HIV Occupational Post-Exposure Prophylaxis

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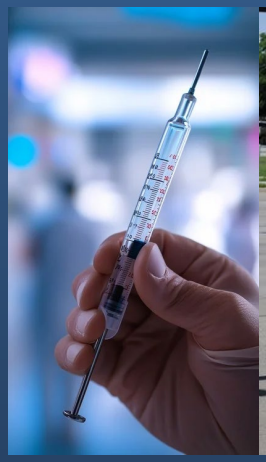
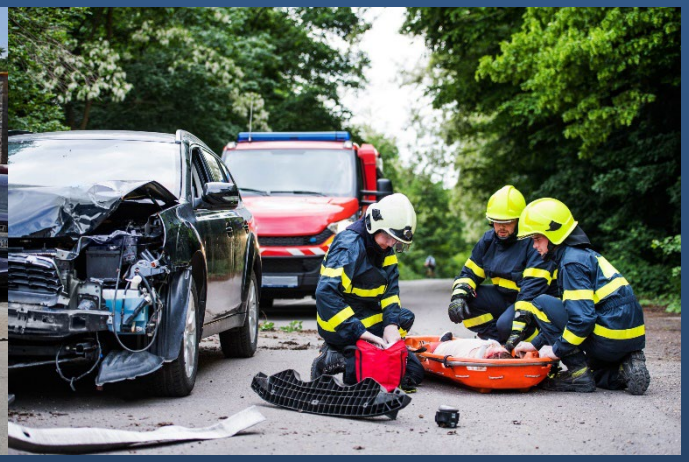
Objectives

- Review HIV routes of and risks for transmission
- Discuss how acute HIV infection may present
- Review methods for reducing risk of infection after exposure

Exposure Risks

- Accidental needlestick after administering a treatment
- Poked accidentally by syringe found on patient
- Foreign blood enters an open wound





What is PEP?

- Regimen to reduce risk of contracting HIV if exposed
- "Plan B" of HIV
  - 72 hour window of efficacy from moment of possible exposure
- Typically consists of 1-2 pills taken 1-2 times daily
  - Regimen consists of enough agents to function as a full HIV treatment

HIV Occupational PEP (oPEP)

- Accidental exposures common in the work place
- 58 **documented** cases of healthcare workers contracting HIV
  - Since 1999, there has only been one known case occurring in 2008
- 150 **possible** cases of healthcare workers contracting HIV
  - 1985-2013

Routes of Exposure

- Of the 58 confirmed cases:
  - 49 from percutaneous puncture or cut
  - 5 from mucocutaneous exposure
  - 2 from percutaneous and mucocutaneous exposure
  - 2 were unknown

Risk Among Healthcare Workers

TABLE. Number of confirmed or possible cases of occupationally acquired HIV infection among health care workers reported to CDC — United States, 1985–2013

Occupation	Confirmed (N = 58)		Possible (N = 150)	
	No.	(%)	No.	(%)
Nurse	24	(41.4)	37	(24.7)
Laboratory technician, clinical	16	(27.6)	21	(14.0)
Physician, nonsurgical	6	(10.3)	13	(8.7)
Laboratory technician, nonclinical	4	(6.9)	—	—
Housekeeper/maintenance	2	(3.4)	14	(9.3)
Technician, surgical	2	(3.4)	2	(1.3)
Embalmer/morgue technician	1	(1.7)	2	(1.3)
Hospice caregiver/attendant	1	(1.7)	16	(10.7)
Respiratory therapist	1	(1.7)	2	(1.3)
Technician, dialysis	1	(1.7)	3	(2.0)
Dental worker, including dentist	—	—	6	(4.0)
Emergency medical technician/paramedic	—	—	13	(8.7)
Physician, surgical	—	—	6	(4.0)
Technician/Therapist, other	—	—	9	(6.0)
Other health care occupations	—	—	6	(4.0)

Abbreviation: HIV = human immunodeficiency virus.

Source: Division of HIV/AIDS Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, CDC.

Joyce MP, Kuhar D, Brooks JT. Notes from the Field: Occupationally Acquired HIV Infection Among Health Care Workers — United States, 1985–2013. Morbidity and Mortality Weekly Report. 2015;63(53):1245-6.

Which fluids are potentially infectious for HIV?

- blood?
- saliva?
- sweat?
- feces?
- semen?
- vaginal secretions?
- cerebrospinal fluid?
- breastmilk?
- synovial fluid?
- pleural fluid?
- peritoneal fluid?
- pericardial fluid?
- amniotic fluid?
- pus?
- urine?
- vomitus?

