Guidelines for the Use of Antiretroviral Agents in Pediatric HIV Infection

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Table 15k. Antiretroviral Therapy-Associated Adverse Effects and Management Recommendations—Rash and Hypersensitivity Reactions  (Last updated April 14, 2020; last reviewed April 14, 2020) (1 of 4)

<table>
<thead>
<tr>
<th>Adverse Effects</th>
<th>Associated ARVs</th>
<th>Onset/Clinical Manifestations</th>
<th>Estimated Frequency</th>
<th>Risk Factors</th>
<th>Prevention/ Monitoring</th>
<th>Management</th>
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</thead>
</table>
| Rash            | Any ARV drug can cause rash. | Onset:  
• First few days to weeks after starting new ARV drug(s) | Common (>10%):  
• EFV  
• ETR  
• FTC  
• NVP | Sulfonamide allergy is a risk factor for rash in patients who are taking PIs that contain a sulfonamide moiety (i.e., DRV). Polymorphisms in CYP2B6 and multiple HLA loci are associated with an increased risk of rash in patients who are taking NVP. | When Starting NVP or Restarting NVP After Interruptions of >14 Days:  
• Utilize once-daily lead-in dosing.  
• Avoid the use of systemic corticosteroids during NVP dose escalation.  
• Assess patient for rash severity, mucosal involvement, and other signs of systemic reaction. | Mild-to-Moderate Maculopapular Rash Without Systemic or Mucosal Involvement:  
• Most rashes will resolve without intervention; ARV drugs can be continued while monitoring.  
• Antihistamines may provide some relief. |
|                 |                  | Presentation:  
• Most rashes are mild-to-moderate, diffuse maculopapular eruptions. | Less Common (5% to 10%):  
• ABC  
• ATV  
• DRV  
• TDF |  |  |  |
|                 |                  | Note: A rash can be the initial manifestation of systemic hypersensitivity (see the SJS/TEN/EM major and HSR sections below). | Unusual (2% to 4%):  
• LPV/r  
• MVC  
• RAL  
• RPV |  |  |  |
|                 |                  | Adults:  
• Female sex  
• Patients who are black, Asian, or Hispanic are at higher risk. | When Starting NVP or Restarting NVP After Interruptions of >14 Days:  
• Utilize once-daily lead-in dosing.  
• Avoid the use of systemic corticosteroids during NVP dose escalation.  
• Assess patient for rash severity, mucosal involvement, and other signs of systemic reaction. |  |  |  |
| SJS/TEN/EM Major | Many ARV drugs, especially NNRTIs (see the Estimated Frequency column) | Onset:  
• First few days to weeks after starting new ARV drug(s) | Infrequent:  
• NVP (0.3%)  
• EFV (0.1%)  
• ETR (<0.1%) |  |  | Discontinue all ARV drugs and other possible causative agents (e.g., TMP-SMX).  
• Provide intensive supportive care, including IV hydration, aggressive wound care, eye care, labial adhesion preventative care, pain management, and antipyretics. Parenteral nutrition and antibiotics may also be necessary.  
• Corticosteroids and/or IVIG are sometimes used, but the use of these interventions is controversial.  
• Do not reintroduce the offending medication. |
|                 |                  | Presentation:  
• Initial rash may be mild, but it often becomes painful, evolving to blister/bulla formation with necrosis in severe cases. Usually involves mucous membrane ulceration and/or conjunctivitis. Systemic symptoms may also include fever, tachycardia, malaise, myalgia, and arthralgia. | Case Reports:  
• ABC  
• ATV  
• DRV  
• LPV/r  
• RAL  
• ZDV |  |  |  |
|                 |                  |  |  |  |  |  |  |

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### DRESS

**Onset:**
- 1–8 weeks after starting new ARV drug(s)

**Presentation:**
- Fever
- Lymphadenopathy
- Facial swelling
- Morbilliform to polymorphous rash
- Peripheral eosinophilia
- Atypical circulating lymphocytes
- Internal organ involvement (particularly the liver and/or kidneys)

**Adverse Effects**
- DRV, DTG, EFV, ETR, NVP, RAL, RPV

**Estimated Frequency**
- Rare

**Risk Factors**
- Unknown

**Prevention/Monitoring**
- Obtain a CBC and AST, ALT, and creatinine levels from patients who present with suggestive symptoms.

**Management**
- Discontinue all ARV drugs and other possible causative agents (e.g., TMP-SMX).
- The role of systemic steroids in treatment is unclear; consultation with a specialist is recommended.
- Provide supportive care for endorgan disease.
- Do not reintroduce the offending medication.

### HSR

**Onset**
- With First Use:
  - Within first 6 weeks of initiating ABC
- With Reintroduction:
  - Within hours of initiating ABC

**Presentation:**
- Symptoms include high fever, diffuse skin rash, malaise, nausea, headache, myalgia, arthralgia, diarrhea, vomiting, abdominal pain, pharyngitis, and respiratory symptoms (e.g., dyspnea).
- With continuation of ABC, symptoms may progress to hypotension and vascular collapse. With rechallenge, symptoms can mimic anaphylaxis.

**Adverse Effects**
- ABC

**Estimated Frequency**
- <1% to 9% (varies by ethnicity)

**Risk Factors**
- HLAB*5701 (HSR is very uncommon in people who are HLAB*5701 negative).
- The risk of HSR is higher in patients who are white than in patients who are black or East Asian.

**Prevention/Monitoring**
- Screen for HLAB*5701.
- ABC should not be prescribed if HLAB*5701 is present. The medical record should clearly indicate that ABC is contraindicated in these patients.
- When starting ABC, counsel patients and families about the signs and symptoms of HSR to ensure prompt reporting of reactions.

