THE ORGANIZATION AND DELIVERY OF
VACCINATION SERVICES IN THE EUROPEAN UNION

UNITED KINGDOM

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United Kingdom

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Governance

The United Kingdom (UK) has a single, over-arching immunization schedule. However, governance of health care and public health is complex. In England these functions are the responsibility of the Department of Health, which also has some UK-wide responsibilities, for example those involving international relations. However, the organization of health care and public health services is devolved to the governments of the other three nations of the UK (Scotland, Wales, Northern Ireland), the three crown dependencies (Jersey, Guernsey, Isle of Man), and the 14 United Kingdom Dependent Territories (including Gibraltar, which is inside the EU). Given the complexity involved, this description is confined to the situation in the four nations of the United Kingdom. While each has, to varying degrees, autonomy in relation to immunization policy, all are advised by the Joint Committee of Vaccinations and Immunisations, with members from the UK and abroad.

The practical arrangements in England are the most complex, reflecting changes in the health system introduced in 2012. Until then, public health services (including immunization services) were part of the national health service (NHS), as is still the case in the other three jurisdictions. In that year, the Health and Social Care Act greatly expanded market-based mechanisms that were already in place in England. These necessitated separation of public health from health care. Local public health functions were transferred to local government but national ones, including oversight of immunization and screening, were transferred to a new organization, Public Health England, which also brought together a range of

existing bodies such as those responsible for radiological protection. Consequently, responsibility is now divided among a number of different organizations. In the other three nations these functions are, to varying degrees, integrated.

In England responsibility for immunization is based on a tripartite agreement between the Department of Health, Public Health England and National Health Service England (NHS England). NHS England's area teams, supported by specialist staff from Public Health England embedded within them, commission immunization services from community and primary care providers. The agreement assigns responsibility to the Department of Health for providing strategic oversight, to NHS England for commissioning services and to Public Health England for providing scientific support. Commissioning intentions and budget requirements for the delivery of the immunization programme are agreed annually by the Department of Health and NHS England, and published in a public health functions agreement. Public Health England supports the Department of Health and NHS England in system leadership and planning, and has specific responsibilities for the implementation of the immunization programme, the provision of service specifications for individual vaccines, the procurement of vaccines and immunoglobulins, and the provision of specialist advice and information at national and local levels.

At local level, arrangements involve NHS England, Public Health England and local government working together to commission and provide leadership for screening and immunization services. Public Health England employs screening and immunization teams embedded within NHS England local teams covering different geographic areas. This means that the screening and immunization teams are accountable to both Public Health England and NHS England. The screening and immunization teams are responsible for providing local leadership, encouraging multi-agency working, ensuring high-quality delivery of programmes based on national specifications, supporting commissioning, providing advice to the public and to health professionals, and monitoring the performance of community and primary care providers. Clinical Commissioning Groups, which are led by local general practitioners (GPs), are expected to support screening and immunization teams, particularly with quality improvement in primary care. Local government is responsible for providing independent scrutiny of the local immunization programme delivery, ensuring it is responsive to local population needs, and commissioning community health services, such as school nursing and sexual health, which can include immunization activities. Each local government body has a specialist public health team, headed by a Director of Public Health.

In Scotland immunization policy is set by the Scottish Government Health Directorates on the advice of the Joint Committee of Vaccinations and Immunisations and other appropriate bodies. NHS Health Protection Scotland works with NHS Health Board Immunisation Coordinators and other national organizations, such as Health Scotland, NHS Education Scotland, and NHS National Services Scotland, to monitor and coordinate the Scottish immunization programme, as part of the Scottish Health Protection Network. There is currently a programme of redesigning and modernizing how local vaccination services are delivered in Scotland. It will implement new models of delivery based on local decision-making and leadership.[1]