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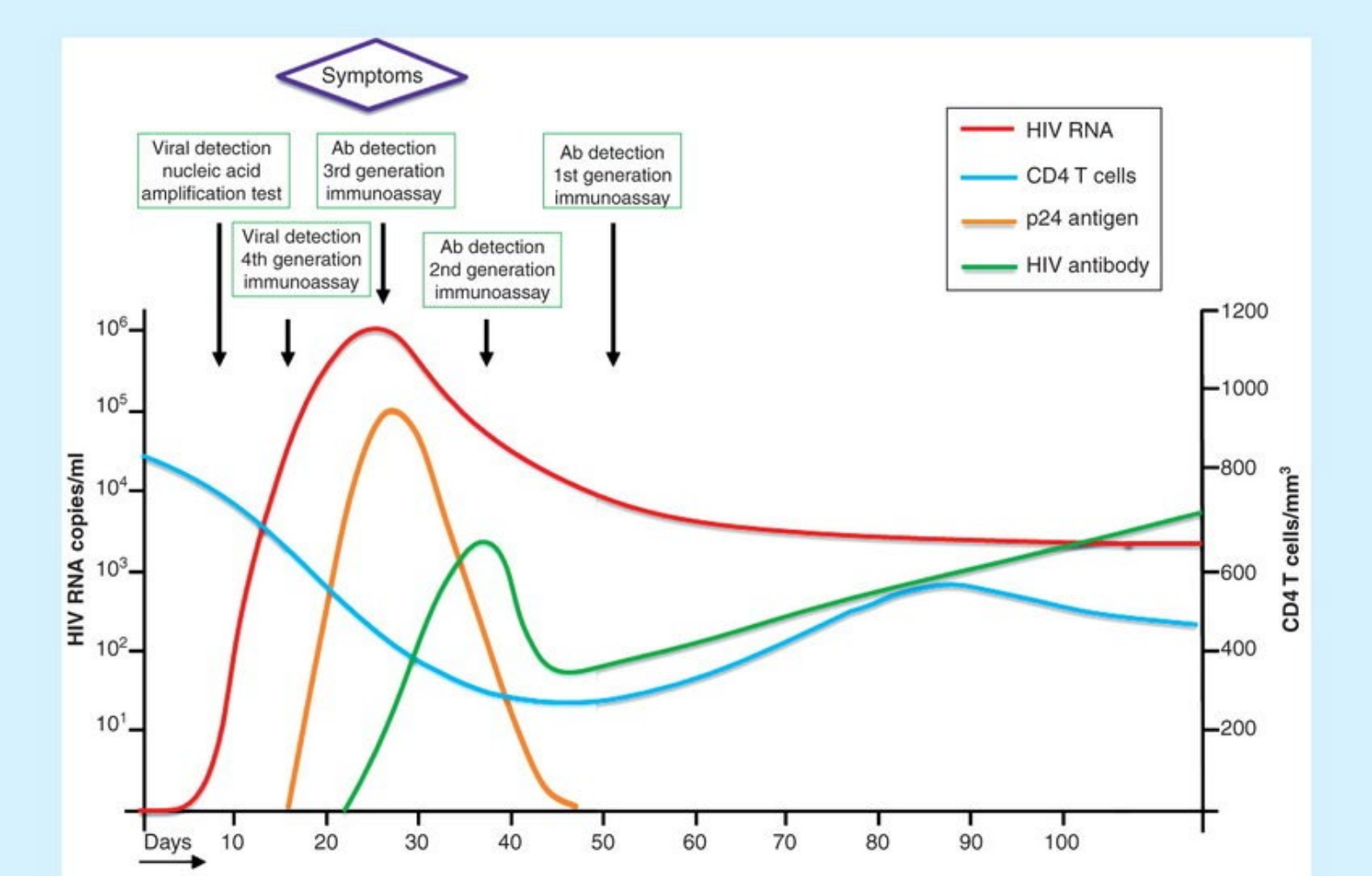
Other Risk Factors to Consider

- Viral load of source patient
  - Undetectable = untransmittable may not apply
- Needlestick considerations:
  - Glove use
    - 50% decrease in volume of blood transmitted
  - Hollow bore vs solid bore
    - Large diameter needles weakly associated with increased risk
  - Time outside of body
    - 90-99% reduction in infectivity after several hours outside of the body

