



Antibioticele la populația pediatrică cu imunodeficiențe – strategii de administrare

Dr. Victor Daniel MIRON

Șef lucrări

Universitatea de Medicină și Farmacie “Carol Davila”

Institutul Național de Boli Infecțioase “Prof. Dr. Matei Balș”

IMUODEFICIENȚĂ

incapacitatea de a produce un răspuns imun adecvat din cauza insuficienței sau absenței unor componente ale sistemului imun.

Primare

- Înnăscute
- Grup eterogen de boli
- Cu substrat genetic
- Forme benigne

- SCID
- HiperIgE
- Deficitul de IgA
- Boala cronică g
- Boala Bruton

[Review](#) > [Arch Dis Child](#). 2016 Apr;101(4):365-70. doi: 10.1136/archdischild-2015-309522. Epub 2016 Jan 14.

Systematic review of the toxicity of short-course oral corticosteroids in children

Fahad Aljebab¹, Imti Choonara¹, Sharon Conroy¹

Affiliations + expand

PMID: 26768830 PMCID: PMC4819633 DOI: 10.1136/archdischild-2015-309522

In conclusion, this systematic review showed the most serious ADR associated with short-course oral corticosteroids was infection which was reported in 1% of patients. The most frequent ADRs were vomiting, behavioural change and sleep disturbance. Vomiting was the main reason for treatment discontinuation. Weight gain was experienced by more than one-third of patients when this was measured.

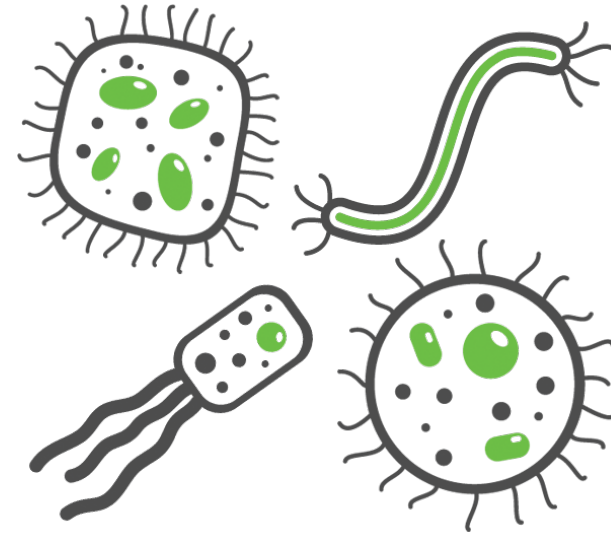
Secundare

- Dobândite
- Prin substratul patogenic al unei alte boli
- Ca urmare a unor tratamente
- Prin expunere la mediu

[Asthma & Immunology](#)
e 6, June 2023, Pages 713-717



Când suspiciionăm o imunodeficiență la un copil?



Virozele repetate **NU sunt semn de imunodeficiență!**

Administrarea repetată de antibiotice pentru “febră ± tuse ± congestie nazală” **NU sunt semn de imunodeficiență!**

Infecții recurente / frecvente
Evoluții severe sau trenante
Manifestări atipice
Răspuns inadecvat