In Northern Ireland immunization policy is set by the Department of Health, on advice from the UK Joint Committee for Vaccines and Immunisation. Northern Ireland has implemented all the Joint Committee's recommendations, although occasionally with slight variations, e.g. with regard to ages of eligibility (Public Health Agency, 2017). The Department of Health tasks the immunization team in the Health Protection Directorate of the Public Health Agency to implement and monitor all national immunization programmes. All pre-school and most influenza immunizations, along with adult vaccines for pneumococcal disease, shingles and pertussis in pregnant women, are administered in general practice. The Public Health Agency works with colleagues in the Health and Social Care Board to support these programmes, and with the Child Health Information System to send invitations and monitor uptake. Teenage immunizations (HPV, Men ACWY, diphtheria, tetanus and polio, and MMR), along with flu immunization for all primary school children, are delivered by school nurses in each of the five Health and Social Care Trusts. The Public Health Agency works with these teams on the delivery and monitoring of these programmes, produces all materials to support the immunization programmes, and delivers communications campaigns to the public.

In Wales immunization policy is monitored and coordinated by Public Health Wales and NHS Wales.

1 http://www.healthscotland.scot/health-topics/immunisation/vaccination-transformation-programme

Guidelines and schedules on immunization against infectious disease, which are commonly referred to as the online Green Book, set out the principles, practices and procedures of immunization in the whole of the UK, with particular emphasis on those immunizations that comprise the routine immunization programme from birth through to adulthood. They apply equally to the devolved administrations of England, Wales, Scotland and Northern Ireland.

Although the Joint Committee of Vaccinations and Immunisations' guidance is generally applied throughout the UK, there is some flexibility to adapt to specific epidemiological circumstances. For example, newborn babies are vaccinated with the BCG vaccine only in 'risk' areas (e.g. parts of London) where the prevalence of tuberculosis is higher. In England, with its more decentralized system, decisions about eligibility also vary based on local settings, such as some areas delivering HPV vaccinations in schools with two doses in one year, or two doses over two years (depending for example on the level of student mobility in some areas compared to others). Some local areas will use catch-up vaccination following outbreaks in certain communities using various delivery strategies, and develop interventions to reach specific under-vaccinated groups (e.g. inequalities immunization nurses work in some local authorities). At local level, specific area teams develop strategic/operational plans for their regions to improve uptake. In England local plans are developed in close collaboration with local authorities.

Vaccinations in the UK are not mandatory but are recommended, including for health care workers. However, the Green Book recommends that all new employees should undergo a pre-employment health assessment, which should include a review of any immunization needs. The guidelines state that all health care staff should be up to date with their routine immunizations, e.g. tetanus, diphtheria, polio and MMR. Influenza vaccination is recommended for health care workers directly involved in patient care, who should be offered influenza immunization on an annual basis.

In theory, all people ordinarily resident in the UK should be registered with a general practitioner in the jurisdiction in which they live. These systems differ in each of the jurisdictions, in relation to content and linkage with other data, with linkage most advanced in Scotland. However, all these registers are known to be incomplete to some extent, and have some duplication. In theory, every time a person uses an NHS service, the record should be updated. This record is held in their GP practice and contains clinical information about the care the person has received. It should enable every health care professional involved at different stages of the person's care to have access to their medical history, including allergies, operations or tests, medicines and immunizations.

In addition, for children in England the Child Health Information System (a local population register of all children including those not registered with a general practitioner) acts as a source of data to estimate coverage for routine and selected childhood immunizations. The Child Health Information System is a patient administration system that provides a clinical record for individual children and supports a variety of activities related to child health, including universal services for population health (including immunization) and support for statutory functions. It identifies registered eligible children, sends out lists to GP practices and sends appointments directly to patients. More generally for both children and adults, GP practices call and recall patients who have not attended vaccination. Similar systems exist in the other jurisdictions, such as the Child Health Surveillance Programme in Scotland and the Northern Ireland Child Health System and the Child Health System in Wales.

Targeted measures and interventions are deployed for specific groups based on an assessment conducted by local public health and National Health Service teams. In the past these have included outreach programmes for specific minority ethnic groups (examples include Travellers, and Charedi (Orthodox Jewish) communities). Refugees and asylum-seekers are entitled to National Health Service care, with different arrangements in each jurisdiction, as are certain other groups, such as EEA citizens, NATO personnel, and victims of human trafficking. However, undocumented migrants face many barriers to obtaining health care and are deterred from doing so by fears of deportation. Information on immunization is available in a number of languages, and interpreters can be booked through GP practices for non-English speaking individuals. National Health Service/Public Health England commissioners also work with local public health departments located in local authorities to identify possible under-served populations.