**Management**
- Discontinue all ARV drugs and investigate other causes of the symptoms (e.g., a concurrent viral illness).
- Provide symptomatic treatment.
- Most symptoms resolve within 48 hours after discontinuing ABC.
- Do not rechallenge with ABC even if the patient is HLAB*5701 negative.
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<tbody>
<tr>
<td>HSR, continued</td>
<td>NVP</td>
<td>Onset:</td>
<td>Occurs in 4% of patients on average, with a range of 2.5% to 11%</td>
<td>Adults: • ARV-naive with a higher CD4 count (&gt;250 cells/mm³ in women; &gt;400 cells/mm³ in men) • Female sex (risk is 3-fold higher in females than in males).</td>
<td>When Starting NVP or Restarting NVP After Interruptions of &gt;14 Days: • A 2-week lead-in period with once-daily dosing, followed by dose escalation to twice daily as recommended, may reduce the risk of reaction. This may not be necessary in children aged &lt;2 years. • Counsel families about signs and symptoms of HSR to ensure prompt reporting of reactions. • Obtain AST and ALT levels in patients with rash. • Obtain AST and ALT levels at baseline, before dose escalation, 2 weeks after dose escalation, and thereafter at 3-month intervals. • Avoid NVP use in women with CD4 counts &gt;250 cells/mm³ and in men with CD4 counts &gt;400 cells/mm³, unless benefits outweigh risks. • Do not use NVP as PEP outside of the neonatal period.</td>
<td>Discontinue all ARV drugs. Consider other causes for hepatitis and discontinue all hepatotoxic medications. Provide supportive care as indicated and monitor the patient closely. Do not reintroduce NVP. It is unclear whether it is safe to use other NNRTIs after a patient experiences symptomatic hepatitis due to NVP, and many experts would avoid the NNRTI drug class when restarting treatment.</td>
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<tr>
<td></td>
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<td>Presentation:</td>
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<tr>
<td></td>
<td></td>
<td>• Flulike symptoms (including nausea, vomiting, myalgia, fatigue, fever, abdominal pain, and jaundice) with or without skin rash that may progress to hepatic failure with encephalopathy</td>
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</tbody>
</table>

*Table 15k. Antiretroviral Therapy-Associated Adverse Effects and Management Recommendations—Rash and Hypersensitivity Reactions (Last updated April 14, 2020; last reviewed April 14, 2020) (3 of 4)
## Table 15k. Antiretroviral Therapy-Associated Adverse Effects and Management Recommendations—Rash and Hypersensitivity Reactions

**Last updated April 14, 2020; last reviewed April 14, 2020**  
(4 of 4)

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>HSR, continued</td>
<td>ETR</td>
<td>Onset:</td>
<td>Rare</td>
<td>Unknown</td>
<td>Evaluate for hypersensitivity if the patient is symptomatic.</td>
<td>Discontinue all ARV drugs. Rechallenge with ETR is not recommended.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Any time during therapy</td>
<td></td>
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<td>Presentation:</td>
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<tr>
<td></td>
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<td>• Symptoms may include rash, constitutional findings, and sometimes organ dysfunction, including hepatic failure.</td>
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</tr>
<tr>
<td>MVC</td>
<td>Rash preceding hepatotoxicity</td>
<td>Rare</td>
<td>Unknown</td>
<td>Obtain AST and ALT levels from patients with rash or other symptoms of hypersensitivity.</td>
<td>Discontinue all ARV drugs. Rechallenge with MVC is not recommended.</td>
<td></td>
</tr>
<tr>
<td>DTG</td>
<td>Rash with hepatic dysfunction</td>
<td>Rare</td>
<td>Unknown</td>
<td>Obtain AST and ALT levels from patients with rash or other symptoms of hypersensitivity.</td>
<td>Discontinue all ARV drugs. Rechallenge with DTG is contraindicated.</td>
<td></td>
</tr>
</tbody>
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The prescribing information for NVP states that patients who experience rash during the 14-day lead-in period should not have the NVP dose increased until the rash has resolved. However, prolonging the lead-in phase beyond 14 days may increase the risk of NVP resistance because of subtherapeutic drug levels. Children who have persistent mild or moderate rash after the lead-in period should receive individualized care. Consult an expert in HIV care when managing these patients. **NVP should be stopped and not restarted** if the rash is severe or progressing. See the Nevirapine section of the Drug Appendix.

**Lead-in dosing is not recommended** when using NVP for either presumptive or definitive HIV therapy in newborns with perinatal HIV exposure or perinatal HIV infection. See the Nevirapine section of the Drug Appendix and Table 12.

**Key:** ABC = abacavir; ALT = alanine transaminase; ART = antiretroviral therapy; ARV = antiretroviral; AST = aspartate aminotransferase; ATV = atazanavir; CBC = complete blood count; CD4 = CD4 T lymphocyte; CYP = cytochrome P; DRESS = drug reaction (or rash) with eosinophilia and systemic symptoms; DRV = darunavir; DTG = dolutegravir; EFV = efavirenz; EM = erythema multiforme; ETR = etravirine; FTC = emtricitabine; HLA = human leukocyte antigen; HSR = hypersensitivity reaction; IV = intravenous; IVIG = intravenous immune globulin; LPV/r = lopinavir/ritonavir; MVC = maraviroc; NNRTI = non-nucleoside reverse transcriptase inhibitor; NVP = nevirapine; PEP = post-exposure prophylaxis; PI = protease inhibitor; RAL = raltegravir; RPV = rilpivirine; SJS = Stevens-Johnson syndrome; TDF = tenofovir disoproxil fumarate; TEN = toxic epidermal necrolysis; TMP-SMX = trimethoprim-sulfamethoxazole; ZDV = zidovudine

**References**