10 semne de imunodeficiență la copil

1 mai mult de 4 infecții noi ale urechii / an

2 mai mult de 2 infecții grave ale sinusurilor / an

3 mai mult de 2 luni de antibiotic/an cu efect redus

4 mai mult de 2 pneumonii / an

5 eșec de creștere și dezvoltare a sugarului

6 abcese recurente, cutanate sau viscerale

7 afte bucale sau micoze cutanate persistente

8 tratament antibiotic iv pentru rezolvarea infecțiilor

9 > 2 infecții diseminate/profunde sau septicemie

10 istoric familial de IDP

10 semne de imunodeficiențe la adulți

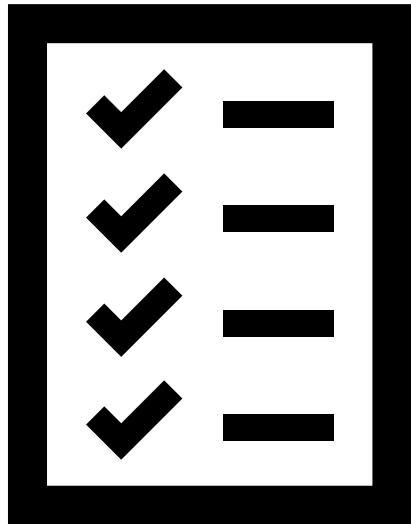


Material suplimentar

Warning signs in adults

1. ≥ 2 new ear infections within 1 year
2. ≥ 2 new sinus infections within 1 year, in the absence of allergy
3. 1 pneumonia per year for > 1 year
4. Chronic diarrhea with weight loss
5. Recurrent viral infections (colds, herpes, warts, condyloma)
6. Recurrent need for IV antibiotics to clear infections
7. Recurrent, deep abscesses of the skin or internal organs
8. Persistent thrush or fungal infection on skin or elsewhere
9. Infection with normally harmless tuberculosis-like bacteria
10. A family history of PID

Cum putem stabili diagnosticul unei imunodeficiențe



- Istoric medical
- Examen clinic
- Investigații de laborator
 - Teste de sânge
 - Teste genetice
 - Investigații imagistice

**MOST
IMPORTANT**

★ Teste de sânge

Hemogramă

Imunogramă

Biochimie



Teste de sânge

Hemogramă

- Limfopenie $<3000 \text{ Ly/mm}^3$ (1 luna – 1 an); $<1500 \text{ Ly/mm}^3$ în rest
- Neutropenie persistenta/ciclica ($\text{Ne} < 1500/\text{mm}^3$)
- Neutrofilie persistenta (și infecții cu piogeni, dar fără formare de puroi)
- Eozinofilie marcată ($10^3 - 10^4/\text{mm}^3$)

Imunogramă

Biochimie



Teste de sânge

Hemogramă

- Limfopenie $<3000 \text{ Ly/mm}^3$ (1 luna – 1 an); $<1500 \text{ Ly/mm}^3$ în rest
- Neutropenie persistenta/ciclica ($\text{Ne} < 1500/\text{mm}^3$)
- Neutrofilie persistenta (și infecții cu piogeni, dar fără formare de puroi)
- Eozinofilie marcată ($10^3 - 10^4/\text{mm}^3$)

Imunogramă

- Valori scăzute IgM, IgG, IgA, IgE
- Valori crescute IgM (și în afara episoadelor infecțioase) sau IgD
- Valori foarte mult crescute IgE

Biochimie



Teste de sânge

Hemogramă

- Limfopenie $<3000 \text{ Ly/mm}^3$ (1 luna – 1 an); $<1500 \text{ Ly/mm}^3$ în rest
- Neutropenie persistenta/ciclica ($\text{Ne} < 1500/\text{mm}^3$)
- Neutrofilie persistenta (și infecții cu piogeni, dar fără formare de puroi)
- Eozinofilie marcată ($10^3 - 10^4/\text{mm}^3$)

Imunogramă

- Valori scăzute IgM, IgG, IgA, IgE
- Valori crescute IgM (și în afara episoadelor infecțioase) sau IgD
- Valori foarte mult crescute IgE

Biochimie

- Acid uric foarte scăzut
- CRP crescut persistent

Când este nevoie de antibiotice la imunodeficiențe?

	Supportive	Definitive
CIDs/SCID	Ig replacement therapy (IV or SC) Antibiotic prophylaxis Antifungal prophylaxis Aggressive management of established infections Infectious precautions when hospitalized Withhold all live vaccines	BMT HSCT Gene therapy a possibility for some SCIDs
B-cell disorders	Ig replacement therapy (IV or SC) Antibiotic prophylaxis Antifungal prophylaxis depending upon etiology Hearing assessment Assessment of pulmonary status and function Close monitoring for co-morbidities	Gene therapy is a potential future treatment in some patients
Innate disorders	Antibiotic prophylaxis Antifungal prophylaxis Cytokine replacement (IFN γ) for CGD Vaccinations (e.g., meningococcal) Ig replacement is sometimes indicated	BMT, e.g., for CGD Gene therapy is a potential future treatment