There are no sanctions for citizens or parents who refuse vaccinations for themselves or for their children, but there have been many awareness campaigns to encourage people to come forward for immunization in the past (notably for MMR), and some are still on-going (HPV,

meningitis, shingles, influenza). Campaigns have included posters, leaflets, NHS websites and mass media.

There are incentives for GP practices to encourage vaccination, for example with payments for vaccine uptake at 2 and 6 years of age and separate specific incentives for achieving a target percentage for the cluster of three-dose vaccines: DTaP/Polio/Hib + MenC + MMR. In England GP practices need to achieve at least 70% coverage of their target population before the 2nd birthday to receive a standard payment and over 90% for a premium payment. English general practices receive an incentive payment if they achieve a set target for immunizing specific at-risk groups against influenza every year as part of the Quality Outcomes Framework; this is not currently the case in Northern Ireland.

Since the 1980s the Child Health Information System and its national equivalents have been used as sources of data to estimate coverage for routine and selective childhood immunizations as part of the Cover of Vaccination Evaluated Rapidly (COVER) Programme. Child Health Information System vaccination data mainly originate from general practitioners' data, as well as other settings where vaccination is delivered. The COVER Programme's vaccine coverage measurements are published quarterly as official statistics and annually as national statistics.

To estimate the coverage of some programmes delivered after the age of 5 in England and for most new vaccine programmes since 2013, data are extracted from GP practice systems. This approach started in 2004 with the influenza and pneumococcal polysaccharide vaccine programmes for people aged over 65 and has now been extended to an increasing number of vaccine uptake collections. Reporting was originally undertaken manually, but by 2008–2009 it had moved to automatic extraction from around 50% of practices and this has now increased to over 95%. In England this data collection is done through the system called ImmForm[2] which is a secure, web-based system used to collect data on vaccine coverage for selected immunization programmes and provide vaccine ordering facilities for the National Health Service. The denominator for childhood MMR is based on the Child Health Information System (*see* below). The denominator for influenza vaccination for adults is based on records of the population registered in GP practices. In Scotland data for children are extracted from the Child Health Surveillance Programme for immunizations, to school-leaving age. In Northern Ireland data for children up to the age of 18 years for both general practitioner and school-based programmes are extracted from the Child Health Information System. The uptake of influenza, shingles and pneumococcal vaccines is extracted electronically via the Apollo system and influenza uptake can also be calculated from general practitioners' fee claim data. Uptake for the pertussis and influenza vaccines in pregnant women is extracted from the maternity computer system NIMATS.

Provision

The majority of vaccines included in the routine schedule are given in primary care by practice nurses working in general practitioner-led surgeries, although Scotland is undergoing a Vaccine Transformation Programme, as already described. In Northern Ireland the system is similar to that in England, but some of the staff delivering vaccines in general practice are employed by the Health and Social Care Trust. The MMR vaccine is provided in two doses, with the first dose given at the age of 12 months and the second dose at around 3 years and 4 months, before children start school. The guidelines mention that there is an opportunity to offer unimmunized or partially immunized individuals the MMR vaccine with diphtheria, tetanus and polio boosters at around 13–14 years of age, and this should be considered as routine practice.

In the past, catch-up campaigns have been conducted for MMR vaccines, particularly following outbreaks. Catch-up vaccinations have been delivered through community services, schools and general practice.

In terms of adult vaccinations against influenza, most adults are vaccinated by their general practitioner. For adults a range of trivalent and quadrivalent inactivated vaccines against influenza are available from suppliers for GP practices to purchase. NHS eligible patients include people over 65 years old and risk groups as detailed in Table 1. As mentioned below, all pregnant women should be offered an inactivated influenza vaccine while pregnant, regardless of their stage of pregnancy. Scotland and Northern Ireland undertake central procurement of influenza vaccines each year, based on the Joint Committee of Vaccinations and Immunisations' recommendations.

