



Public Health
England

Protecting and improving the nation's health

The National Childhood Flu Immunisation Programme 2018/19

Information for healthcare practitioners

About Public Health England

Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. We do this through world-leading science, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. We are an executive agency of the Department of Health and Social Care, and a distinct delivery organisation with operational autonomy. We provide government, local government, the NHS, Parliament, industry and the public with evidence-based professional, scientific and delivery expertise and support.

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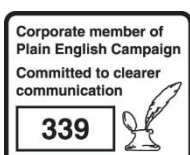


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Background

In 2012, the Joint Committee on Vaccination and Immunisation (JCVI) recommended that the routine annual influenza vaccination programme should be extended to include children, both to provide individual protection to the children themselves and to reduce transmission across all age groups to lessen levels of flu overall and reduce the burden of flu across the population.

The phased introduction of this extension began in 2013 when flu vaccine was offered to all two and three year old children and to those aged four to 10 years (up to and including pupils in school year 6) in seven different geographical pilot areas. Each year, more age groups are being added to the programme and the pilots in primary school aged children started in 2013/14 have continued.

In the 2018/19 flu season, flu vaccine should be offered to all children who are aged two to nine years old (but not ten years or older) on 31 August 2018 and to all primary school-aged children in former primary school pilot areas. It should also be offered to children from six months of age in clinical risk groups.

The key change to the childhood flu programme in the 2018/19 flu season is that:

- children in School Year 5 (children aged 9-10 years) will be included in the programme this year as part of the phased roll-out of the children's programme

Extension of the flu vaccination programme to include healthy children

Extending the flu vaccination programme to include healthy children aims to lower the public health impact of flu by:

- providing direct protection to children, helping to prevent a large number of cases of flu in children
- providing indirect protection by lowering flu transmission from children to other children, adults and to those in the clinical risk groups of any age and averting cases of severe flu and flu-related deaths in older adults and people with clinical risk factors

Studies commissioned by JCVI¹ suggested that, despite the high cost, extending the flu vaccination programme to all children is highly likely to be cost-effective and well below the established cost-effectiveness threshold when indirect protection to the whole population is taken into account, particularly over the longer term.

The role of healthcare professionals

Healthcare professionals have a key role in promoting high uptake of flu vaccination in children through:

- understanding the benefits and evidence base relating to the use of the vaccine against flu
- promoting the vaccine to parents/carers of children who are eligible to receive the flu vaccination
- safely administering flu vaccines in accordance with the vaccine schedule
- ensuring any adverse effects are managed and reported appropriately

¹ Pitman RJ, Nagy LD and Sculpher MJ (2013) Cost-effectiveness of childhood influenza vaccination in England and Wales: Results from a dynamic transmission model. *Vaccine* 31(6): 927-42.

Influenza

Flu is a highly infectious, acute, viral infection of the respiratory tract. It is transmitted by the inhalation of infected droplets and aerosols and by hand-to-mouth/eye contamination from an infected surface. The incubation period can be one to five days (average two to three days).

There are three types of influenza virus which affect humans. Influenza A causes epidemics and pandemics. This virus is found in many different animals and may spread between them. Birds, particularly wildfowl, are the main animal reservoir. The A viruses can live and multiply in wildfowl from where they can transmit to humans. Influenza B tends to cause less severe disease and smaller outbreaks. It is predominantly found in humans and the burden of disease is mostly in children. Influenza C causes minor respiratory illness only.

Groups affected by flu

Flu can affect anyone, but it is a more serious illness in babies, pregnant women, older people and those with certain underlying conditions.

Symptoms of flu

In healthy individuals, flu is usually an unpleasant but self-limiting illness with recovery in five to seven days. Common symptoms include the sudden onset of fever, chills, headache, myalgia (muscle aches) and severe fatigue. Sufferers can also experience a dry cough, sore throat and stuffy nose. In young children, gastrointestinal symptoms such as vomiting and diarrhoea may be seen.

Possible complications of flu

Common complications may include bronchitis, otitis media (middle ear infection) in children and sinusitis. Other less common complications include secondary bacterial pneumonia, viral pneumonia, meningitis and encephalitis.

Flu vaccination programme for children

Live attenuated influenza vaccine (LAIV)

The flu vaccine that should be offered to most children in the eligible cohort groups is a live attenuated influenza intranasal vaccine (LAIV). It contains an attenuated (weakened) vaccine virus that is also cold adapted so that it cannot cause the disease that it protects against.

LAIV is manufactured by AstraZeneca/Medimmune and has been sold in many countries for 15 years. Only one LAIV vaccine is available, marketed as Fluenz Tetra for the UK and EU market, and FluMist Quadrivalent for the US market. Fluenz Tetra and FluMist Quadrivalent are the same product in different packaging.

