

Antiretroviral Therapy (ART) Medication Errors

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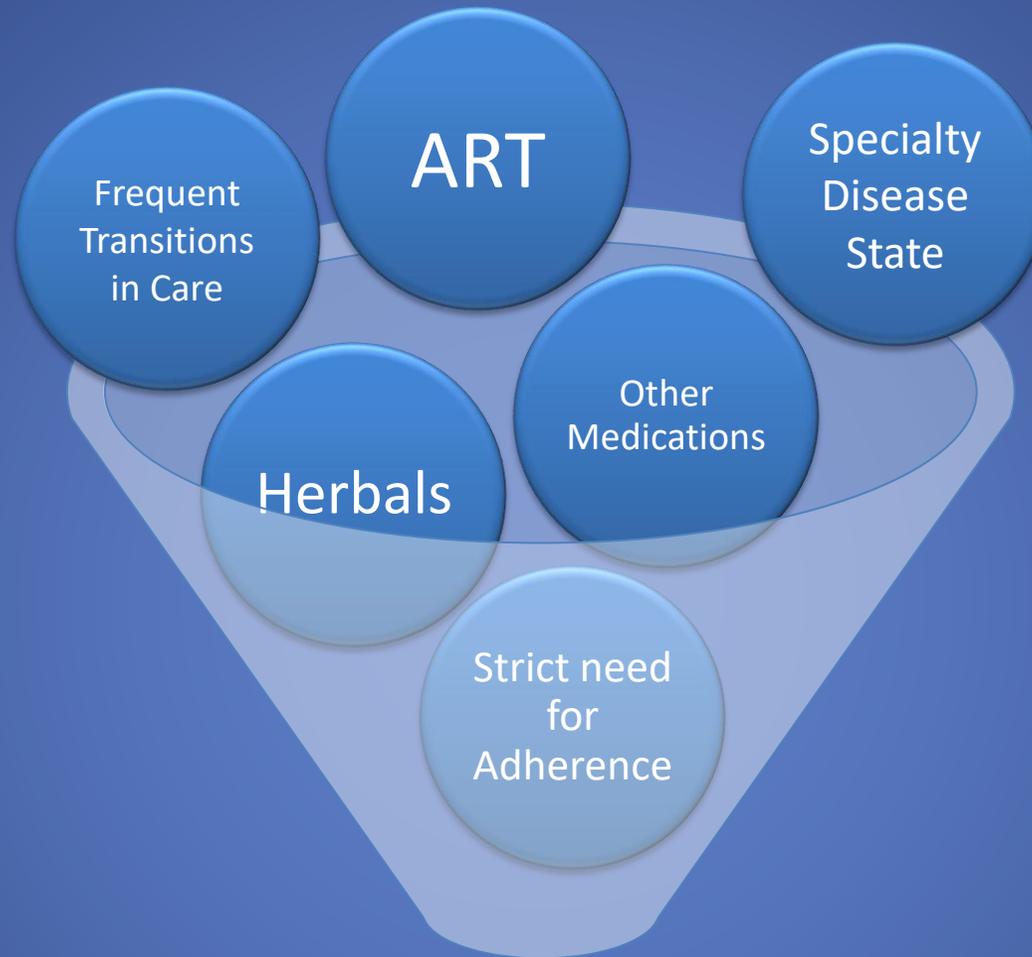