Health care professionals are generally vaccinated by nurses in the occupational health services of employers (e.g. hospitals). The influenza vaccine is also available in

2 www.immform.dh.gov.uk

community pharmacies, administered by pharmacists, and since 2016 has been provided free to eligible patients under the National Health Service, and to others (i.e. those not in clinical risk groups) for a fee. Pregnant women are vaccinated either by midwives in antenatal clinics or in primary care services (by general practice nurses).

The list in Table 1 is not exhaustive, and the health practitioner should apply clinical judgement to take into account the risk of influenza exacerbating any underlying disease that a patient may have, as well as the risk of serious illness from influenza itself. Influenza vaccine should be offered in such cases even if the individual is not in the clinical risk groups specified in Table 1.

Table 1 Clinical risk groups who should receive influenza immunization.

Clinical risk category	Examples (this list is not exhaustive and decisions should be based on clinical judgement)
Chronic respiratory disease	Asthma that requires continuous or repeated use of inhaled or systemic steroids or with previous exacerbations requiring hospital admission.
	Chronic obstructive pulmonary disease (COPD) including chronic bronchitis and emphysema; bronchiectasis, cystic fibrosis, interstitial lung fibrosis, pneumoconiosis and bronchopulmonary dysplasia (BPD).
	Children who have previously been admitted to hospital for lower respiratory tract disease.
Chronic heart disease	Congenital heart disease, hypertension with cardiac complications, chronic heart failure, individuals requiring regular medication and/or follow-up for ischaemic heart disease.
Chronic kidney disease	Chronic kidney disease at stage 3, 4 or 5, chronic kidney failure, nephrotic syndrome, kidney transplantation.
Chronic liver disease	Cirrhosis, biliary atresia, chronic hepatitis
Chronic neurological disease (included in the DES directions for Wales)	Stroke, transient ischaemic attack (TIA). Conditions in which respiratory function may be compromised due to neurological disease (e.g. polio syndrome sufferers). Clinicians should offer immunisation, based on individual assessment, to clinically vulnerable individuals including those with cerebral palsy, learning disabilities, multiple sclerosis and related or similar conditions; or hereditary and degenerative disease of the nervous system or muscles; or severe neurological disability.
Diabetes	Type 1 diabetes, type 2 diabetes requiring insulin or oral hypoglycaemic drugs, diet controlled diabetes.
Immunosuppression	Immunosuppression due to disease or treatment, including patients undergoing chemotherapy leading to immunosuppression, bone marrow transplant, HIV infection at all stages, multiple myeloma or genetic disorders affecting the immune system (e.g. IRAK-4, NEMO, complement disorder)
	Individuals treated with or likely to be treated with systemic steroids for more than a month at a dose equivalent to prednisolone at 20mg or more per day (any age), or for children under 20kg, a dose of 1mg or more per kg per day.
	It is difficult to define at what level of immunosuppression a patient could be considered to be at a greater risk of the serious consequences of influenza and should be offered influenza vaccination. This decision is best made on an individual basis and left to the patient's clinician.
	Some immunocompromised patients may have a suboptimal immunological response to the vaccine.
Asplenia or dysfunction of the spleen	This also includes conditions such as homozygous sickle cell disease and coeliac syndrome that may lead to splenic dysfunction.
Pregnant women	Pregnant women at any stage of pregnancy (first, second or third trimesters).
Morbid obesity (class III obesity)*	Adults with a Body Mass Index ≥40 kg/m²

* Many of this patient group will already be eligible due to complications of obesity that place them in another risk category

Source: UK Government (2018)

Vaccination should also be offered to household contacts of immunocompromised individuals, i.e. individuals who expect to share accommodation on most days over the winter and for whom continuing close contact is unavoidable. This may include carers.

In addition to the above, immunization should be provided to health care and social care workers in direct contact with patients/clients to protect them and to reduce the transmission of influenza within health and social care premises, to contribute to the protection of individuals who may have a suboptimal response to their own immunizations, and to avoid disruption to services that provide their care. This would include:

- health and social care staff directly involved in the care of patients or clients;
- those living in long-stay residential care homes or other long-stay care facilities where rapid spread is likely to follow the introduction of infection and cause high morbidity and mortality (this does not include prisons, young offender institutions, university halls of residence, etc.);
- those who are in receipt of a carer's allowance, or those who are the main carer of an older or disabled person whose welfare may be at risk if the carer falls ill. Vaccination should be given on an individual basis at the general practitioner's discretion in the context of other clinical risk groups in their practice; and
- others involved directly in delivering health and social care so that they and vulnerable patients/clients are at increased risk of exposure to influenza.