LAIV may not be suitable for all children who are eligible for the flu vaccine (please refer to contraindications section below). For those children in whom LAIV is contraindicated, an injectable inactivated influenza vaccine should be offered.

Presentation of LAIV

LAIV is supplied in a box containing 10 single-use, prefilled nasal applicators. Each applicator contains 0.2ml nasal suspension. The nasal applicator is ready to use - no reconstitution or dilution is required. The nasal suspension is colourless to pale yellow, clear to opalescent. Small white particles may be present.

Cold adapted influenza virus

A cold adapted virus is designed not to reproduce well at body temperature (37°C). So it will not replicate in the lungs but will reproduce at the cooler temperatures found in the nose (nasal mucosa). This allows the child to produce antibodies, which then protect against infection. These antibodies work in the lining of the airways and are not produced in response to the inactivated flu vaccine. By limiting viral reproduction to the nose, the worst symptoms of flu are avoided.

Transmission of vaccine virus in LAIV

There is a theoretical potential risk of transmission of the live attenuated flu virus in LAIV to very severely immunosuppressed contacts (for example bone marrow transplant patients requiring isolation) for one to two weeks following vaccination. In the US, where there has been extensive use of LAIV, there have been no reported instances of illness or infections from the vaccine virus among immunocompromised patients inadvertently exposed. Where close contact with very severely immunosuppressed contacts (for example household members) is likely or unavoidable however, consideration should be given to using an appropriate inactivated flu vaccine instead.

Healthcare workers and school staff may be asked questions in relation to the safety of the LAIV being given in schools. Specific information on potential exposure during administration, and from recently vaccinated children, is outlined below.

The nasal influenza vaccine uses a live attenuated (weakened) influenza virus which helps protect against influenza infection in those who receive it. LAIV does not cause clinical influenza in those immunised and is offered to children because it provides good overall protection for children against influenza virus and is expected to provide some cross-protection against mismatched strains. It has a good safety record and is easier to administer than injected vaccines. Millions of doses of LAIV have been given in the USA and in Canada. This vaccine is also given to children in Finland. In the UK, millions of doses of LAIV have been given to young children and to school age children during the last five flu seasons. A small number of respiratory illnesses (including wheeze) were reported in the contacts of vaccinated children. Most of these events were self-limiting and some of them are likely to have been coincidental.

LAIV has a good safety record and unvaccinated contacts are not at risk of becoming seriously ill with the flu vaccine virus, either through being in the same room where flu vaccine has been given or by being in contact with a recently vaccinated individual. Excluding children from school during the period when LAIV is being offered or in the following weeks is therefore not considered necessary. The only exception to this would be the tiny number of children who are extremely immunocompromised (for example those who have just had a bone marrow transplant). These children are normally advised not to attend school anyway because of the definite and much higher risk of being in contact with other infections, including 'wild' influenza, that spread in schools.

Exposure to vaccine virus during administration

- administration of the vaccine is via a nasal applicator which delivers just 0.1ml (around 1/50th of a teaspoon) of fluid into each nostril. There is not a 'mist' of vaccine virus in the air when children are being vaccinated and therefore others in the room should not be at risk of "catching" the vaccine virus. The room or school in which administration of nasal influenza vaccine has taken place does not require any special cleaning afterwards
- images of the vaccine being squirted into the air (which are widely available on the internet) and the US name of the vaccine (FluMist® Quadrivalent) may give a false impression that a vaccine mist fills the room. These images are intended to show how gently the vaccine comes out when inserted into the nose but the vaccine does not create an external mist – almost all the fluid is immediately absorbed into the child's nose where it has been sprayed
- healthcare workers administering LAIV may, theoretically, be exposed to the vaccine virus if it is accidentally released outside of the child's nose. In the US, where there has been extensive use of the vaccine over many years, transmission of the vaccine virus to healthcare workers has not been reported to date. Health care workers who are immunocompromised and those who are pregnant can safely administer the vaccine. As a precautionary measure, however, very severely immunocompromised healthcare workers should not administer LAIV

Shedding of vaccine virus

- although vaccinated children are known to shed virus a few days after vaccination, it is less able to spread from person to person than the natural infection. The amount of virus shed is normally below the levels needed to pass on infection to others and the virus does not survive for long outside of the body. This is in contrast to natural flu infection, which spreads easily during the flu season. In schools using vaccine, therefore, the overall risk of contact with influenza viruses is massively reduced by having a large number of children vaccinated, thus reducing their risk of infection
- in the US, where there has been extensive use of LAIV for many years, serious illness amongst immunocompromised contacts who are

inadvertently exposed to vaccine virus has never been observed. Expert doctors at Great Ormond Street Hospital, who deal with many children with very serious immune problems, do not recommend keeping such children off school purely because of vaccination

