

Table 3. Study characteristics and outcomes for the outcome measure safety – adverse events

First author, year	Vaccine	Patients	Medication used ^a	Follow-up	Result	Effect of medication on results
DPT						
Brunner, 2020	DT	IG: n=29 JIA patients using abatacept CG: n=17 JIA patients not vaccinated using abatacept	All ABT, 22 MTX, 3 LD-GC	24 months	SAE 4, AE 29 (all ABT – no vaccine related)	Not reported
HPV						
Heijstek, 2014	HPV-b (Cervarix vaccine)	IG: n=68 JIA patients CG: n=55 HC	24 MTX, 9 TNFi, 6 other DMARD	12 months	AE similar in JIA and HC, no SAE	Not reported
Esposito, 2014	HPV-b (Cervarix vaccine)	IG: n=21 JIA patients CG: n=55 HC	10 NSAID, 5 MTX, 6 TNFi	7 months	Similar AE as HC	Not reported
HBV/HAV						
Erguven, 2010	Hepatitis A	IG: n=47 JIA patients CG: n=67 HC	4 anti-TNF, 5 NSAIDs, 29 MTX, 12 prednisolone, 19 salazopyrine, 11 MTX-prednisolone	2 months after second dose	No side effects were encountered in any of the patients. No reactivation was seen and there was no increment in CHAQ scores.	Not reported
PCV/PPV						
Aikawa, 2015	PPV23	IG: n=17 JIA patients pre-etanercept CG: n=10 JIA patients using MTX	IG: MTX HD 2 weeks before ETA CG: 10 LD MTX	12 months	No increased AE.	1 patient without anti-TNF had redness and swelling in the injection site. No difference in upper respiratory tract infections between patients with and without anti-TNF (n=11, 60% vs n=3 (30%) respectively, p=0.12)
Influenza						
Dell'Era, 2012	Influenza (M59 adjuvanted, with H1N1, H3N2, and influenza B)	IG: n=60 JIA patients CG: n=30 HC	30 DMARD vs. 30 aTNF (Etanercept)	3 months	AE similar in JIA and HC	No AEs directly related to medication
Camacho-Lovillo, 2017	Influenza (H1N1, H3N2, B)	IG: n=25 JIA patients CG: n=6 healthy siblings	15 anti-TNF α (11 etanercept and 4 adalimumab), 4 anti-IL-1R (anakinra), 6 anti-IL-6R (tocilizumab)	1 year	No severe AE were observed. 7/41 local reactions, 2/41 systemic AE: drug reactions	Two (4.9%) had systemic adverse drug reactions (one in control and one in biological treatment group). 11 patients had febrile episodes, not related to vaccination (four in the non-biological

						and seven in the biological therapy group)
Toplak, 2012	Influenza (H1N1, H3N2, Influenza B)	IG: n=31 JIA patients CG: n=14 HC	18 NSAID, 2 DMARD, 7 DMARD + GC, 4 TNF	6 months	Similar AE	Not reported
Woerner, 2011	Influenza (H1N1, H3N2, H1N1 MDCK cell adapted, H3N2 MDCK adapted, and influenza B MDCK adapted)	IG: n=34 in total, of which n=25 JIA patients CG: n=16 HC	18 MTX, 10 TNFi, 8 MTX+TNFi, 16 no medication	4-8 weeks after single dose or after the second of two doses.	Similar AE	No difference in AE between immunosuppressed and immunocompetent group.
MMR (live-attenuated vaccine)						
Heijstek, 2013	MMR (MMR-NVI and M-M-RVAXPRO)	IG: n=68 vaccinated JIA patients CG: n=69 unvaccinated JIA patients	60 MTX, 15 biologicals, 3 GC	12 months	No MMR infections induced by vaccination	Not reported
Covid-19						
Ziv, 2022	Covid-19 (BNT162b2 mRNA vaccine)	IG: n=1639 patients with IRD, of which 380 with JIA CG: n=524.471 HC	Not reported	21.6 weeks [interquartile range (IQR) 14.7–39.1], 19.0 weeks (IQR 13.6–36.9) and 8.9 weeks (IQR 7.3–11.6) after one, two and three doses of vaccine, respectively.	One patient with JIA (0.12%) was hospitalized due to COVID-19 infection, compared with 0.08% in the control group.	Not reported

AB, antibody; ABT, abatacept; ADA, adalimumab; AE, adverse event; ANR, Anakinra; AZA, azathioprine; bDMARD, biological disease modifying anti-rheumatic drugs; CAM, canakinumab; CG, control group; CYC, cyclosporine; Cy, cyclophosphamide; DTP, diphtheria tetanus pertussis; ETN, etanercept; GC, glucocorticosteroids; GMT, geometric mean; HAV, hepatitis A virus; HBV, hepatitis B virus; HC, healthy controls; pts, patients; HCQ, hydroxychloroquine; IBD, inflammatory bowel disease; IFX, infliximab; IG, intervention group; IgG, immunoglobulin G; IRD, immune rheumatic diseases; IS, immunosuppression; IVIG, intravenous immunoglobulines; JIA, juvenile idiopathic arthritis; LEF, leflunomide; MMF, mycophenolic acid; MMR(/V), measles mumps rubella (/varicella); 6-MP, 6-mercaptopurine; MTX, methotrexate; MV, measles vaccine; NSAID, non-steroid anti-inflammatory drug; RAI, relative avidity index; RD, rheumatic diseases; RTX, rituxim; SAE, severe adverse event; SC, seroconversion titer; SFU, spot forming units; SP, seroprotection; TBE, tick-borne-encephalitis; TBEV, tick-borne-encephalitis virus; TCZ, tocilizumab; Thiopur, thiopurine; TNFi, tumor necrosis factor inhibitor; TT, tetanus toxoid; vacc, vaccine; VZV, varicella zoster virus;

^a Medication used in the intervention group, unless reported different. Numbers represent amount of patients using that medication.