

COMMENTARY

International Health Regulations in practice: Focus on yellow fever and poliomyelitis

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ABSTRACT

The spread of infectious disease represents a global threat and therefore remains a priority on the international public health agenda. The International Health Regulations (IHR) (2005) came into effect in June 2007 and provide a legal framework to which the 196 member states of the World Health Assembly agree to abide.¹ These regulations include implementation of protective, control and response measures at points of entry to a country (i.e. land borders, sea and airports), and of notification measures, all of which aim to prevent or limit the spread of disease while minimising disruption to international trade.

The World Health Organization can apply and enforce IHR (2005) to any disease considered to pose a significant threat to international public health. This short paper focuses on 2 diseases; yellow fever and poliomyelitis, both of which have the potential to spread internationally. It will discuss the measures applied under IHR (2005) to minimize the threat, and explore the implications for both travelers and travel health advisors.

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Yellow fever

Yellow fever (YF) is caused by a virus of the Flaviviridae family, which circulates between infected monkeys or humans and mosquitoes. The infection may be asymptomatic or mild, or can cause serious illness including life threatening hemorrhagic fever. Treatment is supportive. YF is a risk in tropical parts of Africa, South America, eastern Panama in Central America and Trinidad in the Caribbean. The epidemiology of YF is dynamic; outbreaks may occur after long periods of virus inactivity (sometimes years) and risk areas may expand during large outbreaks.

Maps of areas where YF is a risk are available on the individual country pages at <http://travelhealthpro.org.uk/country-information/>.

YF is a vaccine preventable disease. The vaccine is live, attenuated and well tolerated by most people. Vaccination-induced serious adverse events such as viscerotropic or neurotropic disease occur only rarely, but death has been reported. Healthcare professionals discussing YF with a traveler need to be aware of the 2 separate issues of 1) recommendation for vaccination (for personal protection) and 2) requirement for an International Certificate of Vaccination or Prophylaxis (ICVP) as a condition of entry to a (receiving) country.

All travelers to countries where YF occurs should have an individual risk assessment and be offered YF vaccination for personal protection, unless medically contraindicated. Recommendations for YF vaccination and risk countries are listed by the WHO^{2,3} and this information is disseminated consistently and widely in the public domain (e.g. by the National Travel Health Network and Centre, Health Protection Scotland and

US Centers for Disease Control and Prevention). Following the conclusions of the WHO Strategic Advisory Group of Experts on Immunization (SAGE), it is now accepted that YF vaccination confers at least 35 y and likely lifelong protection in most people, and that a booster dose is not needed, with a few exceptions,^{4,5}

An International Certificate of Vaccination or Prophylaxis (ICVP) is issued at the time of vaccination and this document is considered under IHR (2005) to be proof of YF vaccination.¹

WHO Member States are required on request, to submit to the WHO entry requirements relating to YF. Entry requirements fall into the following categories:

- No ICVP required (wherever you arrive from);
- ICVP required if arriving from a country with risk of yellow fever (as listed by the WHO,^{2,3} or sometimes not on the WHO list, but defined by the receiving country);
- ICVP required if transiting a country with risk of yellow fever where transit has been for over 12 hours (variables relating to transit exist);
- ICVP mandatory (i.e., required wherever you arrive from, risk country or not).

The requirements of each country are also listed by the WHO.^{2,3}

Historically, the ICVP for yellow fever was considered to be valid for 10 y. Although YF is specifically designated under IHR (2005) and the regulations that apply are well established, significant changes, particularly relating to the duration of validity of ICVP under IHR (2005) take place during 2016. Validity of the ICVP will come into line with the conclusions of SAGE that the vaccine confers lifelong protection,⁴ and

therefore, following vaccination an ICVP will have a lifelong validity.^{3,4} All member states were required to submit a statement of their interpretation of the SAGE conclusions and hence the length of validity of ICVP by 10 July, 2016.

The WHO have stated:³

- From 11 July 2016 the period of validity of ICVP will change from 10 y to life of the person vaccinated, including for certificates already issued and new certificates;
- As of 11 July 2016, valid ICVP presented by arriving travelers cannot be rejected on the ground that more than 10 y have passed since the date vaccination became effective as stated on the certificate; boosters or revaccination cannot be required⁷

It is hoped that all member states will comply with this guidance. However, health professionals should be mindful that changes at country level regarding the accepted period of validity of ICVP may take time and some countries have already indicated that they do not accept a life-long validity of the ICVP. Healthcare professionals should be prepared to advise travelers accordingly. In addition, country requirements may be subject to change, particularly at times of large disease outbreaks in a region and such changes may not always be reflected at WHO level. In these circumstances health professionals are encouraged to use a real time resource for information on current advice regarding recommendations and requirement for vaccination.