- a tiny number of children who are extremely severely immunocompromised e.g. immediately after a bone marrow transplant, would not be attending school anyway because the risk from all the other infections that children pass to each other at school would be too great. It is important that all children with immune problems should themselves be vaccinated, usually with an injected inactivated vaccine. Similarly, healthy children who have family contacts who are very severely immunocompromised should be given an inactivated influenza vaccine

Vaccine recommendations

In England, flu vaccine should be offered to all children who are aged two to nine years old (but not ten years or older) on 31 August 2018 and to children aged from 2 years up to 18 years in clinical risk groups. LAIV should be offered unless contraindicated (please refer to contraindications section below). For further information about the childhood flu immunisation programme 2017/19, please refer to the annual flu letter from DH/PHE/NHS England: [The national flu immunisation programme 2018/19](#).

Number of vaccine doses required

Children NOT in clinical risk groups only require one dose of LAIV. A single dose is 0.2ml (administered as 0.1ml per nostril).

The marketing authorisation holder's Summary of Product Characteristics² (SPC) states that, for children who have not previously been vaccinated against seasonal flu, a second dose should be given after an interval of at least four weeks. The JCVI has considered this issue and has recommended that as a second dose of the vaccine provides only modest additional protection, children who are not in a clinical risk group should be offered a single dose of LAIV.

Healthcare professionals are reminded that in some circumstances, the recommendations regarding vaccines given in the Green Book chapters may

² Fluenz Tetra® Summary of Product Characteristics (SPC). Available at: <https://www.medicines.org.uk/emc/product/3296> [last accessed 17 July 2018].

differ from those in the SPC for a particular vaccine. When this occurs, the recommendations in the Green Book are based on current expert advice received from the JCVI and this advice should be followed. The Green Book recommendations and/or further advice from the Department of Health/Public Health England should be reflected in PGDs.

Children aged two years to less than nine years who are in a clinical risk group and who have not received flu vaccine before should receive two doses of LAIV. The second dose should be given at least four weeks after the first.

Administering an inactivated influenza vaccine after a first dose of LAIV

In the event that eligible children who have previously received one dose of LAIV require a second dose (ie those in clinical risk groups who have never received flu vaccine before and are aged between two and less than nine years) but all LAIV stock has expired, a suitable inactivated injectable flu vaccine should be offered as an alternative, allowing a four-week minimum interval period between the two doses.

Contraindications and precautions

There are very few children who cannot receive any flu vaccine. When there is doubt, appropriate advice should be sought promptly from the local NHS England screening and immunisation team, local health protection team or a consultant paediatrician to minimise the period the child is left unvaccinated.

Contraindications

LAIV should not be given to a child or adolescent who:

- is under 24 months or 18 years or older
- has had a confirmed anaphylactic reaction to a previous dose of flu vaccine
- has had a confirmed anaphylactic reaction to any component of the vaccine
- is clinically severely immunodeficient due to conditions or immunosuppressive therapy such as: acute and chronic leukaemias; lymphoma; HIV infection not on highly active antiretroviral therapy (HAART); cellular immune deficiencies; and high dose corticosteroids (prednisolone at least 2mg/kg/day for a week or 1mg/kg/day for a month or equivalent)
- is currently taking or has been prescribed oral steroids in the last 14 days for respiratory disease

- is receiving salicylate therapy
- is pregnant

The **Green Book³** chapter on 'contraindications and special considerations' (chapter 6) gives further advice on the use of live vaccines in individuals who are severely immunosuppressed. Where LAIV is contraindicated, consideration should be given to the use of inactivated flu vaccine instead.

LAIV is not contraindicated for use in children or adolescents with stable HIV infection receiving antiretroviral therapy; those receiving topical steroids, standard dose inhaled corticosteroids, low-dose systemic corticosteroids or those receiving corticosteroids as replacement therapy, for example for adrenal insufficiency.

Precautions

LAIV is not recommended for children and adolescents with severe asthma or active wheezing, for example those who are currently taking oral steroids or who have been prescribed oral steroids in the last 14 days for respiratory disease. There is limited safety data on children who are currently taking a high dose of an inhaled steroid – Budesonide >800 mcg/day or equivalent (eg Fluticasone >500 mcg/day) so such children should only be given LAIV on the advice of their specialist. As these children are a defined risk group for flu, those who cannot receive LAIV should receive an inactivated flu vaccine.