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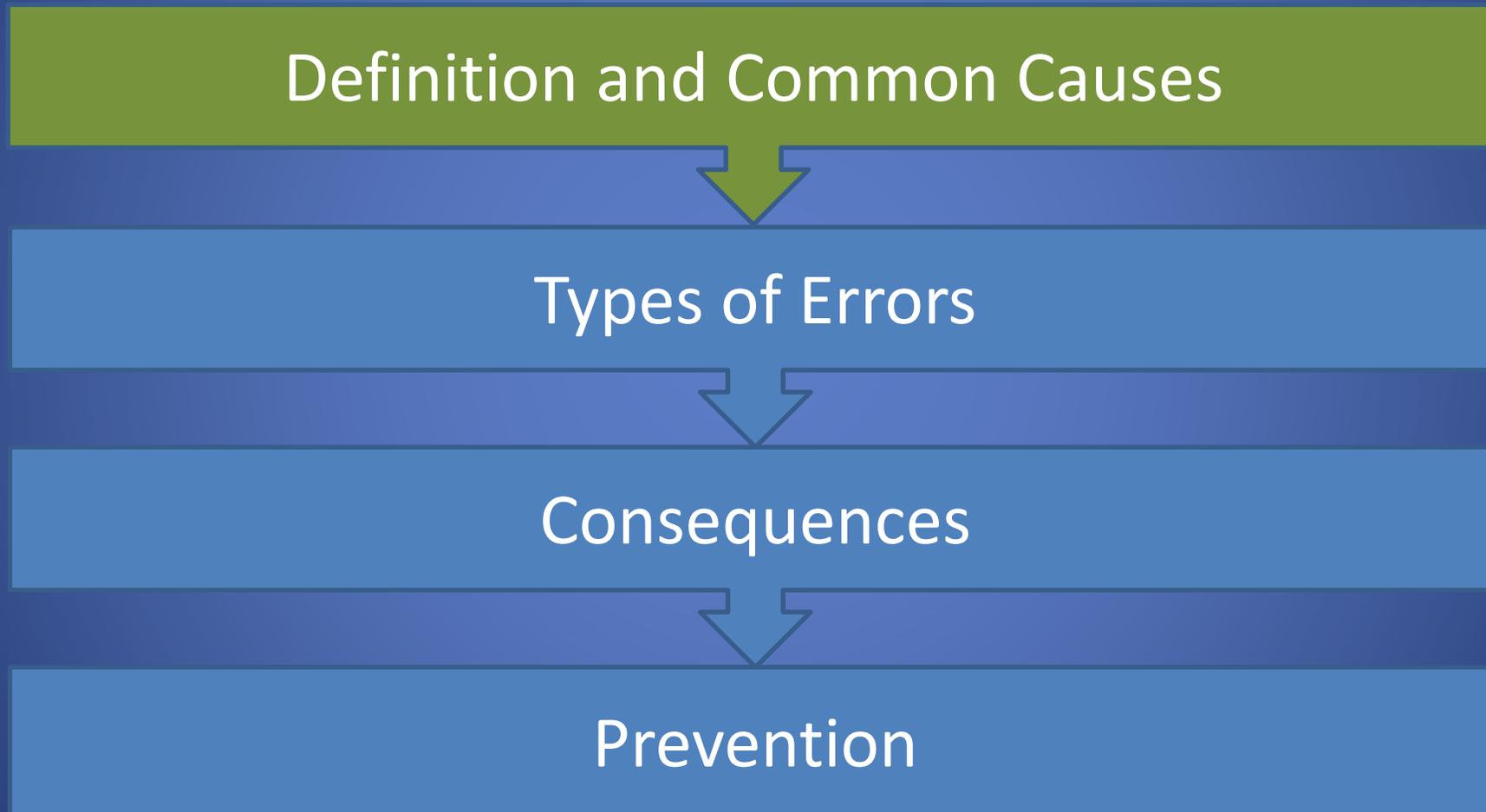
Objectives

- Illustrate common factors leading to medication errors involving ART
- Identify types of medications errors, including drug interactions, common in patients on ART
- Describe ways to prevent ART errors in patients living with HIV



ERRORS!