Poliomyelitis

Poliomyelitis (polio) is caused by a human enterovirus called the poliovirus which is transmitted from person-to-person usually faeco-orally. There are three serotypes of wild poliovirus (WPV) – type 1, type 2, and type three. The last wild type 2 poliovirus was detected in India in 1999. Type 1 and type 3 WPV continue to circulate in endemic areas. Both are very infectious and can cause paralytic polio. Vaccine-derived polioviruses (VDPVs) are rare strains of poliovirus that have genetically mutated from the strain contained in the oral polio vaccine.⁶

Polio mainly affects children under 5 y of age, and most infections are asymptomatic or very mild, but 1 in 200 infections can lead to paralysis and death in 5% to 10% of cases.

As most infections are asymptomatic, the virus can be “silently” spread in unvaccinated or inadequately vaccinated populations before the first case of polio paralysis is identified. Polio or suspected polio is a notifiable disease under IHR (2005),⁷ and the WHO considers a single confirmed case of polio paralysis, including VDPV to be an outbreak, particularly in countries where very few cases occur.^{6,7}

In 1988, the World Health Assembly adopted a resolution for the worldwide eradication of polio and launched the Global Polio Eradication Initiative. The strategy to eradicate polio is based on preventing infection by immunizing every child to stop transmission and ultimately make the world polio free.⁶ Polio vaccination is included in national immunisation programmes throughout the world, with most children receiving a primary course of either inactivated (parenteral) or live (oral) tri or bivalent vaccine (as of April 2016, oral trivalent vaccine will be replaced by oral bivalent vaccine in a globally

synchronised switch, removing the type 2 component of the vaccine from global immunisation programmes).⁶ Oral vaccine (OPV) is inexpensive, safe for immune-competent individuals and effective, inducing long lasting immunity in the recipient and passive immunity in close contacts. However, rarely, it can cause vaccine associated paralytic polio (VAPP). Occasionally the excreted live vaccine virus may change and in an under immunised population, circulate (cVDPV). Inactivated vaccine carries no risk of paralytic polio and confers an excellent protective immune response. However, inactivated vaccine is costly and only induces low immunity in the intestine, and therefore does not confer passive immunity in a population. High levels of vaccination coverage must be maintained to stop transmission and prevent outbreaks.⁶

All travelers to a country reporting polio cases should be up to date with their national schedule vaccinations, including polio and should be offered a booster if more than 10 y have elapsed since their last dose.⁸

At the time of writing, polio remains endemic in only two countries Afghanistan and Pakistan, although case numbers are declining.⁹ However, as long as cases continue to be reported, all countries, especially vulnerable countries with poor infrastructures and/or trade and travel links with endemic countries will remain at risk of importation of polio.

As well as the risk from WPV, outbreaks of cVDPV are of concern; currently outbreaks are occurring in Guinea, Lao People’s Democratic Republic, Madagascar, Myanmar, Nigeria and Ukraine.¹⁰

IHR (2005) have only recently been applied to polio infection; in May 2014, following notification of international spread of poliovirus and the acknowledgment that travelers contributed to this spread, an Emergency Committee of the WHO declared that under IHR (2005) the international spread of WPV represented a Public Health Emergency of International Concern (PHEIC).¹¹ Temporary recommendations were made under PHEIC for countries reporting cases and/or exporting the virus to reduce the potential for spread. These measures, reviewed every 3 months, are a global public health initiative, with the aim of interrupting international spread of polio viruses (shown in Table 1.)

Health professionals discussing polio with a traveler need to be conversant with the 2 separate issues of the recommendation of vaccination for personal protection and requirement for an ICVP as a condition of exit from a country under PHEIC (see Table 1). Unlike the requirement for YF vaccination, in the case of polio, under IHR (2005), the need for vaccination applies only to those exiting rather than entering a country. Health professionals must also be mindful that for some travelers (i.e., pregnant or immune compromised) it may not be appropriate to receive OPV, the vaccine of choice in endemic countries.