Vaccination with LAIV should be deferred in children with a history of active wheezing in the past 72 hours or those who have increased their use of bronchodilators in the previous 72 hours. If their condition has not improved after a further 72 hours then, to avoid delaying protection in this high risk group, these children should be offered an inactivated flu vaccine.

If a child is acutely unwell, immunisation may be postponed until they have fully recovered. This is to avoid confusing the differential diagnosis of any acute illness by wrongly attributing any signs or symptoms to the adverse effects of the vaccine. However, minor illnesses without fever or systemic upset are not valid reasons to postpone immunisation.

³ Public Health England. Immunisation against infectious disease. Contraindications and Special Considerations. <https://www.gov.uk/government/publications/contraindications-and-special-considerations-the-green-book-chapter-6> [last accessed 17 July 2018].

Reporting adverse reactions

As with all vaccines and other medicines, healthcare professionals and patients are encouraged to report suspected adverse reactions to flu vaccines using the **yellow card reporting scheme** at <http://yellowcard.mhra.gov.uk>. The LAIV Fluenz Tetra® and the inactivated quadrivalent flu vaccines carry a black triangle symbol (▼). This symbol is used as a reminder to healthcare professionals and the public to report all suspected side-effects to the Medicines and Healthcare Products Regulatory Agency (MHRA) using the Yellow Card scheme.

Risk of anaphylaxis following administration of LAIV

As with all vaccines, there is a very rare possibility of this vaccine causing a severe allergic reaction (anaphylaxis). All healthcare professionals responsible for vaccination should be trained to recognise and treat anaphylaxis.

Which vaccine to give a pregnant girl

There is limited data on the use of live attenuated flu vaccine in pregnancy. While there is no evidence of risk with LAIV, inactivated flu vaccines are preferred for those who are pregnant. There is no need, however, to specifically test eligible girls for pregnancy or to advise avoidance of pregnancy in those who have been recently vaccinated. There are no specific precautions regarding pregnant women who are exposed to children who have been vaccinated with LAIV as the likelihood of onward transmission is considered very low.

Egg allergy

JCVI has advised⁴ that, except for those with severe anaphylaxis to egg that has previously required intensive care, children with an egg allergy can be safely vaccinated with LAIV in any setting (including primary care and schools). Those children who have both egg allergy and a clinical risk factor that contraindicates LAIV (eg immunosuppression) should be offered an inactivated injectable flu vaccine with a very low ovalbumin content (less than 0.12µg/ml).

Children with a history of severe anaphylaxis to egg that has previously required intensive care, should be referred to specialists for immunisation in

⁴ Joint Committee on Vaccination and Immunisation Minutes of the February 2015 meeting. Available at : <https://www.gov.uk/government/groups/joint-committee-on-vaccination-and-immunisation#minutes>

hospital. LAIV is not otherwise contraindicated in children with egg allergy. Egg-allergic children with asthma can receive LAIV if their asthma is well controlled (please see the advice on severe asthma in the precautions section above).

Inactivated vaccines with ovalbumin content more than 0.12µg/ml (equivalent to 0.06µg for 0.5ml dose) or where content is not stated should not be used in egg-allergic children. The ovalbumin content of the flu vaccines for 2018/19 will be published on the [PHE Annual flu programme](#) web page.

The use of inactivated flu vaccine when LAIV is contraindicated

For children in clinical risk groups under 18 years of age where LAIV is contraindicated (or it is otherwise unsuitable), an appropriate quadrivalent inactivated influenza vaccine will be supplied by PHE and should be offered. Inactivated flu vaccines suitable for children are presented as prefilled syringes for intramuscular injection. The preferred site for injection is the anterolateral aspect of the thigh for infants under one year. Children over one year of age can receive the vaccine in the deltoid region of the upper arm.

Some inactivated flu vaccines are restricted to use in particular age groups or are not suitable for those with an egg allergy. Those administering flu vaccines must be familiar with and refer to the manufacturer's SPC for individual brands when administering inactivated flu vaccines.

Inactivated flu vaccines can cause similar systemic adverse reactions as LAIV. They may also cause injection site reactions (redness, swelling, tenderness). These usually disappear after one or two days.

How many doses of inactivated flu vaccine to give

Where a child, aged six months to less than nine years, cannot receive LAIV due to a contraindication (or other reason) and has not received any flu vaccine before, they should receive two doses of inactivated flu vaccine, with the second dose at least four weeks after the first. The inactivated flu vaccines are interchangeable – the second dose does not have to be the same vaccine given for the first dose.

Children who have received one or more doses of any flu vaccine before should be considered as previously vaccinated. Two doses are only required the first year the child receives any flu vaccine. In subsequent years, they can be given a single dose as their immune system will already have been primed.

