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1. INTRODUCTION

- Because of the higher risk for respiratory and liver complications in patients with CF, specific recommendations for vaccination include the administration of influenza, pneumococcal, varicella, HAV and HBV vaccines.
- Otherwise, vaccination in patients with CF should follow the usual vaccination schedule of the general population.
- Live attenuated vaccines are not contraindicated but must be administered before lung transplantation.

Table 1: Vaccines and vaccination schedules for adult CF patients^{*a,b}

	Vaccine	Vaccination schedule	Comment
Baseline vaccination	Influenza (inactivated)	1 dose yearly (trivalent if possible)	Vaccinate also relatives and households with a single dose.
	Pertussis (Tdap)	1 dose at the age of 25-29	Tdap is a combination vaccine for tetanus and diphtheria. Although in the current guidelines it is not recommended for the general population, CF patients may benefit from the use of Tdap (instead of Td) every 10-20 years. Vaccinate relatives and households with a single dose.
	Tetanus / diphtheria (Td)	1 dose every 10-20 years	
	Varicella ^{*c}	2 doses 4 weeks apart	In seronegative patients
	Hepatitis B	3-dose series at 0,1,6 months	Control anti-HBs at 4 weeks after last dose. Accelerated schedules with 4 doses may be used.
	Human Papillomavirus	3-dose series	For females and males 9-26 years-old

(continued)

	Pneumococcal Conjugated Vaccine-13 ^{*b}	1 dose	Currently, no recommendation regarding boosting doses can be made. Wait > 12 months if pneumococcal polysaccharide vaccine-23 has been administered
	MMR ^{*c}	1–2 doses	In adults, 1 dose followed by serological control and a booster administration if no seroconversion
Travel-related vaccination	Hepatitis A	2 doses 6-12 months apart	Administer intramuscular pooled immunoglobulins in case of inadequate time from vaccination to travel
	Polio	1 dose	
	Yellow fever	1 dose	
	Japanese encephalitis	2 doses (0-28 days)	
	Rabies	Pre-exposure: 4 doses Post-exposure: 2-4 doses	Vaccination schedule post-exposure to rabies depends on previous pre-exposure vaccination
	Typhoid fever (polysaccharide)	1 dose	
	Typhoid fever (oral)	2 doses at days 1, 3 and 5	

^{*a} Vaccination status should be reviewed during the annual assessment. Other specific situations for vaccination status review include parenthood and lung transplantation (before listing and while waiting on list).

^{*b} At the time of writing, all vaccines are reimbursed by the basic health insurance in the exception of the pneumococcal conjugated vaccine-13 (Prevenar[®]).

^{*c} MMR and varicella are live vaccines: when there is an indication to administer any of those vaccines to a patient waiting on the lung transplant list, administer them as early as possible (e.g. at patient assessment for listing) to allow a sufficient time period between the vaccination and the transplant (ideally at least 4 weeks). If there is an urgent transplant occurring before this recommended period, antivirals for varicella can be given but no antivirals are available for MMR.

2. REFERENCES

1. Malfroot A, Adam G, Ciofu O, et al. Immunisation in the current management of cystic fibrosis patients. *Journal of cystic fibrosis: official journal of the European Cystic Fibrosis Society* 2005;4:77-87.
2. Danzinger-Isakov L, Kumar D. Guidelines for vaccination of solid organ transplant candidates and recipients. *Am J Transplant* 2009;9 Suppl 4:S258-62.