While the PHEIC recommendations have no direct public health benefit to the UK, and are unlikely to impact on personal risk for UK travelers if national travel guidance is followed, to support the WHO and to avoid the possibility of UK travelers experiencing difficulties when departing WPV infected countries (and being revaccinated if unable to prove vaccination within the last year) a pragmatic approach was adopted in England Wales and Northern Ireland. This involved making health professionals

Table 1. WHO PHEIC implications (adapted from Simons & Patel 2015¹²)^{10,12} (Listed countries as of 12 May 2016; countries listed are subject to change).

Country status	Traveler status	Recommendation for polio vaccination	International Certificate of Vaccination or Prophylaxis (ICVP)	Other record of polio vaccination
Infected and exporting WPV or cVDPV Afghanistan, Pakistan ¹⁰	Residents, including visitors who have lived in the country for > 4 weeks where last dose of polio vaccine was > 12 months before date of departure	Yes: between 4 weeks and 12 months before leaving the infected country	Yes: required to be presented at point of departure from infected country and may be required for visa application and/or on entry to a receiving country	No
Infected, but not exporting WPV or cVDPV Nigeria, Guinea, Madagascar, Ukraine, Lao People's Democratic Republic and Myanmar ¹⁰	Residents, including visitors who have lived in the country for > 4 weeks where last dose of polio vaccine was > 12 months before date of departure	Yes: between 4 weeks and 12 months before leaving the infected country	No	Yes: encouraged to obtain appropriate proof of polio vaccination
Polio-free countries	Traveling to WPV infected country (which is exporting the virus) for more than 4 weeks	All travelers should ensure they have completed an age appropriate polio vaccination schedule according to their national immunisation schedule. In addition: consider a booster dose of polio containing vaccine before departing polio-free country based on national guidelines	No	Proof of vaccination may be required to be presented on departure from infected country

Polio vaccination

All travellers should have completed a polio vaccination course according to the UK schedule.

A booster dose of a polio-containing vaccine is recommended for those who have not received a dose within the previous 10 years.

The following additional advice should also be followed until further notice:

- Travellers to settings with extremely poor hygiene (e.g. refugee camps), or likely to be in close proximity with cases (e.g. healthcare workers), and/or visiting for 6 months or more, are advised to have a booster dose of polio-containing vaccine if they had not received vaccination in the past 12 months.
- Travellers who intend to visit [XXXX] for 4 weeks or more should be aware that proof of vaccination, given 4 weeks to 12 months before departure from the country [an International Certificate of Vaccination or Prophylaxis (ICVP)], may be required on exit. Failure to produce this documentation may result in vaccination at the point of departure, most likely with oral polio vaccine.
- Immunosuppressed and their household contacts or pregnant individuals who plan to travel to [XXXX] for 4 weeks or more are advised to receive inactivated polio vaccine (IPV) within 1 year before planned departure from [XXXX] and to ensure this is recorded on an ICVP.

Polio vaccination

All travellers should have completed a polio vaccination course according to the UK schedule.

All travellers to [XXXX] should make sure they have had a polio-containing vaccine in the past 10 years and that children have had an age appropriate course of vaccine.

Those who are travelling to settings with extremely poor hygiene (e.g. refugee camps), or likely to be in close proximity with cases (e.g. healthcare workers), and/or expecting to stay in [XXXX] for more than 6 months and are previously fully vaccinated, should receive an additional dose of polio vaccine if they have not received a dose in the previous 12 months.

Figure 2. NaTHNaC/Public Health England – Polio vaccination recommendation: countries infected with WPV or cVDPV but not currently exporting.¹³

and travelers aware of the WHO recommendations and implications in affected countries and for WPV infected countries to follow the guidance in Figures 1 and 2.

The most recent meeting of the Emergency Committee under the IHR (2005) took place in May 2016 and concluded that the international spread of polio continues to constitute a Public Health Emergency of International Concern (PHEIC). The Committee was asked to reassess the situation within the next 3 months.¹⁰

Conclusion

In the context of travel advice, travel vaccinations are generally recommended for the protection of the traveler. This is a concept that is easily understood by both healthcare professional and traveler alike. However, under IHR, vaccinations may also be required for public health benefit, a subtle but significant difference. Healthcare professionals and travelers need to understand this, together with the important role of measures implemented under IHR (2005), as part of the strategy to prevent the international spread of diseases and to protect global public health.

Disclosure of potential conflicts of interest

No potential conflicts of interest were disclosed.

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