Deferring vaccination due to acute illness

If the child has an acute severe febrile illness, LAIV administration should be deferred until recovered. Minor illnesses without fever or systemic upset are not valid reasons to postpone vaccination.

Vaccine constituents

The LAIV is supplied in a single use nasal applicator (type 1 glass) with nozzle (polypropylene with polyethylene transfer valve), nozzle tip-protector (synthetic rubber), plunger rod, plunger stopper (butyl rubber) and dose divider clip, none of which should affect latex sensitive individuals.

LAIV does not contain any preservatives such as thiomersal but it does contain a highly processed form of gelatine (derived from pigs) as one of its additives. Gelatine is commonly used in a range of pharmaceutical products, including many capsules and some vaccines. The gelatine in LAIV is used as a stabiliser - it protects the live viruses from the effects of temperature.

The gelatine used in live vaccines is highly purified and hydrolysed (broken down by water), so it is different from the natural gelatine used in foods. Very sensitive scientific tests have shown that no DNA from pigs can be detected in the LAIV nasal flu vaccine (Fluenz Tetra). These tests show that the gelatine is broken down so much that the original source cannot be identified⁵.

Vaccine acceptability for Muslim and Jewish communities

Members of Muslim or Jewish religious communities may be concerned about using vaccines that contain gelatine from pigs (porcine gelatine). This statement from representatives of the Jewish community may help some patients/parents/carers to reach a decision about having the vaccine:

Rabbi Abraham Adler from the Kashrus and Medicines Information Service said:

“It should be noted that according to Jewish laws, there is no problem with porcine or other animal derived ingredients in non-oral products. This includes vaccines, including those administered via the nose, injections, suppositories, creams and ointments”.

⁵ Oxford Vaccine Group. Vaccine Knowledge Project Vaccine ingredients page, gelatine section. Available at: <http://vk.ovg.ox.ac.uk/vaccine-ingredients#gelatine> [last accessed 17 July 2018].

However, it is acknowledged that some groups within the British Muslim community may consider the porcine product to be forbidden. The final decision about whether parents have their child vaccinated is with them. In order to come to an informed decision, they should be able to consider the evidence about the advantages and disadvantages of the vaccination. They may wish to seek advice from their faith leaders or other community leaders.

Fluenz Tetra and FluMist Quadrivalent are the only live attenuated flu vaccines available in Europe.

Current policy is that **only** those who are in clinical risk groups are able to receive an inactivated injectable vaccine as an alternative. Children who are not in clinical risk groups should only be offered LAIV. A child who is unable to have LAIV, for reasons other than being medically contraindicated, will continue to derive benefit from the programme by virtue of the reduction of transmission among their peers. They are not eligible for an inactivated vaccine.

PHE's statement⁶ on vaccines and gelatine can be found [here](#). PHE has also published a specific document⁷: [Children's flu vaccination programme, the nasal flu vaccine and porcine gelatine](#).

Ordering, storage and handling

Ordering LAIV

All flu vaccines for children are purchased centrally by PHE. This includes vaccine for all children aged two to three years, for children in reception class and school years 1 to 5 and for children in risk groups aged six months to less than 18 years.

For children in risk groups under 18 years of age where LAIV is contraindicated, a suitable quadrivalent inactivated influenza vaccine has been procured centrally by PHE. The quadrivalent inactivated influenza vaccine being supplied by PHE is licensed for children from six months of age.

⁶ Public Health England (2014) Vaccines and Gelatin: PHE's response. <https://www.gov.uk/government/news/vaccines-and-gelatine-phe-response> [last accessed 17 July 2018].

⁷ Public Health England (2014). The children's flu vaccination programme, the nasal flu vaccine Fluenz and porcine gelatine. <https://www.gov.uk/government/publications/childrens-flu-vaccination-programme-nasal-flu-vaccine-and-porcine-gelatine> [last accessed 17 July 2018].

LAIV and inactivated injectable flu vaccines for children can be ordered through the ImmForm website: www.immform.dh.gov.uk as for other centrally purchased vaccines.

It is important not to order or hold more than two weeks' worth of LAIV; local stockpiling can cause delays in stock being released and increases the risk of significant loss if there are cold chain failures. It also increases the risk of out of date vaccine being used as Fluenz Tetra has a short shelf life.

In the 2016/17 and 2017/8 flu seasons, ordering controls using allocations based on previous years' uptake were introduced on centrally supplied flu vaccines. These were put in place to reduce the amount of excess vaccine, in particular LAIV, ordered by general practice but not administered to children. It is envisaged that controls will also be in place in 2018/19. The latest information on these controls will be available in [Vaccine Update](#) and on the ImmForm news item both prior to, and during, the flu vaccination period.