Financing

All routine vaccines recommended in the national immunization programme are free at the point of delivery for both children and adults. This means that there is no direct financial barrier to childhood vaccination.

Vaccination against influenza in adults is also free of charge at the point of delivery for all recommended groups (described above). For non-recommended groups, influenza vaccination is accessible in a pharmacy for a fee (around £12, but each pharmacy is free to set its own prices). Most travel vaccines also have to be purchased.

The costs of routine vaccines and vaccination services are fully covered through the statutory financing system via general taxation with no contribution from employers, local government or patients.

Key barriers and facilitators

Measles

The UK achieved measles elimination status from the World Health Organization in 2017. The overall coverage rate for the MMR vaccine is high, with MMR coverage across the UK as a whole at 91.6% for the first-dose vaccine, and 88.0% for the second-dose vaccine. However, this level remains below the 95% target set by the World Health Organization.

MMR uptake rates have recovered from the 'Wakefield controversy', erroneously linking the measles vaccine and autism, which has hampered MMR vaccine uptake in the UK in the past 20 years. However, there may still be some in the original cohort who may not have been vaccinated with MMR in the 1990s or who may not have received two doses as recommended.

Under-immunized groups: A report published by the National Institute for Health and Care Excellence in 2016 highlighted a number of groups of the population who might not be fully immunized with childhood vaccines, including MMR. These include:

- 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 single parents;
- those not registered with a general practitioner;
- younger children from large families;
- children who are hospitalized or have a chronic illness;
- those from some ethnic minority groups;

- those from non-English speaking families; and
- vulnerable children, such as those whose families are travellers, asylum-seekers or homeless.

There was some evidence that uptake of MMR has declined at a greater rate among children of more highly educated parents and among those living in more affluent areas. 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.

An analysis of factors for under-immunization for MMR (2013 UK Millennium Cohort Study) showed that just over 40% of children who were unimmunized with MMR vaccine at age 3 had either partially or fully caught-up by age 5. The likelihood of catching up varied markedly with a number of social factors, and more so for full than partial catch-up. Some families, particularly those from ethnic minority groups, appear to have difficulty accessing vaccination in a timely fashion. Advantaged families and those citing non-practical reasons for non-vaccination at age 3 are more likely to persist in not immunizing their child against MMR.

Regional variation: There are regional variations in uptake. In England, for example, London, Manchester and Birmingham have lower uptake rates for most vaccines, including MMR. This has been attributed to higher mobility of the population in urban centres, and also to issues with the quality of data, particularly the denominator.

Some **ethnic groups** have been reported to be under-immunized for MMR and have experienced outbreaks in recent years. These include Roma and Traveller communities, the Somali population, and Orthodox Jewish communities. A recent study on Traveller and Roma communities in the UK identified language, literacy, discrimination, poor school attendance, poverty and housing as barriers across different communities. Trustful relationships with health professionals were important and continuity of care valued (Jackson et al., 2017).

Migration: the occurrence of measles outbreaks in 2017–2018 in Eastern European communities indicate that these populations are under-vaccinated, primarily because of a combination of factors such as a lack of understanding of the UK immunization schedule and health services, lack of trust, and issues around language barriers.

In terms of **facilitators**, steps are required to minimize time to uptake in those families who do eventually catch up, through the reduction of practical barriers. National Institute for Health and Care Excellence guidance outlines actions to reduce inequalities in immunization, including provision of information in multiple languages, offering immunization checks and administration in alternative settings, and sending out reminder invitations from general practitioners.

In terms of specific groups, such as Traveller or Orthodox Jewish communities, tailored strategies have proven to be effective, particularly when they involve close engagement with the communities. For example, outreach programmes such as the one carried out following an outbreak of measles on a Traveller site in Manchester involved containing its spread with daily visits by the same health visitor (Reynolds et al., 2008). A strategy to provide vaccinations during a child health clinic was also successful in increasing MMR uptake in Hackney (WHO, 2016).