HIV Testing and Symptoms

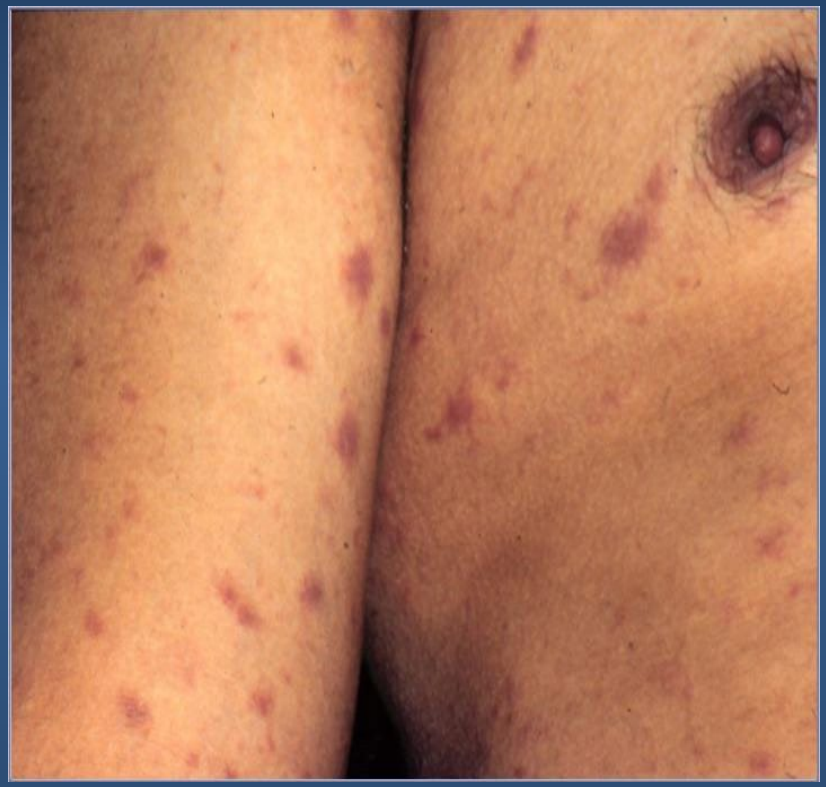
Laboratory Markers of HIV Infection



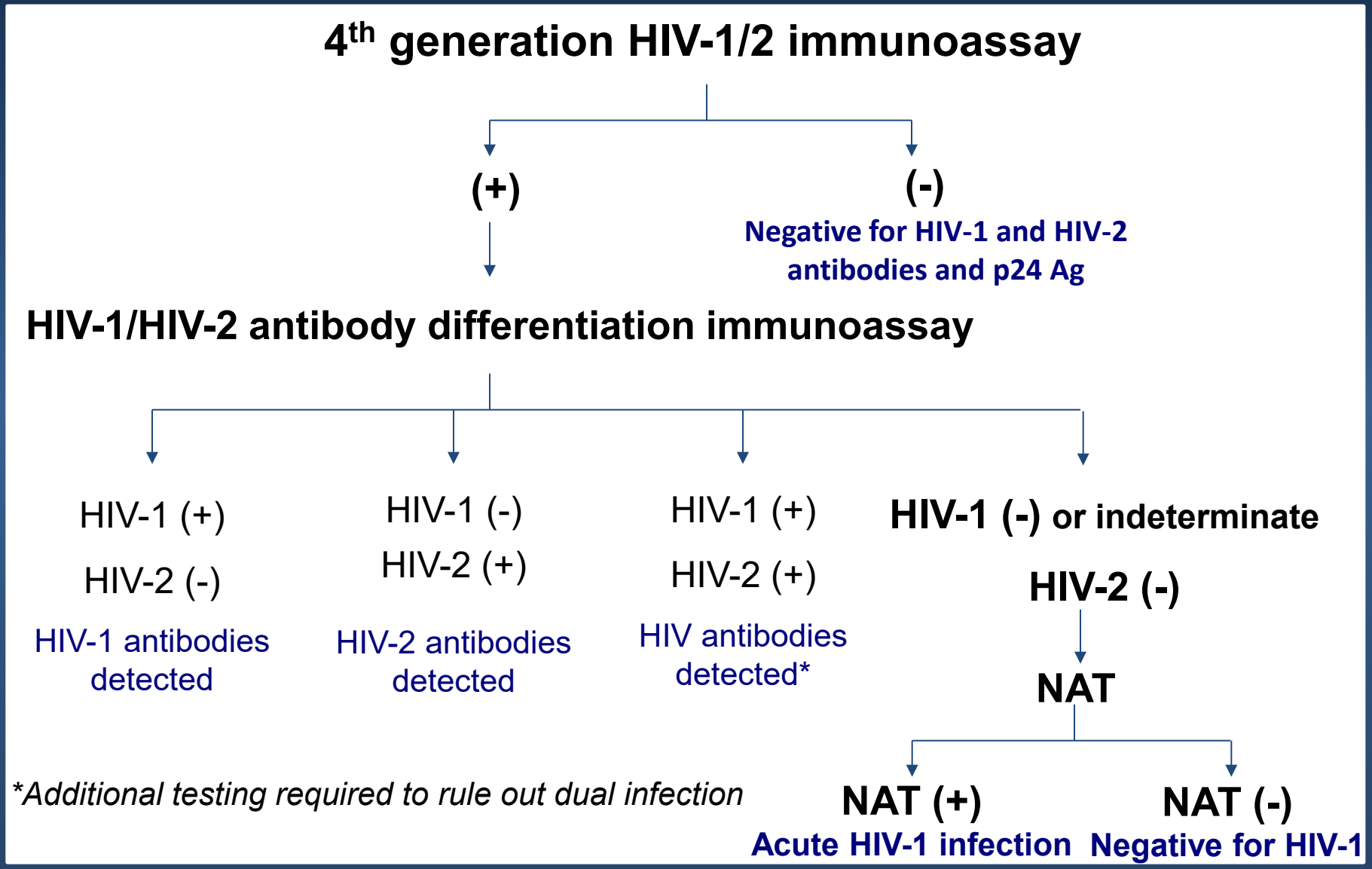
Routy JP, Cao W, Mehraj V. Overcoming the challenge of diagnosis of early HIV infection: a stepping stone to optimal patient management. *Expert Rev Anti Infect Ther*. 2015;13(10):1189-93. Figure 1.