Antiretroviral Therapy (ART) Medication Errors



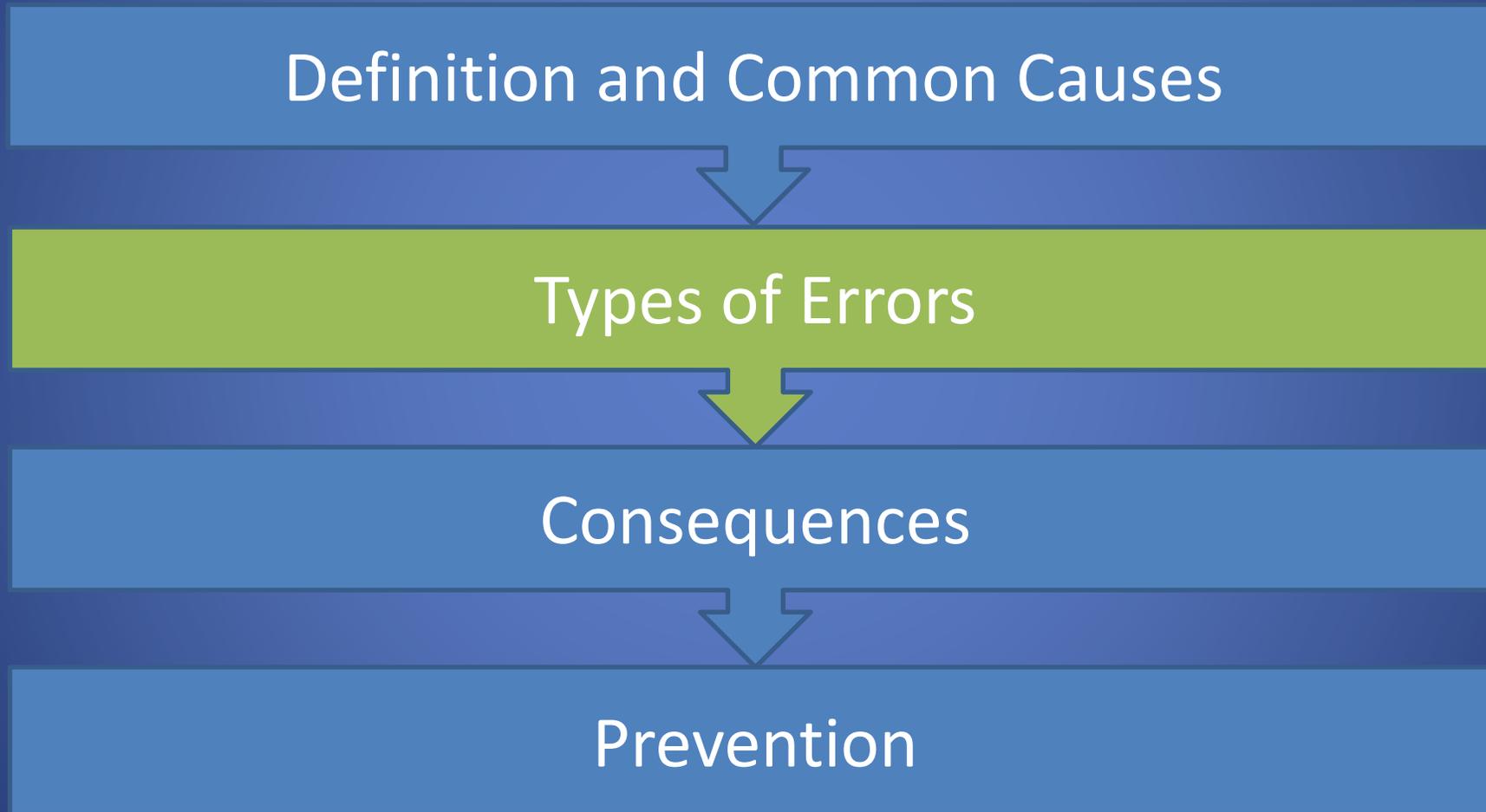
Definition

- Any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer

Common Causes

- Patient Misuse
 - Poor understating of directions
 - No knowledge of interactions / OTC medications
 - Don't fully grasp importance
- Poor Communication/Procedures
 - Lack of standardization with ART
 - Transitions in care
- Lack of Product Knowledge/Training
 - Specialty area of medicine

Antiretroviral Therapy (ART) Medication Errors



Common Errors Made By Healthcare Professionals

- Wrong Medication
- Wrong Dose
- Missing Medications / Information
- Drug Interactions
- Errors with Two-Drug Regimens