Ig immunoglobulin, *IV* intravenous, *SC* subcutaneous, *CID* combined immunodeficiency, *SCID* severe combined immunodeficiency, *IFN γ* interferon- γ , *BMT* bone marrow transplantation, *CGD* chronic granulomatous disease, *HSCT* hematopoietic stem cell transplantation

Când este nevoie de antibiotice la imunodeficiențe?

Supportive	Definitive
<p>Ig replacement therapy (IV or SC)</p> <p>Antibiotic prophylaxis</p> <p>Antifungal prophylaxis</p> <p>Aggressive management of established infections</p> <p>Infectious precautions when hospitalized</p> <p>Withhold all live vaccines</p>	<p>BMT</p> <p>HSCT</p> <p>Gene therapy a possibility for some SCIDs</p>
<p>Ig replacement therapy (IV or SC)</p> <p>Antibiotic prophylaxis</p> <p>Antifungal prophylaxis depending upon etiology</p> <p>Hearing assessment</p> <p>Assessment of pulmonary status and function</p> <p>Close monitoring for co-morbidities</p>	<p>Gene therapy is a potential future treatment in some patients</p>
<p>Antibiotic prophylaxis</p> <p>Antifungal prophylaxis</p> <p>Cytokine replacement (IFNγ) for CGD</p> <p>Vaccinations (e.g., meningococcal)</p> <p>Ig replacement is sometimes indicated</p>	<p>BMT, e.g., for CGD</p> <p>Gene therapy is a potential future treatment</p>

Cum facem profilaxia antibiotică?

Examples of prophylactic antimicrobial regimens used in patients with immunodeficiency

Infection to be prevented	First-line regimen	Alternative regimens
<i>Pneumocystis jirovecii</i>	Sulfamethoxazole-trimethoprim: <ul style="list-style-type: none"> Infants >4 weeks of age and children: 5 mg/kg/day orally in 2 divided doses, 3 days/week (based on TMP; maximum 160 mg per dose, 320 mg per day) Adults and adolescents with normal renal function: 160 mg (based on TMP) daily or 3 days/week, or 80 mg (based on TMP) daily 	Dapsone: <ul style="list-style-type: none"> Infants and children: 2 mg/kg/dose orally once daily (maximum daily dose: 100 mg/day) Adults: 100 mg once daily or 50 mg twice daily Atovaquone: <ul style="list-style-type: none"> 1 to 3 months: 30 mg/kg orally once daily 4 to 24 months: 45 mg/kg orally once daily >24 months: 30 mg/kg orally once daily Adolescents ≥13 years and adults: 1500 mg orally once daily Pentamidine: <ul style="list-style-type: none"> Children <5 years: 9 mg/kg (maximum dose: 300 mg/dose) inhalation per nebulizer once every 4 weeks Children >5 years, adolescents and adults: 300 mg inhalation per nebulizer once every 4 weeks
<i>Staphylococcus spp.</i>, gram negative spp	Sulfamethoxazole-trimethoprim: <ul style="list-style-type: none"> Infants >4 weeks of age and children: 5 mg/kg/day orally in 2 divided doses (based on TMP; maximum 160 mg per dose, 320 mg per day) Adolescents and adults: 160 mg (based on TMP) daily or twice daily 	Amoxicillin:* <ul style="list-style-type: none"> Children: 10 to 20 mg/kg per day as a single dose or divided twice daily (maximum dose 875 mg per day) Adolescents and adults: 875 mg twice daily Ciprofloxacin:*† <ul style="list-style-type: none"> Children: 10 mg/kg/dose twice daily (maximum dose 500 mg) Adults: 500 mg twice daily Amoxicillin and clavulanate:* <ul style="list-style-type: none"> Children: 20 mg/kg per day as a single dose or divided twice daily (maximum dose 875 mg per day, based on amoxicillin) Adolescents and adults: 875 mg daily (based on amoxicillin)
<i>Mycoplasma spp.</i>, <i>Streptococcus spp.</i>	Azithromycin: <ul style="list-style-type: none"> Children: 5 to 10 mg/kg/dose orally 3 times weekly (maximum dose of 250 mg) Adolescents and adults: 250 mg orally 3 times weekly 	
Non-tuberculous mycobacteria	Azithromycin: <ul style="list-style-type: none"> Children: 20 mg/kg/dose orally once weekly (maximum dose 1200 mg weekly but may be given as 600 mg twice per week if higher doses cause nausea) Adolescents and adults: 1200 mg weekly but may be given as 600 mg twice per week if higher doses cause nausea 	
<i>Aspergillus spp.</i>	Itraconazole: <ul style="list-style-type: none"> Children: 5 mg/kg/day orally daily (maximum dose 200 mg) Adolescents and adults: 200 mg orally daily 	Voriconazole:‡ <ul style="list-style-type: none"> ≤50 kg: 8 mg/kg/dose orally twice daily (maximum dose 350 mg) >50 kg: 4 mg/kg/dose orally twice daily (maximum dose 200 mg)
<i>Candida spp.</i>	Fluconazole: <ul style="list-style-type: none"> Children: 6 mg/kg orally daily (maximum dose 400 mg) Adolescents and adults: 400 mg orally once daily 	
HSV/VZV	Acyclovir: <ul style="list-style-type: none"> Children <40 kg: 600 mg/m²/dose orally 4 times per day Children >40 kg: 800 mg orally 4 times per day Adults: 800 mg orally twice daily 	
CMV	Valganciclovir: <ul style="list-style-type: none"> Children 1 month to 16 years old: once daily oral dose (mg) = 7 × body surface area × creatinine clearance Adolescents ≥17 years and adults with normal renal function: 900 mg orally once daily 	

