

Vaccination schedule for people with Down's syndrome, 20XX

Vaccines and Down's syndrome

People with Down's syndrome (DS), especially during childhood, are particularly susceptible to suffer from infections and their recurrences. This is mainly as a result of the association of the syndrome with an immunodeficiency of multifactorial origin, although they are often more predisposed due to the coexistence of certain structural anomalies, particularly in the respiratory tract.

Vaccinations can prevent a good number of these diseases. The immune dysfunctions of DS are not a contraindication for the currently available vaccines: their immunogenicity and safety are not significantly different from those observed in the general population. Some of these induce somewhat lower humoral responses to the usual ones (mumps, measles, acellular pertussis (whooping cough), but obtaining levels considered protective.

These determining factors require that this group must strictly adhere to the systematic vaccine guidelines established in each Community, and their inclusion among the risk groups that must have the benefit of receiving vaccines which have selective indications.

Systematic vaccines

Their application using standard strategies have demonstrated their effectiveness in people with DS. Some comments on some of them may illustrate the importance of adhering to these:

- *Vaccine against hepatitis B.* DS leads to a predisposition to hepatitis B, to the chronic carrying of the causal virus and its transmissibility. Early vaccination is important, given that the vaccine efficacy decreases with age and may be compromised with the concurrence of the, not uncommon, comorbidities of the syndrome (obesity, coeliac disease).
- *DTaP/Tdap Vaccines.* While the diphtheria and acellular pertussis components induce sufficient specific antibodies, insufficient responses of the specific IgG and their avidity against the tetanus toxoid on the administration

of a booster dose have been documented. For this reason, it is essential complete the recommended boosters throughout life.

- *Vaccine against Haemophilus influenzae type b (Hib).* IgG2 deficiency, more common in DS than in the rest of the population, is a well known cause of vaccine failure, and an eventuality to be ruled out.
- *Flu Vaccine.* A vaccine systematically recommended annually for 60-65 year-old adults, it is indicated in any age group with risk factors for complications. Anomalies in the immune response to flu vaccines have been detected in DS, which turns these people into patients at risk, regardless of the possible effects of other predisposing factors.

Non-systematic vaccines

Some vaccines, not currently included, or are only included in a few Autonomous Community childhood vaccination calendars, have their particular indication in people with DS, to whom they should be systematically administered:

- *Pneumococcal vaccines.* While the 23-valent polysaccharide vaccine is the one indicated in persons >65 years of age, with the pneumococcus vaccination for the rest of the age groups only being included in the majority of national calendars for persons at risk of invasive pneumococcal disease, and they do not usually include DS among them. DS has been shown to be a risk condition for the development of invasive pneumococcal disease. Down's syndrome children frequently suffer from acute otitis media, sinusitis and pneumonias and their lethality for sepsis is particularly high: a principal aetiological agent of these processes is pneumococcus. While the conjugated pneumococcal is not included in all Autonomous Community calendars, DS should be considered a risk factor requiring systemic vaccination, since it occurs in some of them, .
- *Hepatitis A vaccine.* The physical contact and the usual healthcare of children with DS in specialised centres favour the horizontal transmission of the causal virus. On the other hand, a possible co-infection in patients with

chronic hepatitis B, to which the DS child is predisposed, would be particularly serious.

Vaccination calendar for people with Down's syndrome

The reasons given support the idea of an expanded vaccinations calendar for people with DS, without any doubt, particularly as they are predisposed to immuno-preventable diseases and their complications.

Based on these assumptions, DOWN ESPAÑA and the Catalan Down's Syndrome Foundation (FCSD), with the collaboration and consensus of the Spanish Paediatrics Association Vaccinations Advisory Committee (CAV-AEP) and the Spanish Vaccinology Association (AEV), have prepared an appropriate vaccinations calendar for this group, which is shown in the following Table and it needs to be given widespread coverage. It must be considered complimentary to the existing vaccination calendars in Spain, particularly that of the AEP, on which it has been based.

Vaccination schedule for people with Down's syndrome, 2012¹

Vaccines ²	Age in months						Age in years					Adult
	0	2	4	6	12-15	15-18	2	3	4-6	11	14	
Hepatitis B ³	HB	HB	HB	HB								
Diphtheria, tetanus, pertussis		DTaP	DTaP	DTaP		DTaP			Tdap	Tdap		Td ⁴
Poliomyelitis		IPV	IPV	IPV		IPV						
<i>H. influenzae</i> b		Hib	Hib	Hib		Hib						
Meningococcal C		MenC	MenC	MenC	MenC							
Pneumococcal ⁵		PCV	PCV	PCV	PCV		PPV 23 ⁶					
Triple virus					MMR		MMR					
Human papillomavirus ⁷										HPV 3 doses		
Rotavirus		RV 2-3 doses ^h										
Varicella					Var		Var					
Influenza ⁸					Influenza (yearly)							
Hepatitis A ⁹					HA		HA					

DTaP: vaccines against diphtheria, tetanus, pertussis "paediatric" or high antigen load; Influenza: vaccines against flu; HA: vaccines against hepatitis A; HB: vaccines against hepatitis B; Hib: vaccines against *Haemophilus influenzae* type b; HPV: vaccines against human papillomavirus; IPV: vaccines against inactivated poliomyelitis, injectable; MenC: vaccines against meningococcal serogroup C; MMR: vaccines against mumps, measles, rubeola; PCV: vaccines against pneumococcal, conjugate; RV: vaccines against rotavirus; Tdap: vaccines against diphtheria, tetanus, pertussis "adult" or low antigen load; Var: vaccines against varicella; VNP23: vaccines against pneumococcal, polysaccharide, 23-valent.

¹Consensus by the Spanish Paediatric Association (AEP), the Spanish Vaccinology Association (AEV), the Catalan Down's Syndrome Foundation (FCSD) and DOWN ESPAÑA.

²The need for an extended vaccination schedule for people with Down's syndrome is based on its relationship with a multifactorial immunodeficiency, to their frequent need to be referred to Specialised Care Centres, and to factors that have the potential to reduce the immunogenicity of the vaccines (obesity, coeliac disease, etc.).

³In accordance with the current vaccine regulations of each Autonomous Community. At any age, in the absence of a previous vaccination, a series of 3 doses is given (0, 1 and 6 months), given the predisposition to complications of HB in people with DS.

⁴Booster dose during adulthood, following the regulations of each Autonomous Community. Ensure that a total of 5 doses are received.

⁵The CAV (Vaccine Advisory Committee) of the AEP recommends pneumococcal vaccinations with conjugated vaccines from 2 months to 5 years-old, with PCV offering the most cover in Spain according to current epidemiological and microbiological data.

⁶A single dose of PPV23 from 2 years-old, with at least an 8 weeks interval from the last dose of PCV. If there is confirmed immunodeficiency, a second and last dose of PPV23 will be given 5 years after the first one. The administration of PCV13 has recently been approved for adults over 50 years-old.

⁷n girls.

⁸2 or 3 doses, depending on the vaccine preparation available or prescribed.

⁹The 2nd dose, 6-12 months after the 1st.

Selected bibliography

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