Vaccination Rationale and Recommendations (2023)

Rationale

The practice of immunization is an excellent example of scientific advances applied to addressing human health concerns. Modern vaccination programs have dramatically reduced the incidence and prevalence of immunizable infectious diseases across the globe, completely eradicating smallpox[1] and significantly reducing the incidence of many other life-threatening infections.[2] Vaccines are demonstrably safer than the therapeutic medications we regularly consume when ill.[3] In fact, apart from clean water, vaccination is the best performing intervention currently available in reducing the burden of infectious disease.[4]

As an international organization, our company has a voluntary policy regarding employee immunization. However, individual Regions and Departments are free to establish more binding requirements for their employees. Certainly individual national governments can establish mandatory requirements if they so choose – most company employees are familiar with the widely required Yellow Fever vaccination card when travelling to/from/within Africa.

There are many different vaccines on the market at present; these vary somewhat in their effectiveness and the significance of the diseases for which they were developed. Many are familiar with the "childhood" vaccinations offered to infants and children in most countries of the world (e.g. against polio, measles, diphtheria, tetanus, pertussis, etc.). There are also important vaccine preventable diseases to which company employees may well be exposed as adults (e.g. rabies, meningococcus, etc.) as well as multiple other vaccines that exist against diseases that are commonly perceived to be less problematic (or less available) in the African setting (e.g. shingles, influenza, etc.). While immunizations in the first two categories might attract specific recommendations, those in the final category are acknowledged to more clearly fall in the realm of individual choice; for such diseases no recommendations will be forthcoming.

In general, there are many good reasons why immunization merits favorable consideration. On a personal level, the most important is to reduce the risk of being affected by one of the diseases in question. This includes the risk of:

1. contracting the disease;[5]
2. morbidity (illness) as a result of the disease;[6]
3. cancer / other diseases (e.g. Hepatitis B can lead to hepatocellular cancer)
4. related concerns such as ability to travel, or illness while travelling;
5. disability resulting from the disease;
6. mortality (death) as a result of the disease.

It is important to acknowledge that vaccination does not happen in a vacuum; one's choices (and their consequences) affect more than just one's person or family. So a variety of other reasons in favour of immunization exist:

1. Disease eradication and elimination. Many are aware that Smallpox has already been eradicated worldwide as a result of a global immunization campaign in the 1970s. Current efforts are focussed on polio as the next disease that could be eradicated. Endemic transmission of measles was eliminated in the Americas in 2002.[7]
2. Herd immunity. When few people are immunized, the chances of an individual being infected by a particular organism are high. However, the larger the percentage of individuals who are immunized the less the likelihood that an infecting organism will find a susceptible host, which results in reduced likelihood of ongoing disease transmission. Although determined somewhat by the transmission characteristics of the infecting agent, by the time 95% of a host population is immunized, the likelihood of a disease being transmitted within that population is very low (helpfully, this also protects those few

who are medically unable to be vaccinated [e.g. immunocompromised or allergic to vaccine components]). In order to maximize herd immunity (thereby rendering disease transmission in a population highly unlikely), a maximum percentage of individuals in a population need to be immunized (which explains why immunization programs seek to enroll everyone). Conversely, the more people who are not immunized against a certain disease, the greater the risk of that disease being transmitted to others within that community. Immunization coverage of only 50% provides coverage to those who were immunized, but very little protection to the other half of the populace.

While 100% uptake is ideal, the fact that 95% coverage provides almost the same level of protection gives rise to the "free rider" problem, since the final 5% of the population can enjoy the benefit of minimal disease transmission (the result of everyone else being immunized), without having to be immunized themselves.

Tragically, in western societies, where individualism trumps communal obligations and most of the immunizable diseases are exceedingly rare (because of the success of immunization programs), the value of personal immunization continues to be challenged. Declining to be immunized is considerably more risky in developing countries, where the average level of immunization is well below the levels achieved in the west.[8]