The approach to antimicrobial prophylaxis in patients with various forms of primary immunodeficiency is not standardized. The agents and doses shown in the table are commonly used, but other regimens may also be appropriate.

TMP: trimethoprim; spp: species; HSV: herpes simplex virus; VZV: varicella zoster virus; CMV: cytomegalovirus.

* No standard second line as varying strains with varying resistance patterns.

† Clinicians should weigh the risks of adverse musculoskeletal effects against the benefits when considering long-term use of fluoroquinolones in children.

‡ Requires drug level monitoring.

References:

- Kuruvilla M, de la Morena MT. Antibiotic prophylaxis in primary immune deficiency disorders. *J Allergy Clin Immunol Pract* 2013; 1:373.
- Milto C, Pulvirenti F, Cinetto F, et al. Double-blind, placebo-controlled, randomized trial on low-dose azithromycin prophylaxis in patients with primary antibody deficiencies. *J Allergy Clin Immunol* 2019; 144:584.

Cum facem profilaxia antibiotică?

Examples of prophylactic antimicrobial regimens used in patients with immunodeficiency

Infection to be prevented	First-line regimen	Alternative regimens
<i>Pneumocystis jirovecii</i>	Sulfamethoxazole-trimethoprim: <ul style="list-style-type: none"> ▪ Infants >4 weeks of age and children: 5 mg/kg/day orally in 2 divided doses, 3 days/week (based on TMP; maximum 160 mg per dose, 320 mg per day) ▪ Adults and adolescents with normal renal function: 160 mg (based on TMP) daily or 3 days/week, or 80 mg (based on TMP) daily 	Dapsone: <ul style="list-style-type: none"> ▪ Infants and children: 2 mg/kg/dose orally once daily (maximum daily dose: 100 mg/day) ▪ Adults: 100 mg once daily or 50 mg twice daily Atovaquone: <ul style="list-style-type: none"> ▪ 1 to 3 months: 30 mg/kg orally once daily ▪ 4 to 24 months: 45 mg/kg orally once daily ▪ >24 months: 30 mg/kg orally once daily ▪ Adolescents ≥13 years and adults: 1500 mg orally once daily Pentamidine: <ul style="list-style-type: none"> ▪ Children <5 years: 9 mg/kg (maximum dose: 300 mg/dose) inhalation per nebulizer once every 4 weeks ▪ Children >5 years, adolescents and adults: 300 mg inhalation per nebulizer once every 4 weeks
<i>Staphylococcus spp, gram negative spp</i>	Sulfamethoxazole-trimethoprim: <ul style="list-style-type: none"> ▪ Infants >4 weeks of age and children: 5 mg/kg/day orally in 2 divided doses (based on TMP; maximum 160 mg per dose, 320 mg per day) ▪ Adolescents and adults: 160 mg (based on TMP) daily or twice daily 	Amoxicillin:* <ul style="list-style-type: none"> ▪ Children: 10 to 20 mg/kg per day as a single dose or divided twice daily (maximum dose 875 mg per day) ▪ Adolescents and