Storing LAIV

LAIV must be stored in accordance with manufacturer's instructions. It should be stored between +2°C and +8°C in its original packaging and protected from light. It must not be frozen and as for most other vaccines, heat speeds up the decline in potency, reducing vaccine shelf life.

Before use, LAIV may be left out of the refrigerator for a maximum period of 12 hours at a temperature not above 25°C as indicated in the [Summary of Product Characteristics²](#) (SPC). If the vaccine has not been used after this 12 hour period, it should be disposed of.

Shelf life of LAIV

LAIV has an expiry date 18 weeks after manufacture – this is much shorter than inactivated injectable flu vaccines. Expiry dates should be checked regularly and all efforts should be made to vaccinate children before the Christmas holidays if possible.

Vaccine safety and efficacy

Potential side-effects of LAIV

Nasal congestion/runny nose (rhinorrhoea), reduced appetite, malaise and headache are common adverse reactions following administration of LAIV. Hypersensitivity reactions such as urticaria, facial oedema, bronchospasm and anaphylaxis can occur rarely.

LAIV efficacy

LAIV provides good overall protection for children against influenza virus, and is expected to provide some cross-protection against mismatched strains. Using a live attenuated vaccine provides more antigenic stimuli; more elements of the immune system are involved resulting in the production of IgA, a T-cell response and cell mediated immunity. Vaccine effectiveness varies from year to year depending upon the circulating strains and the vaccine composition.

In August 2016, JCVI reviewed all the UK and other international evidence in light of emerging evidence of low effectiveness of the nasal spray vaccine (lower than inactivated vaccine), reported in the United States (US). After reviewing evidence from across the UK, Finland, Canada and the US following the 2015/16 influenza season, much of which demonstrates good overall effectiveness, the clear recommendation of the JCVI was to continue to recommend the use of the live attenuated influenza nasal spray vaccine for preventing flu in children and the continuation of the UK childhood influenza immunisation programme together with on-going intensive monitoring of the programme performance.

For more information please go to:

<https://www.gov.uk/government/publications/jcvi-statement-on-the-nasal-spray-flu-vaccine>

It takes about two weeks for the body to acquire protection. This is why it is best to offer vaccination as early as possible in the flu season before flu viruses start to circulate.

Vaccine administration

Administering LAIV

LAIV is administered by the intranasal route and is supplied in an applicator that allows 0.1ml to be administered into each nostril (total dose of 0.2ml). Clear diagrams showing administration are provided in the [SPC](#) and NHS Education for Scotland has made a [video for health professionals on how to administer the vaccine](#).

Administration of LAIV by healthcare staff in clinical risk groups

In theory, healthcare workers may have low level exposure to live attenuated influenza vaccine viruses during administration of the vaccine and/or from recently vaccinated patients. The vaccine viruses are cold-adapted and attenuated however and are unlikely to cause symptomatic influenza. In the US, where there has been extensive use of LAIV, no transmission of vaccine virus in healthcare settings has ever been reported and there have been no reported instances of illness or infections from the vaccine virus among healthcare professionals inadvertently exposed. Thus, the US Centers for Disease Control and Prevention has considered that the risk of acquiring vaccine viruses from the environment is unknown but is probably low⁸. As a precaution, however, very severely immunosuppressed individuals should not administer LAIV. Other healthcare workers who have less severe immunosuppression or are pregnant, should take reasonable precautions to avoid inhaling the vaccine and ensure that they themselves are appropriately vaccinated.

Sneezing, nose blowing and nasal dripping following administration

If the child sneezes, blows their nose or has nasal dripping following administration of LAIV, the vaccine dose does not need to be repeated. Binding of the virus to epithelial cells occurs very rapidly and there are more virus particles in the vaccine than are needed to establish immunity. Therefore sneezing or blowing the nose immediately after immunisation with LAIV will not affect immunity⁹ and reassurance should be given that the vaccine will still be effective if any of these occur.

Administering LAIV when the patient has a blocked or runny nose

There are no data on the effectiveness of LAIV when given to children with a heavily blocked or runny nose (rhinitis) caused by infection or allergy. As heavy nasal congestion might impede delivery of the vaccine to the nasopharyngeal mucosa, deferral of administration until resolution of the nasal congestion or use of an appropriate alternative intramuscularly administered flu vaccine should be considered.