3. Reduced risk to others. People who are infected are a potential source of infection to others. This is precisely why most international schools have policies requiring that their students be up to date with their vaccinations and why such policies are widely supported by parents. Failure to do so places all the other students at risk if an unimmunized student becomes infected with one of the immunizable diseases.
4. An important consideration in the context of our company is the message that we communicate to those around us where we live. All African countries are working to make progress in immunizing their populace, some more successfully than others, but they all have room for improvement and have national programmes for this purpose. As visitors, it is important that we support such national initiatives rather than undermine them. Choosing to decline immunization suggests that employees are "above" national health policies, and sends a negative message to those around us (domestic workers, colleagues, neighbours, etc.) regarding the concept of immunization; this is not a very appropriate message to be communicating.
5. From a company perspective, unimmunized employees present risks to the company as well as its other employees:
    a. Unimmunized employees are a risk to everyone around them , since, if they contract one of the immunizable diseases, they become a source of infection to others (even immunized individuals have a small susceptibility, since all vaccines have a non-zero failure rate [cf. footnote 5]);
    b. Potential tensions between families whose members have/have not been immunized;
    c. Costs (financial and otherwise) of dealing with infected individuals (pastoral care, employment coverage, communication, etc.);
    d. Litigation from employees or others outside the company; even if unsuccessful, such cases have to be defended;
    e. Litigation of children against their parents or the company, if the child is not immunized but contracts an immunizable disease and develops permanent sequelae.
6. There are a variety of other benefits to be gained from immunization (reduced national health costs, extended life expectancy, reduced antibiotic resistance, etc.) which will not be explored in detail here; the major reasons and benefits have been highlighted above.

Like all health care interventions, immunizations are not perfect. It has already been noted above that they are not 100% effective; furthermore, they do have a small incidence of side effects, most of which are relatively minor, but severe reactions, including death, have occurred. The important thing to remember, however, is that the risk of disease in unvaccinated populations is significant; for example, in 2018 there were more than

140,000 worldwide deaths due to measles.[9] In contrast, the risk of serious adverse effects from immunization is minimal, especially compared to other risks in life.[10]

Recommendations

In light of the abundant benefits from vaccination programs, for both individuals and the community at large, the company recommends that all Full-Term employees adopt and adhere to an immunization schedule suitable for them.[11] In general this includes two components: the immunization schedule recommended in their country of origin (set within their MR), along with any additional immunization recommendations specific to their workplace environment (set by the relevant RR). For example, anyone living in the "meningitis belt"[12] should be vaccinated against meningococcus.

Different MR countries have slightly different immunization schedules for children and adults, so no attempt will be made to try to exhaustively rehearse all the possible options. However, they all follow quite closely the World Health Organization guidelines for immunization, which can be downloaded at https://cdn.who.int/media/docs/default-source/immunization/immunization_schedules/immunization-routine-table1.pdf or open Table 1 in the links to other detailed immunization tables found at https://www.who.int/teams/immunization-vaccines-and-biologicals/policies/who-recommendations-for-routine-immunization---summary-tables. Other vaccines could be added (e.g. influenza, varicella [chicken pox], varicella zoster [shingles]) but these would be optional rather than recommended. Some individuals object to HPV vaccine; while there is no scientific rationale against HPV, in deference to existing strong opinions, this vaccine could also be considered optional.

While Covid-19 vaccination is not a part of the vaccination schedules above, it is highly encouraged by the WHO elsewhere in their extensive Covid-19 documentation. As a company, AIM strongly recommends (but does not mandate) Covid-19 vaccination; however, most countries in Africa require Covid-19 vaccination if one wants to avoid border delays, potentially two weeks of quarantine on entering the country, or possibly even being refused entry to the country.

For RRs, each RR is responsible to establish its own expectations, but in general, for those working in "Africa" (continent and islands), the following vaccines would be added to the vaccines recommended from the Mobilizing Regions: Hepatitis A and Yellow Fever; in addition, Rabies and Typhoid vaccines should be considered, and Meningococcus as well if one will be living in the meningitis belt. Note that post-exposure Rabies vaccine is not always available so immunization in advance (ideally via the intradermal route) is preferable; for more information, see https://www.who.int/en/news-room/fact-sheets/detail/rabies.

Postscript: Malaria

Malaria remains an active concern in almost all of the places where company employees are located. Appropriate precautions and interventions to minimize the risk of contracting malaria are strongly encouraged. A document outlining recommended approaches to malaria prevention ("Malaria Prevention Recommendations") has been developed by company medical personnel and is available to all employees.

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[1]As recently as 1967 there were 10-15 million Smallpox cases reported, of whom roughly one quarter died and most others suffered permanent sequelae. See "Smallpox", World Health Organization Fact Sheet, September 21, 2007, http://web.archive.org/web/20070921235036/http://www.who.int/mediacentre/factsheets/smallpox/en/; accessed November 4, 2022.