adults: 875 mg twice daily Ciprofloxacin:*† <ul style="list-style-type: none"> ▪ Children: 10 mg/kg/dose twice daily (maximum dose 500 mg) ▪ Adults: 500 mg twice daily Amoxicillin and clavulanate:* <ul style="list-style-type: none"> ▪ Children: 20 mg/kg per day as a single dose or divided twice daily (maximum dose 875 mg per day, based on amoxicillin) ▪ Adolescents and adults: 875 mg daily (based on amoxicillin)
<i>Mycoplasma spp,</i>	Azithromycin:	

Cum f

	<p>2 divided doses (based on TMP; maximum 160 mg per dose, 320 mg per day)</p> <ul style="list-style-type: none"> Adolescents and adults: 160 mg (based on TMP) daily or twice daily 	<p>twice daily (maximum dose 875 mg per day)</p> <ul style="list-style-type: none"> Adolescents and adults: 875 mg twice daily <p>Ciprofloxacin:*[†]</p> <ul style="list-style-type: none"> Children: 10 mg/kg/dose twice daily (maximum dose 500 mg) Adults: 500 mg twice daily <p>Amoxicillin and clavulanate:*</p> <ul style="list-style-type: none"> Children: 20 mg/kg per day as a single dose or divided twice daily (maximum dose 875 mg per day, based on amoxicillin) Adolescents and adults: 875 mg daily (based on amoxicillin)
<i>Mycoplasma spp,</i> <i>Streptococcus spp</i>	<p>Azithromycin:</p> <ul style="list-style-type: none"> Children: 5 to 10 mg/kg/dose orally 3 times weekly (maximum dose of 250 mg) Adolescents and adults: 250 mg orally 3 times weekly 	
Non-tuberculous mycobacteria	<p>Azithromycin:</p> <ul style="list-style-type: none"> Children: 20 mg/kg/dose orally once weekly (maximum dose 1200 mg weekly but may be given as 600 mg twice per week if higher doses cause nausea) Adolescents and adults: 1200 mg weekly but may be given as 600 mg twice per week if higher doses cause nausea 	
<i>Aspergillus spp</i>	<p>Itraconazole:</p> <ul style="list-style-type: none"> Children: 5 mg/kg/day orally daily (maximum dose 200 mg) Adolescents and adults: 200 mg orally daily 	<p>Voriconazole:^Δ</p> <ul style="list-style-type: none"> ≤50 kg: 8 mg/kg/dose orally twice daily (maximum dose 350 mg) >50 kg: 4 mg/kg/dose orally twice daily (maximum dose 200 mg)
<i>Candida spp</i>	<p>Fluconazole:</p> <ul style="list-style-type: none"> Children: 6 mg/kg orally daily (maximum dose 400 mg) Adolescents and adults: 400 mg orally once daily 	
HSV/VZV	<p>Acyclovir:</p> <ul style="list-style-type: none"> Children <40 kg: 600 mg/m²/dose orally 4 times per day Children >40 kg: 800 mg orally 4 times per day Adults: 800 mg orally twice daily 	
CMV	<p>Valganciclovir:</p> <ul style="list-style-type: none"> Children 1 month to 16 years old: once daily oral dose (mg) = 7 × body surface area × creatinine clearance 	

Cum facem profilaxia antibiotică?

