [Available at <https://mcb.org.uk/mcb-updates/position-on-flu-vaccines/>]
- xiii Public Health England (2014) *The children's flu vaccination programme, the nasal flu vaccine Fluenz and porcine gelatine: Your questions answered* [Available at [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/386842/2902998\\_PHE\\_FluPorcine\\_QAforParents\\_FINAL\\_CT.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/386842/2902998_PHE_FluPorcine_QAforParents_FINAL_CT.pdf)]
- xiv nhs.uk (2019) NHS vaccinations and when to have them [Available at <https://www.nhs.uk/conditions/vaccinations/nhs-vaccinations-and-when-to-have-them/>]
- xv nhs.uk (2017) Rotavirus vaccine overview [Available at <https://www.nhs.uk/conditions/vaccinations/rotavirus-vaccine/>]