⁸ Centers for Disease Control and Prevention (2013) Prevention and Control of Seasonal Influenza with Vaccines: Recommendations of the Advisory Committee on Immunization Practices — United States, 2013–2014. MMWR September 20, 62(RR07);1-43

http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6207a1.htm?s_cid=rr6207a1_w#AvailableLAIV

⁹ Astra Zeneca. Re: FLUMIST (influenza vaccine [live attenuated]) – Re-administration of FLUMIST subsequent to sneezing [Internet] Message to: British Columbia Centre for Disease Control. 2013 July 30. Cited in: British Columbia Centre for Disease Control Live Attenuated Influenza Vaccine Questions and Answers for Health Care Providers 2013-2014 . Revised Nov 2013

Administering an incomplete dose of vaccine

It is not necessary to repeat the dose of vaccine as long as at least 0.1ml of the vaccine has been given intranasally¹⁰ as each half dose (0.1ml) contains enough viral particles to induce an immune response¹¹.

If the vaccine is accidentally squirted into the child's eye, it may cause some slight irritation to the eye and eyewash/normal saline should be used to wash out the eye. The child/parent should be advised to seek medical advice if any irritation occurs and persists beyond what might reasonably be expected.

What to do if the child refuses the second half of the vaccine dose after the first half has been given

As each half dose (0.1ml) contains enough viral particles to induce an immune response¹¹, it is not necessary to offer an inactivated vaccine or a repeat live vaccine on another occasion.

Inadvertent administration of both half doses in the same nostril

It is recommended that LAIV be administered as two divided sprays (0.1ml into each nostril) to maximize the vaccine's contact surface area of epithelial cells within the nasopharynx. No clinical trials have been conducted using a single-nostril administration. However, there is no need to repeat immunisation as each half dose (0.1ml) contains enough viral particles to induce an immune response¹¹.

Inadvertent administration of LAIV to a child who is aged less than 24 months

LAIV is contraindicated in all children aged less than 24 months due to an increase in adverse events in this age group. An increase in wheezing and hospitalisation was observed in clinical trials that included children aged from six to 23 months of age. The decision not to license the vaccine for use in children aged less than 24 months was based on these observations rather than vaccine efficacy in this age group.

¹⁰ Astra Zeneca. FLUMIST® (Influenza Vaccine [Live, attenuated]) – Inadvertent Oral Administration & Inadvertent Eye Exposure [Internet] Message to: British Columbia Centre for Disease Control. 2013 July 30. Cited in: British Columbia Centre for Disease Control Live Attenuated Influenza Vaccine Questions and Answers for Health Care Providers 2013-2014. Revised Nov 2013

¹¹ Astra Zeneca. FLUMIST® (Influenza Vaccine [Live, attenuated]) – Single nostril Administration/Inadvertent Single Nostril Administration [Internet] Message to: British Columbia Centre for Disease Control. 2013 July 30. Cited in: British Columbia Centre for Disease Control Live Attenuated Influenza Vaccine Questions and Answers for Health Care Providers 2013-2014 . Revised Nov 2013

Children who have received LAIV at less than 24 months of age do not require a replacement dose. The inadvertently administered vaccine should count as a valid dose as LAIV will provide protection in this age group. However, the child's parents/carers should be informed of the possible adverse events in the short term and advised to seek medical care if adverse events occur. They should be reassured that no long term effects from receiving LAIV are anticipated.

Children from six months of age in clinical risk groups who have not received a flu vaccine previously should count the inadvertently administered LAIV as the first dose. The child should also be offered the inactivated flu vaccine four weeks later to complete the two dose schedule (in line with the recommendation that children aged six months to under 9 years who have not received inactivated flu vaccine previously should be offered a second dose at least four weeks after the first dose). If the child reaches their second birthday in the four weeks between the dose of LAIV and when a second dose of flu vaccine would be due, a further dose of LAIV can be given (if not contraindicated).

Healthcare professionals should report the administration error via their local governance system(s) so that lessons can be learnt and the risk of future errors minimised.

Inadvertent administration of LAIV to a child who is immunosuppressed

If an immunocompromised individual receives LAIV then the degree of immunosuppression should be assessed. If the individual is severely immunocompromised, antiviral prophylaxis should be considered, otherwise they should be advised to seek medical advice if they develop flu-like symptoms in the four days (the usual incubation period) following administration of the vaccine. If antivirals are used for prophylaxis or treatment, then in order to maximise their protection in the forthcoming flu season, the patient should also be offered inactivated influenza vaccine. This can be given straight away.

Healthcare professionals should report the administration error via their local governance system(s) so that the appropriate action can be taken, lessons can be learned and the risk of future errors minimised.