Sulfametoxazol-trimetoprim Azitromicina

Examples of prophylactic antimicrobial regimens used in patients with immunodeficiency

Infection to be prevented	First-line regimen	Alternative regimens
<i>Pneumocystis jirovecii</i>	Sulfamethoxazole-trimethoprim: <ul style="list-style-type: none"> Infants >4 weeks of age and children: 5 mg/kg/day orally in 2 divided doses, 3 days/week (based on TMP; maximum 160 mg per dose, 320 mg per day) Adults and adolescents with normal renal function: 160 mg (based on TMP) daily or 3 days/week, or 80 mg (based on TMP) daily 	Dapsone: <ul style="list-style-type: none"> Infants and children: 2 mg/kg/dose orally once daily (maximum daily dose: 100 mg/day) Adults: 100 mg once daily or 50 mg twice daily Atovaquone: <ul style="list-style-type: none"> 1 to 3 months: 30 mg/kg orally once daily 4 to 24 months: 45 mg/kg orally once daily >24 months: 30 mg/kg orally once daily A d Pentam C in C in
<i>Staphylococcus spp.</i> , gram negative spp	Sulfamethoxazole-trimethoprim: <ul style="list-style-type: none"> Infants >4 weeks of age and children: 5 mg/kg/day orally in 2 divided doses (based on TMP; maximum 160 mg per dose, 320 mg per day) Adolescents and adults: 160 mg (based on TMP) daily or twice daily 	Amoxicil C t A Ciproflo C it A Amoxicil C d A
<i>Mycoplasma spp.</i> , <i>Streptococcus spp</i>	Azithromycin: <ul style="list-style-type: none"> Children: 5 to 10 mg/kg/dose orally 3 times weekly (maximum dose of 250 mg) Adolescents and adults: 250 mg orally 3 times weekly 	
Non-tuberculous mycobacteria	Azithromycin: <ul style="list-style-type: none"> Children: 20 mg/kg/dose orally once weekly (maximum dose 1200 mg weekly but may be given as 600 mg twice per week if higher doses cause nausea) Adolescents and adults: 1200 mg weekly but may be given as 600 mg twice per week if higher doses cause nausea 	
<i>Aspergillus spp</i>	Itraconazole: <ul style="list-style-type: none"> Children: 5 mg/kg/day orally daily (maximum dose 200 mg) Adolescents and adults: 200 mg orally daily 	Voricon 5 3 > 2
<i>Candida spp</i>	Fluconazole: <ul style="list-style-type: none"> Children: 6 mg/kg orally daily (maximum dose 400 mg) Adolescents and adults: 400 mg orally once daily 	
HSV/VZV	Acyclovir: <ul style="list-style-type: none"> Children <40 kg: 600 mg/m²/dose orally 4 times per day Children >40 kg: 800 mg orally 4 times per day Adults: 800 mg orally twice daily 	
CMV	Valganciclovir: <ul style="list-style-type: none"> Children 1 month to 16 years old: once daily oral dose (mg) = 7 × body surface area × creatinine clearance Adolescents ≥17 years and adults with normal renal function: 900 mg orally once daily 	