Acute Retroviral Syndrome Signs/Symptoms

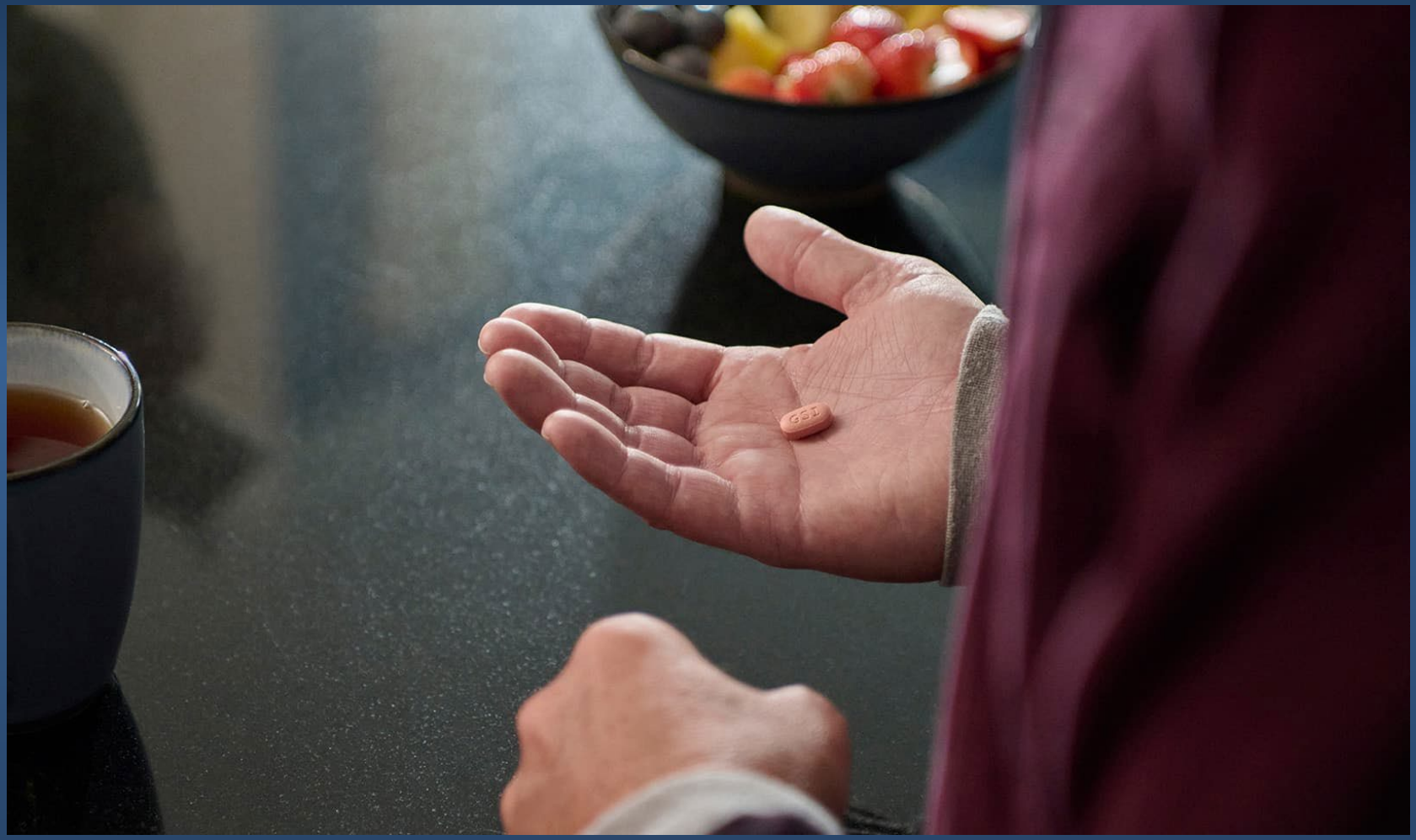
- Fever
- Malaise
- Myalgia
- Rash
- Headache
- Sore throat
- Lymphadenopathy