Wrong Medication: Look/Sound Alike

- Retrovir/Ritonavir
- Nelfinavir/Nevirapine
- Viracept/Viramune/ Viread
- Invirase/Efavirenz
- Combivir/Trizivir
- Isentress/Intelence
- Prezista/Prezcobix
- Reyataz/Evotaz

Wrong Medication: Combo Pills

- Single medication given in place of the combination
 - Abacavir dispensed in place of Epzicom (abacavir/lamivudine)
 - Tivicay (dolutegravir) dispensed in place of Triumeq (dolutegravir/abacavir/lamivudine)

Wrong Medication: Tenofovir Alafenamide

Stribild
(Tenofovir Disoproxil Fumarate/Emtricitabine/Cobicistat/Elvitegravir)



Genvoya
(Tenofovir Alafenamide/Emtricitabine/Cobicistat/Elvitegravir)

Complera
(Tenofovir Disoproxil Fumarate/Emtricitabine/Rilpivirine)



Odefsey
(Tenofovir Alafenamide/Emtricitabine/Rilpivirine)

Truvada
(Tenofovir Disoproxil Fumarate/Emtricitabine)



Descovy
(Tenofovir Alafenamide/Emtricitabine)

Wrong Medication: Abbreviations

- HIV providers LOVE abbreviations
- AZT – Zidovudine / Azidothymidine
 - Aztreonam
 - Azathioprine
 - Azithromycin
 - ART
- Example regimen: **ABC/3TC, TDF, DRV/r**
 - How many medications?
 - How many different prescriptions?

Wrong Medication Dose or Frequency

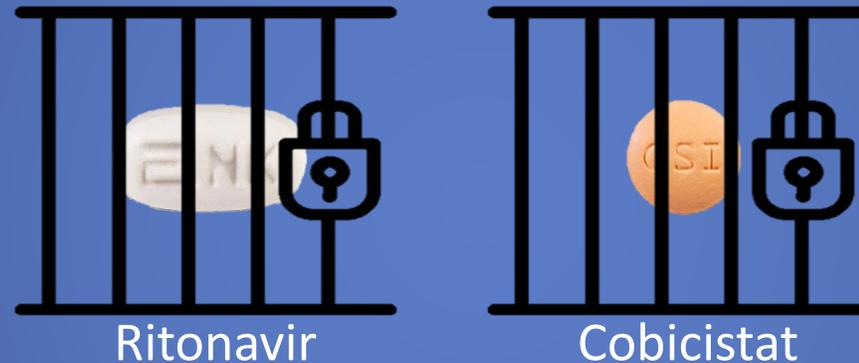
- Medication dosage may need to be changed based on:
 - Patient's kidney function
 - Past medication resistance
 - Pregnancy
 - Patient's weight (pediatric patients)

Missing Medications/Information

- All patients on therapy should have 3 ART
 - Doesn't have to be 3 pills
 - Don't take one without the others
 - Ritonavir & Cobicistat don't count
 - Juluca and Dovato (2 medications) are the only exceptions
- Don't forget to document time of day taken and relation to food
 - Ask the patient!
 - Once daily doesn't always mean 0900

Drug Interactions: Boosters

- Our HIV meds are the culprits:



- The crime: Increasing drug levels of other medications

Boosted Medications: Statins

- Concentrations increased when using in combination with PIs and COBI
 - Avoid: Lovastatin and Simvastatin
 - Can be used with caution: Pravastatin, Atorvastatin, and Rosuvastatin

Boosted Medications: Inhaled/Intranasal Corticosteroids

Avoid unless
benefits
outweigh
risks

- Fluticasone, Budesonide, Flunisolide, Triamcinolone, Mometasone

Best option

- Beclomethasone

Boosted Medications: Benzodiazepines

Contraindicated
with all PIs and
EFV

- Midazolam
- Triazolam

Use with caution
with PIs and
COBI

- Alprazolam
- Diazepam
- Flurazepam

Minimal
interaction

- Lorazepam
- Oxazepam
- Temazepam

Boosted Medications: Antidepressants

Avoid

- Nefazodone
- Fluvoxamine

Start at a low dose and titrate slowly

- TCAs, Fluoxetine, Paroxetine, Duloxetine, Venlafaxine, Bupropion, Mirtazepine, Trazodone