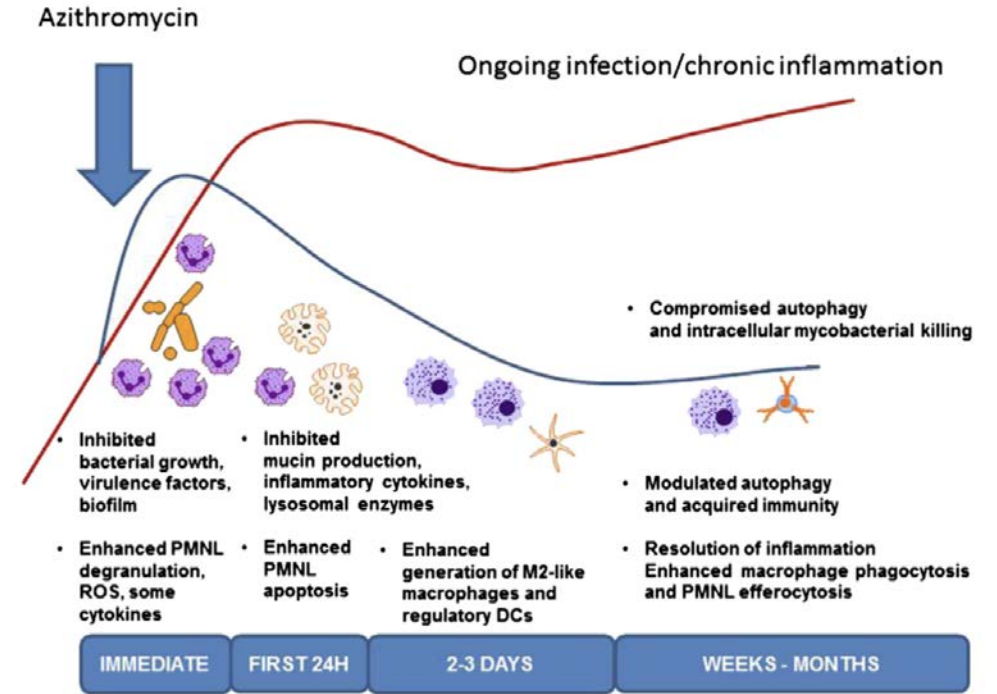


Fig. 2. Proposed time course of azithromycin actions on infection and chronic inflammation.

The approach to antimicrobial prophylaxis in patients with various forms of primary immunodeficiency is not standard, but other regimens may also be appropriate.

TMP: trimethoprim; spp: species; HSV: herpes simplex virus; VZV: varicella zoster virus; CMV: cytomegalovirus.

* No standard second line as varying strains with varying resistance patterns.

† Clinicians should weigh the risks of adverse musculoskeletal effects against the benefits when considering long-term use of fluoroquinolones in children.

‡ Requires drug level monitoring.

References:

- Kuruvilla M, de la Morena MT. Antibiotic prophylaxis in primary immune deficiency disorders. *J Allergy Clin Immunol Pract* 2013; 1:573.
- Milto C, Pulvirenti F, Cinetto F, et al. Double-blind, placebo-controlled, randomized trial on low-dose azithromycin prophylaxis in patients with primary antibody deficiencies. *J Allergy Clin Immunol* 2019; 144:584.

Source: Parnham MJ, Haber VE, Giamarellos-Bourboulis EJ, Perletti G, Verleden GM, Vos R. Azithromycin: Mechanism of action and their relevance for clinical applications. *Pharmacology & Therapeutics*. 2014;143(2):225-245.

Cum tratăm infecțiile copiilor cu imunodeficiențe?

4

right **D**rug

right **D**ose

De-escalation to pathogen-directed therapy,

right **D**uration of therapy

Imunodeficiență primară / secundară?

Tipul de deficit imun?

Localizarea infecției?

Date epidemiologice - cele mai frecvente bacterii implicate?