HIV 4th Generation Testing Algorithm



PEP Regimens



Key Points of PEP Regimens

- Duration is always 28 days
- COMPLETE regimen against HIV
- Timing is critical
  - Begin AS SOON AS POSSIBLE

Preferred PEP Regimens

- Biktarvy® (emtricitabine/tenofovir alafenamide/bictegravir)
  - One pill taken once daily
  - Most prescribed regimen for people with HIV
  - Very recent data suggests efficacy for PEP
- Truvada® (emtricitabine/tenofovir disoproxil) + Tivicay® (dolutegravir)
  - Two pills taken once daily
  - Very similar to Biktarvy®
- Truvada® + Isentress® (raltegravir)
  - Two pills, one daily and one twice daily
  - Lower HIV barrier to resistance from raltegravir vs other options

Emtricitabine/Tenofovir

- Both medications tend to be very well tolerated
- Tenofovir has two formulations:
  - Tenofovir disoproxil (TDF)
  - Tenofovir alafenamide (TAF)
- Common side effects include nausea, bloating
  - Concerns for renal, bone mineral density effects from tenofovir
- Both medications have renal adjustments
  - Emtricitabine full dose okay until CrCl < 30 mL/min
  - TDF full dose okay until CrCl < 50 mL/min
  - TAF full dose okay until CrCl < 15 mL/min

Integrase Inhibitors (INSTIs)

- Class includes bictegravir, dolutegravir, raltegravir
- All medications tend to be very well tolerated
- Common side effects include nausea
- Less common side effects include HA, sleep disturbance
- No renal adjustments
  - Little to no data in advanced liver disease

Drug/Drug Interactions

- Integrase inhibitors can chelate polyvalent cations, lose efficacy
  - Give 2 hours before or 6 hours after Ca/Mg/Fe/Al/Zn supplements
- Not recommended with select medications
  - Phenytoin, barbiturates, carbamazepine, oxcarbazepine, rifamycins diminish INSTI and TAF levels
  - Some PEP adjustments can be made to overcome the interactions
- Dolutegravir can increase metformin levels
  - Recommend decreasing metformin dose to 1,000 mg max/day during use
- Avoid St. John's Wort

PEP Considerations and Lab Testing

Additional Concerns in PEP

- Chronic hepatitis B infection
  - Emtricitabine and tenofovir are also active against HepB
  - Brief use may induce a HepB flare upon discontinuation
  - May need to follow with hepatology for further management
- Source individual has known HIV resistance
  - The PEP regimen should be crafted to treat the resistant individual's virus
  - Contact an ID/HIV expert for assistance in managing this
- Patient has advanced CKD or liver disease
  - Contact ID/HIV specialist for assistance
    - Alternate medications not discussed may need to be used

Testing the Source Individual

- Can stop PEP if the source individual tests negative for HIV
- If unable to test source or can not be located, continue PEP
  - Complete full 28 days
  - Interim HIV screening while on PEP should not be used to stop early

oPEP Labs at Baseline

- HIV 4th gen screen
- Comprehensive metabolic panel
- Hepatitis B surface antibody
- Hepatitis B core antibody (IgG or total)
- Hepatitis B surface antigen
- Hepatitis C antibody