Adult vaccinations against influenza

The National Institute for Health and Care Excellence has identified a number of groups that are underserved by seasonal flu vaccination (NICE, 2018), including:

- people who are homeless or sleep rough;
- people who misuse substances;
- asylum-seekers;
- Roma and Travellers;
- people with learning disabilities; and
- young people leaving long-term care.

Factors at general practice level, where the vast majority of vaccinations are conducted, include the lack of a lead member of staff, the lack of uptake targets, no systematic use of additional prompts within IT systems to identify eligible patients, and little or no opportunistic vaccinating and using phone calls as a first-line strategy to invite

patients for vaccination (Newby et al., 2016). Barriers include reluctance to be vaccinated by some NHS staff, beliefs that the vaccine will make recipients unwell, and issues around access and the convenience of vaccination for staff (Shrikrishna et al., 2015).

Barriers to maternal immunization against influenza involve a general reluctance to vaccinate among pregnant women, and issues around the complexity of vaccination pathways where several providers such as general practitioners and antenatal services vaccinate (and associated data quality issues of maintaining registry and sharing data), as well as lack of understanding of the timing of vaccination.

No recent research could be identified on factors associated with non-immunization of people over 65 years of age in the UK. A qualitative study published in 2007 concluded that many older people did not feel vulnerable to influenza, regardless of their age, and this influenced their views on the need for immunization. Both refusers and defaulters overstated adverse effects from influenza vaccine, so this is a potential target for an intervention. Individual prompts, particularly from general practitioners, seemed to be the most significant motivators to attend for immunization (Evans et al., 2007). In a survey conducted in 2006, over 80% reported being influenced by a recommendation by a health care worker. The most common reason reported for non-uptake was good health (44%), or illness considered to be due to the vaccine (25%) (Mangtani et al., 2006).

Facilitators of influenza vaccination uptake among adults include:

- national targets to support commissioning arrangements and incentives for achieving coverage targets for GP practices (using the Quality Outcomes Framework for at-risk groups) and for hospital trusts (using the Commissioning for Quality and Innovation framework), improving the uptake of influenza vaccinations for front-line clinical staff;

- using existing resources to support targeting, tailoring and information provision for eligible groups;

- the UK has introduced the recommendation of offering influenza vaccination to all children aged 2 to 11 years who are not in a clinical risk group to reduce transmission in the community and reduce the number of cases of flu-related illnesses and deaths among older adults. As of 2018 the universal influenza vaccination programme is available for children aged 2 to 9 years (Hodgson et al., 2017). In Scotland and Northern Ireland the vaccine has been offered to all those aged 2 to 11 years.

- the Health and Safety at Work Act (1974) makes employers responsible for offering the influenza vaccination to health and social care staff who have direct care responsibilities;

- support from national bodies, professional groups and royal colleges (organizations such as the British Medical Association and the Royal College of Nursing) helps to encourage their members and others to accept the influenza vaccination;

- provision in general practice is driven by a nationally enhanced service specification. This requires all eligible patients to be called (invited); records to be kept up to date; vaccination status (or reason for declining a vaccine) to be recorded accurately; appropriate skills and training for those administering the influenza vaccine; consideration of accessibility so that service users' needs are met; and regular monitoring and reporting of vaccination activity;

- availability of influenza vaccination in some pharmacies in England, through NHS provision. The highest percentage of vaccinations outside GP practices was given to patients aged 65 years and over in pharmacies (5.6% of all vaccinations for those 65 years and over). Vaccinations in pharmacies have increased for adult and at-risk groups; and

- existing examples of best practice guidance for increasing influenza vaccination uptake in general practice as well as for health care workers.

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Useful websites

United Kingdom: https://www.gov.uk/government/publications/the-complete-routine-immunisation-schedule

Northern Ireland: http://www.publichealth.hscni.net/directorate-public-health/health-protection/immunisationvaccine-preventable-diseases

Scotland: https://www.nhsinform.scot/healthy-living/immunisation

Wales: http://www.wales.nhs.uk/sitesplus/888/page/43510