[2] "Vaccination has greatly reduced the burden of infectious diseases. Only clean water, also considered to be a basic human right, performs better." Andre, FE, R Booy, et al, "Vaccination greatly reduces disease, disability, death and inequity worldwide", Bulletin of the World Health Organization, February 2008, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2647387/, accessed November 4, 2022.

[3] Ibid.

[4] Plotkin SL, Plotkin SA. A short history of vaccination. In: Plotkin SA, Orenstein WA, Offit PA, eds. *Vaccines*, 6th edn. Philadelphia: Elsevier Saunders; 2013: 1. See https://books.google.ca/books?hl=en&lr=&id=BFQq2-fIAJ8C&oi=fnd&pg=PA1&dq=Plotkin+SL,+Plotkin+SA.+A+short+history+of+vaccination.+In:+Plotkin+SA,+Orenstein+WA,+eds.++Vaccines+,+4th+edn.+Philadelphia:+WB+Saunders%3B+2004:+1-15.+&ots=jihUwGhI2i&sig=ZP11LFCgwIdQseHL1IjXE_TPYG0&redir_esc=y#v=onepage&q=Plotkin%20SL%2C%20Plotkin%20SA.%20A%20short%20history%20of%20vaccination.%20In%3A%20Plotkin%20SA%2C%20Orenstein%20WA%2C%20eds.%20%20Vaccines%20%2C%204th%20edn.%20Philadelphia%3A%20WB%20Saunders%3B%202004%3A%201-15.&f=false, accessed November 4, 2022.

[5]It should be noted that immunization greatly reduces, but does not completely eliminate the risk of infection. Failure rates vary depending on the disease and vaccine; for example, measles has a failure rate of less than 1% serologic immunity after two doses if given after the first birthday; polio has a similar failure rate of roughly 1% for a full series of 3 doses. See the section *Immunogenicity and Vaccine Efficacy* in Chapters 13 (Measles) and 18 (Poliomyelitis) of the CDCs "Epidemiology and Prevention of Vaccine-Preventable Diseases" (The Pink Book); www.cdc.gov/vaccines/pubs/pinkbook/index.html, accessed November 4, 2022.

[6] In the rare situation in which an immunized individual becomes infected with the disease against which they have been immunized, the disease tends to occur in a less severe form. See section *Mitigation of Disease Severity* in Andre et al.

[7] http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(12)60522-4/fulltext, full text available with free registration; see *Introduction,* accessed November 4, 2022.

[8]Some African countries have quite high vaccination coverage, but this does not apply to all.

[9] https://www.who.int/en/news-room/fact-sheets/detail/measles, accessed November 4, 2022.

[10] For example, in the US, where a tracking mechanism exists to monitor and compensate adverse vaccine reactions, between 2006 and 2022 over 149 million doses of measles vaccine were administered and since 2006 there have been 169 compensable reactions to a measles vaccine; this is roughly 1 compensable adverse reaction in 880,000 doses. If deaths represented 10% of this number (in 33 years [1989-2022] there were 83 death claims out of a total of 1334 claims filed [6.2%]), the odds of dying would be 1 in 8,800,000. See https://www.hrsa.gov/sites/default/files/hrsa/vicp/11-01-22-VICP-Stats-508%20Compliant.pdf, accessed November 4, 2022. For comparison, the lifetime odds of dying in the USA are roughly: by opioid overdose (1 in 67); road traffic accident (1 in 101); drowning (1 in 1,024); choking (1 in 2,745); insect sting (1 in 57,825). Data from the US National Safety Council (2020), https://injuryfacts.nsc.org/all-injuries/preventable-death-overview/odds-of-dying, accessed November 4, 2022.

[11] Short-Term employees are encouraged to follow these guidelines, but for such employees these recommendations could be interpreted more flexibly.

[12] Senegal, Gambia, Guinea-Bissau, Guinea, Cote d'Ivoire, Ghana, Togo, Benin, Mauritania, Mali, Burkina Faso, Niger, Nigeria, Chad, Sudan, South Sudan, Cameroon, Central African Republic, Democratic Republic of Congo, Uganda, Rwanda, Burundi, Tanzania, Kenya, Ethiopia, Eritrea. See map in Mustapha, M. Mustapha and Lee H. Harrison, "Vaccine prevention of meningococcal disease in Africa: Major advances, remaining challenges," human Vaccines & Immunotherapeutics 2018; 14(5), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5989898; accessed November 4, 2022.