

COMMENTARY



Compliance with vaccination schedules

Adamos Hadjipanayis^{a,b}

^aMedical School, European University, Nicosia, Cyprus; ^bPaediatric Department, Larnaca General Hospital, Larnaca, Cyprus

ABSTRACT

Childhood immunization is amongst the most cost-effective public health interventions for reducing children's morbidity and mortality.

Vaccination coverage is commonly used to assess the vaccination status of a community. Adherence to schedule is critical for providing maximum effectiveness against vaccine-preventable diseases in the community. This is of paramount importance for diseases that are continuously circulating because they can cause large outbreaks.

All stakeholders (public health administrators and vaccination providers) should work together in order to increase both vaccination coverage and adherence to schedule. They have to improve the infrastructure used for delivering vaccines, train the health care professionals and finally raise the awareness of the importance of vaccines among parents.

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Childhood immunization is amongst the most cost-effective public health interventions for reducing children's morbidity and mortality.¹ Childhood immunization not only contributes towards improved health outcomes but also lessens expenses on health services.² The ultimate goal of immunization programs is the reduction of vaccine-preventable diseases in children. Unfortunately, according to the World Health Organization, more than two million children deaths are reported each year from vaccine-preventable diseases.³ This indicates that compliance to the recommended vaccination schedule is a challenge for all stakeholders involved.

Vaccination coverage and adherence to vaccination schedule

In order to assess vaccination status, the official reports on vaccinations usually make reference to the term 'vaccination coverage' (or 'vaccination uptake'). Vaccination coverage reflects the proportion of children who have received a specific vaccine at a specific milestone (usually 12 months, 24 months or 7 years old).

Vaccination coverage is a key measure of any immunization system performance (national or international). On the other hand, one should never underestimate or neglect the importance of vaccination adherence to schedule (compliance or timeliness to childhood vaccination schedule) which is the timely administration of a specific vaccination according to the immunization schedule. At the population level, vaccination coverage might be the most important factor in vaccine impact. At individual level, adherence to schedule guarantees the protection against the disease. Moreover, adherence to schedule is crucial in providing maximum effectiveness against vaccine-preventable diseases in the community. This is of paramount importance for diseases that are constantly

circulating, because they can cause large population outbreaks. Such diseases are currently measles and pertussis. The European Centre for Disease Prevention and Control reports 13547 measles cases in the last twelve months in countries of the European Union, despite the fact that vaccination coverage for measles among these countries is over 85% (excluding France, Italy and Denmark).

Recent studies (both in Europe and the USA) indicate that adherence to schedule is much lower compared to vaccination coverage. In a recent USA report, only 25% of children received all vaccines according to the recommended vaccination schedule.⁴

In a Cyprus, in a recently published study, the vaccine coverage was 81% for the diphtheria, tetanus and pertussis vaccine (DTaP) and 64% for the pneumococcal vaccine, whereas the adherence to schedule for the second dose of each of these vaccines was 66% and 26% respectively.⁵

In Belgium, 95% children did not receive the third dose of diphtheria, tetanus and pertussis vaccine on time and up to a third of these children experienced delay in receiving the first dose of the measles, mumps and rubella vaccine.⁶

The above published evidence suggests that vaccination coverage does not express the true dynamics of immunization status in a specific period of a child's life. For example, a 7-year-old child who is considered fully vaccinated for a specific vaccine might have received the vaccine at a much later time than recommended, thus, leaving the child vulnerable to the vaccine-preventable disease during his/her earlier lifetime. The above is fully supported by an article which showed that 11–21% of children whose vaccination is complete at an interim milestone will have incomplete vaccinations by the next milestone.⁷

Conversely, if a child receives vaccines earlier than recommended or with a shorter interval between doses, even if considered fully vaccinated at a specific date, may have a sub-

optimal immune response. This leads to a false sense of protection from the vaccine-preventable disease. Luman found that five to fourteen percent of children had received vaccines too early to be considered effective.⁸

In most industrialised and/or developed countries vaccination coverage is high, although this indicator may overestimate protection unless adherence to vaccination schedule is equally high.

These countries should focus on maintaining this achievement, but at the same time make efforts to improve vaccination timeliness. Therefore, future research on assessing vaccination rates should look into both vaccination coverage and adherence to vaccination schedule. *Childhood vaccination rate* is defined as the percentage of children that receive the respective vaccination in the recommended timeframe.

Meanwhile, all stakeholders should work together in order to increase vaccination rates. Public health administrators and vaccination providers (paediatricians, nurses, health visitors etc) should work together to ensure children receive all vaccinations at the appropriate times and intervals as specified by the national vaccination schedule.

There are three main pillars to achieve this:

These focus on a) improving the infrastructure used for delivering vaccines, b) training health care professionals involved and c) raising awareness of the importance of vaccines among parents.

Improve the infrastructure used for delivering vaccines

Every country should have a universal vaccination schedule which has to be centrally administered and supported by an information immunization system in order to monitor vaccinations.

It has been proven that parents' forgetfulness is one of the main causes of missed vaccinations in their children.⁹ Thus, implementing tools to ensure delivery of reminders to parents could substantially improve vaccination rates. Such tools could be texts to mobile devices, emails and notifications from smart phone applications. Moreover, a recent study showed that phone call reminders play a vital role in improving both vaccination coverage and adherence to vaccination schedule.¹⁰

It is of paramount importance to emphasize that reminders for the upcoming vaccinations are much more beneficial than any recall system which reminds parents for the missed vaccine doses.

Community-led programs, such as community nurse visits or vaccine administration at schools by health visitors could substantially improve vaccination rates. Easy and free access to vaccines is also essential in achieving high adherence to the vaccination schedule.

Health care professionals

It has been proven that the large number of vaccines included in the recommended childhood vaccination schedule and the complicated dosing schedule, lead to vaccination delays.¹¹ Thus, health care professionals should take advantage of every given opportunity to concurrently administer vaccines. Many studies have proven that combination vaccines are associated with improved vaccination coverage and adherence to schedule.¹²

Parents

Parents should be educated on the importance of vaccines and adherence to the recommended vaccination schedule. Moreover, they should be reassured about the safety of vaccines.

Public health awareness campaigns and public vaccination safety campaigns should be used to help parents make informed decisions. All modern tools such a social media can be utilized in order to achieve the above and can also be useful as a tool for conveying upcoming vaccination reminders.

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No potential conflicts of interest were disclosed.

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