Immunodeficiency	Bacteria
Chronic granulomatous disease	<i>Staphylococcus aureus</i> (abscesses of various sites) <i>Burkholderia</i> spp Enterobacteria (septicemia, urinary infections) <i>Nocardia</i> spp (adenitis, skin infections, abscesses) <i>Actinomyces</i> spp (adenitis, skin infections) <i>Mycobacteria</i> spp
Congenital neutropenia	<i>Staphylococcus</i> spp (all sites) Enterobacteria (septicemia, abscesses, cellulitis) <i>Streptococcus pneumoniae</i> (pneumonitis)
Complement factor deficiencies: classical, C3, factor H, factor I	<i>S. pneumoniae</i> (pulmonary, ENT infections) Hib (pulmonary, ENT infections)
Complement factor deficiencies: properdin, late components	<i>Neisseria meningitidis</i> (meningitides)
Asplenia	<i>S. pneumoniae</i> (OPSI) Hib (OSPI) <i>N. meningitidis</i> (OSPI) <i>Ehrlichia</i> spp (infections after bite) <i>Capnocytophaga</i> spp (infections after bite)
Agammaglobulinemia	<i>S. pneumoniae</i> (ENT, pulmonary infections, meningitides) Hib (ENT, pulmonary infections, meningitides) <i>N. meningitidis</i> (meningitides) <i>Pseudomonas aeruginosa</i> (superinfection of bronchiectasis) <i>Campylobacter jejuni</i> (gastrointestinal infections)
Hyper-IgM syndrome with cellular defect (mutations in CD40, CD40L)	<i>S. pneumoniae</i> (ENT, pulmonary infections meningitides) Hib (ENT, pulmonary infections meningitides) <i>N. meningitidis</i> (meningitides) <i>P. aeruginosa</i> (superinfection of bronchiectasis) <i>C. jejuni</i> (gastrointestinal infections)
Hyper-IgM syndrome without cellular defect (mutations in AID, UNG, PMS2)	<i>S. pneumoniae</i> (ENT, pulmonary infections, meningitides) Hib (ENT, pulmonary infections, meningitides) <i>N. meningitidis</i> (meningitides) <i>P. aeruginosa</i> (superinfection of bronchiectasis) <i>C. jejuni</i> (gastrointestinal infections)
CVID	<i>S. pneumoniae</i> (ENT, pulmonary infections, meningitides) Hib (ENT, pulmonary infections meningitides) <i>N. meningitidis</i> (meningitides) <i>P. aeruginosa</i> (superinfection of bronchiectasis) <i>C. jejuni</i> (gastrointestinal infections)

Table 2. INFECTIONS IN PATIENTS ON CHRONIC STEROIDS

Bacterial

Enterobacteriaceae
Legionella micdadei
Listeria monocytogenes
Mycobacterium tuberculosis
Nontuberculous mycobacteria
Nocardia asteroides
Rhodococcus equi
Salmonella sp.
Staphylococcus aureus
Streptococci

Fungal

Aspergillus
Blastomyces
Candida albicans and *nonalbicans* sp.
Coccidioides immitis
Cryptococcus neoformans
Fusarium sp.
Histoplasma capsulatum
Penicillium marneffei
Pseudallescheria boydii
Zygomycoses

Viral

Adenovirus
Cytomegalovirus
Herpes simplex virus
Human papillomavirus
Influenza/parainfluenza
Respiratory syncytial virus
Varicella zoster

Parasitic

Cryptosporidiosis / *Isospora belli*
Pneumocystis carinii
Strongyloides stercoralis
Toxoplasma gondii

Infections in which steroids might play a role in treatment

- TB meningitis
- TB pericarditis (select cases only)
- Pneumococcal meningitis (in adults)
- *H. influenzae* type b meningitis (in kids)
- Severe *Pneumocystis* pneumonia
- COVID-19 pneumonia with hypoxemia
- Moderate to severe croup
- Infectious mononucleosis with airway compromise
- Immune reconstitution inflammatory syndrome (IRIS) (not an infection per se)
- Neurocysticercosis
- Eosinophilic meningitis (weaker evidence)
 - *Angiostrongylus cantonensis*
 - *Gnathostomiasis*
 - *Baylisascaris*
- Acute schistosomiasis syndrome (Katayama fever)
- Severe ocular or visceral larva migrans (toxocariasis)
- Severe typhoid fever
- Ramsay Hunt syndrome (weak evidence)
- Severe lepra reaction
- Refractory septic shock (although generally for hemodynamic reasons)

Antibiotice

PROFILAXIE la copiii cu imunodeficiențe cronice

Antibiotice

TRATAMENT la copiii cu imunodeficiențe în funcție de:

- tipul de imunodeficiență
 - localizare infecției
 - germene implicat

Vă mulțumesc!