Recognition of severe immunosuppression

An individual may be considered severely immunosuppressed if they:

- are severely immunodeficient due to conditions or immunosuppressive therapy

- have acute and chronic leukaemia
- have lymphoma
- are HIV positive and not on highly active antiretroviral therapy
- have a cellular immune deficiency
- are taking a high dose of steroids

Administering LAIV with other vaccines

LAIV can be given at the same time as, or at any interval before or after other vaccines, including live vaccines. Although it was previously recommended that, where vaccines cannot be administered simultaneously, a four-week interval should be observed between live viral vaccines, JCVI has now advised that no specific intervals need to be observed between the live attenuated intranasal flu vaccine and other live vaccines. See the [Revised recommendations for the administration of more than one live vaccine](#)¹² for more information.

Administering LAIV with antiviral agents against flu

There is a potential for flu antiviral agents to lower the effectiveness of LAIV. Therefore, flu antiviral agents and LAIV should not be administered concomitantly. LAIV should be delayed for at least 48 hours after cessation of treatment with flu antiviral agents. Administration of flu antiviral agents within two weeks of administration of LAIV may adversely affect the effectiveness of the vaccine.

Inadvertent administration of an expired dose of LAIV

Inadvertently administering an expired dose of LAIV is unlikely to cause harm to the child other than that the expired dose may not offer them adequate protection. Health professionals should inform the parent/carer of the error, provide reassurance where necessary and discount the expired dose. An additional dose of LAIV that is in date should be offered as soon as possible (on the same day as the expired vaccine was given or as soon as the error is discovered), to ensure satisfactory protection. There is no minimum interval between an expired and a valid dose of LAIV as it is the same product being administered. In the event that 'in date' LAIV is not available, a suitable inactivated flu vaccine should be offered as an alternative.

¹² Public Health England. Revised recommendations for the administration of more than one live vaccine. 24th April 2015. Available at: <https://www.gov.uk/government/publications/revised-recommendations-for-administering-more-than-1-live-vaccine> [last accessed 17 July 2018].

Inadvertently administering an expired dose of LAIV is a clinical incident that should be reported via the local governance system(s), so that appropriate action can be taken, lessons can be learnt and the risk of future errors minimised.

Administering LAIV to patients with a needle phobia

Patients aged 18 years and older with a needle phobia, should be encouraged, where possible, to have the injected inactivated vaccine.

LAIV is not licensed in adults because there is some evidence of poorer efficacy when compared with the inactivated vaccine.

However, individual medical practitioners may choose to use LAIV “off-label” for adults, without any other medical contra-indication, who are eligible for influenza vaccination but who cannot be vaccinated with injectable vaccines. This could include patients with learning difficulties who become seriously distressed with needles.

The legislation does allow for such situations and the Medicines and Healthcare products Regulatory Agency state that ‘there are clinical situations when the use of medicines outside the terms of the licence (ie, ‘off-label’) may be judged by the prescriber to be in the best interest of the patient on the basis of available evidence’¹³. The responsibility for such use rests with the health professional. In this situation, a patient specific direction (PSD) will be required. In these exceptional circumstances, where it has not proved possible to administer the inactivated vaccine, PHE has agreed that the national LAIV stock can be used for this purpose.

¹³ Medicines and Healthcare products Regulatory Agency. Off-label or unlicensed use of medicines: prescribers’ responsibilities. Available on Gov.uk website at: <https://www.gov.uk/drug-safety-update/off-label-or-unlicensed-use-of-medicines-prescribers-responsibilities> [last accessed 17 July 2018].

Useful links

Letter detailing 2018/19 flu programme

Department of Health, Public Health England, NHS England. The national flu immunisation programme 2018/19. Published 26 March 2018. Available at:

<https://www.gov.uk/government/publications/national-flu-immunisation-programme-plan>

Immunisation against infectious disease (the Green Book) Influenza chapter 19. Available at:

<http://www.gov.uk/government/publications/influenza-the-green-book-chapter-19>

Leaflets, posters and training slides prepared specifically for the childhood flu programme. Available at: www.gov.uk/government/collections/annual-flu-programme

Toolkit for childhood flu programme available at

www.gov.uk/government/publications/flu-immunisation-toolkit-for-programme-extension-to-children

A video for health professionals on how to administer the vaccine

produced by NHS Education for Scotland is available at

<http://www.nes.scot.nhs.uk/education-and-training/by-theme-initiative/public-health/health-protection/seasonal-flu/childhood-seasonal-flu-vaccination-programme-resources-for-registered-practitioners.aspx>

Fluenz Tetra[®] Summary of Product Characteristics and Patient Information Leaflet available at

<https://www.medicines.org.uk/emc/product/3296>

PGD templates for LAIV and inactivated flu vaccines are available at:

<https://www.gov.uk/government/collections/immunisation-patient-group-direction-pgd>

Additional flu resources available at

www.gov.uk/government/collections/annual-flu-programme