Non-Occupational PEP Testing

Table 2. Recommended schedule of laboratory evaluations of source and exposed persons for providing nPEP with preferred regimens

Test	Source	Exposed persons			
	Baseline	Baseline	4–6 weeks after exposure	3 months after exposure	6 months after exposure
		For all persons considered for or prescribed nPEP for any exposure			
HIV Ag/Ab testing[a] (or antibody testing if Ag/Ab test unavailable)	✓	✓	✓	✓	✓[b]
Hepatitis B serology, including: hepatitis B surface antigen hepatitis B surface antibody hepatitis B core antibody	✓	✓	—	—	✓[c]
Hepatitis C antibody test	✓	✓	—	—	✓[d]
		For all persons considered for or prescribed nPEP for sexual exposure			
Syphilis serology[e]	✓	✓	✓	—	✓
Gonorrhea[f]	✓	✓	✓[g]		
Chlamydia[f]	✓	✓	✓[g]	—	—
Pregnancy[h]	—	✓	✓	—	—
		For persons prescribed tenofovir DF+ emtricitabine + raltegravir or tenofovir DF+ emtricitabine + dolutegravir			
Serum creatinine (for calculating estimated creatinine clearance[i])		✓	✓	—	—
Alanine transaminase, aspartate aminotranferase		✓	✓	—	—
	For all persons with HIV infection confirmed at any visit				
HIV viral load	✓	✓[j]			
HIV genotypic resistance	✓	✓[j]			

nPEP Testing Footnotes

Abbreviations: Ag/Ab, antigen/antibody combination test; HIV, human immunodeficiency virus; nPEP, nonoccupational postexposure prophylaxis; tenofovir DF, tenofovir disoproxil fumarate.

[a] Any positive or indeterminate HIV antibody test should undergo confirmatory testing of HIV infection status.

[b] Only if hepatitis C infection was acquired during the original exposure; delayed HIV seroconversion has been seen in persons who simultaneously acquire HIV and hepatitis C infection.

[c] If exposed person susceptible to hepatitis B at baseline.

[d] If exposed person susceptible to hepatitis C at baseline.

[e] If determined to be infected with syphilis and treated, should undergo serologic syphilis testing 6 months after treatment

[f] Testing for chlamydia and gonorrhea should be performed using nucleic acid amplification tests. For patients diagnosed with a chlamydia or gonorrhea infection, retesting 3 months after treatment is recommended.

- For men reporting insertive vaginal, anal, or oral sex, a urine specimen should be tested for chlamydia and gonorrhea.
- For women reporting receptive vaginal sex, a vaginal (preferred) or endocervical swab or urine specimen should be tested for chlamydia and gonorrhea.
- For men and women reporting receptive anal sex, a rectal swab specimen should be tested for chlamydia and gonorrhea.
- For men and women reporting receptive oral sex, an oropharyngeal swab should be tested for gonorrhea. (http://www.cdc.gov/std/tg2015/tg-2015-print.pdf)

[g] If not provided presumptive treatment at baseline, or if symptomatic at follow-up visit.

[h] If woman of reproductive age, not using effective contraception, and with vaginal exposure to semen.

[i] eCrCl = estimated creatinine clearance calculated by the Cockcroft-Gault formula; eCrClCG = [(140 − age) x ideal body weight] ÷ (serum creatinine x 72) (x 0.85 for females).

[j] At first visit where determined to have HIV infection.

Counseling at Each Visit

- Use condoms
- Avoid blood/tissue donations
- Avoid pregnancy and breastfeeding if possible
- Discuss possible drug adverse effects
- Review possible drug/drug interactions
- Emphasize importance of adherence to PEP regimen
- Consider reevaluation of healthcare workers 72 hours after exposure, particularly if more becomes known about source individual

PEP in Pregnancy/Lactation

- Considerations similar to those of non-pregnant persons
  - Parent and fetus are both at risk of HIV acquisition
  - Based on current data, recommended PEP regimens appear safe
- Very limited data for breastfeeding while on PEP
- Breastfeeding with acute HIV significantly increases risk of transmission
  - Can consider pumping and discarding or storing pending source testing

Conclusion

- PEP an available resource for preventing HIV infection
- "Pill in pocket" studies do exist
  - Potential benefit in supplying PEP courses for emergency healthcare self-administration
- If using, begin as soon as possible
- PEP medications traditionally well tolerated

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