Fewer 3A4 Interactions

- Citalopram
- Escitalopram
- Sertraline

Boosted Medications: PDE-5 Inhibitors

- Not recommended when used for pulmonary hypertension

Medication	Standard Dose	Fold increase in AUC with RTV	Modified Dose
Sildenafil	50mg	11	25mg q48h
Vardenafil	10mg	49	2.5mg q72h
Tadalafil	10mg	2.2	5mg q72h

Drug Interactions: Acid Suppressants

- Our HIV meds are the victims:



Rilpivirine



Atazanavir

- The crime: Decreasing efficacy of the HIV medications

Drug Interaction: Heartburn Medication

- Atazanavir and rilpivirine require stomach acid for absorption

	Atazanavir	Rilpivirine
Proton Pump Inhibitors (ex: Prilosec)	Separate by 12 hours	AVOID
H2 Antagonists (ex: Zantac)	Separate by 10 hours	Cannot be given 12 hours before or 4 hours after RPV
Antacids (ex: TUMS)	Cannot be given 2 hours before or 2 hours after ATV	Cannot be given 2 hour before or 4 hours after RPV

Polyvalent Cations

- Our HIV meds are the victims:



- The crime: Decreasing efficacy of the HIV medications

Drug Interactions: Polyvalent Cations

- Polyvalent cations: Zinc, Iron, Calcium, Aluminum, Magnesium (ZICAM)
- Found in antacids, laxatives, supplements, prenatal vitamins, sucralfate
- Can bind and inactivate raltegravir, elvitegravir, dolutegravir, and bictegravir
- Each medication has unique guidance on how to avoid this interaction

Unique Interactions

- Dolutegravir or Bictegravir + Metformin
 - Increased metformin concentrations due in renal transporter inhibition
 - Cut metformin dose in half
- Protease Inhibitors, Efavirenz or Neviripine + Oral Contraceptives (or methadone)
 - Decreased ethinyl estradiol and norethindrone
 - Requires alternative contraceptive; may induce withdrawal

Use of Two-Drug Regimens

- Dolutegravir/Rilpivirine
 - Can only be used in patients:
 - Who are virologically suppressed on a stable antiretroviral regimen for at least 6 months
 - With no history of treatment failure and
 - With no known resistance to dolutegravir or lamivudine
- Dolutegravir/Lamivudine
 - Should not be used alone in patients with Hepatitis B

Common Errors Made By Patients

- Wrong Administration
- Missed / Late Doses
- Drug Interactions With Over-The-Counter Medications / Herbal Medications

Wrong Administration Time: Food

Change in Total Drug Level Based on Food		
Antiretroviral	With Food	Empty Stomach
Atazanavir		- 70%
Indinavir	- 77%	
Nelfinavir		- 3 fold
Saquinavir		- 6 fold
Tipranavir		- 30%
Darunavir		- 30%
Efavirenz	+ 28% (+79%Cmax)	
Rilpivirine		- 40%

Reyataz [Product Insert]. Princeton, NJ: Bristol-Myer Squibb;2010. Crixivan [Product Insert]. Whitehouse Station, NJ: Merck & Co;2009. Viracept [Product Insert]. La Jolla, CA: Agouron; 2008. Invirase [Product Insert]. Nutley, NJ: Roche Labs;2010. Aptivus [Product Insert]. Ridgefield, CT: Boehringer Ingelheim;2009. Prezista [Product Insert]. Raritan, NJ: Janssen Products;2006. Sustiva [Product Insert]. Princeton, NJ:Bristol-Myer Squibb;2010. Edurant [Product Insert]. Titusville, NJ: Janssen Products;2011

Missed / Late Doses

- Missed doses can cause:
 - Detectable viral loads
 - Increased risk of HIV transmission
 - Development of HIV resistance
- Late doses are better than doses missed entirely
 - In general, follow the “Half Way” rule
 - If you remember and it is less than half way till your next dose, take it
 - Never double up on medications

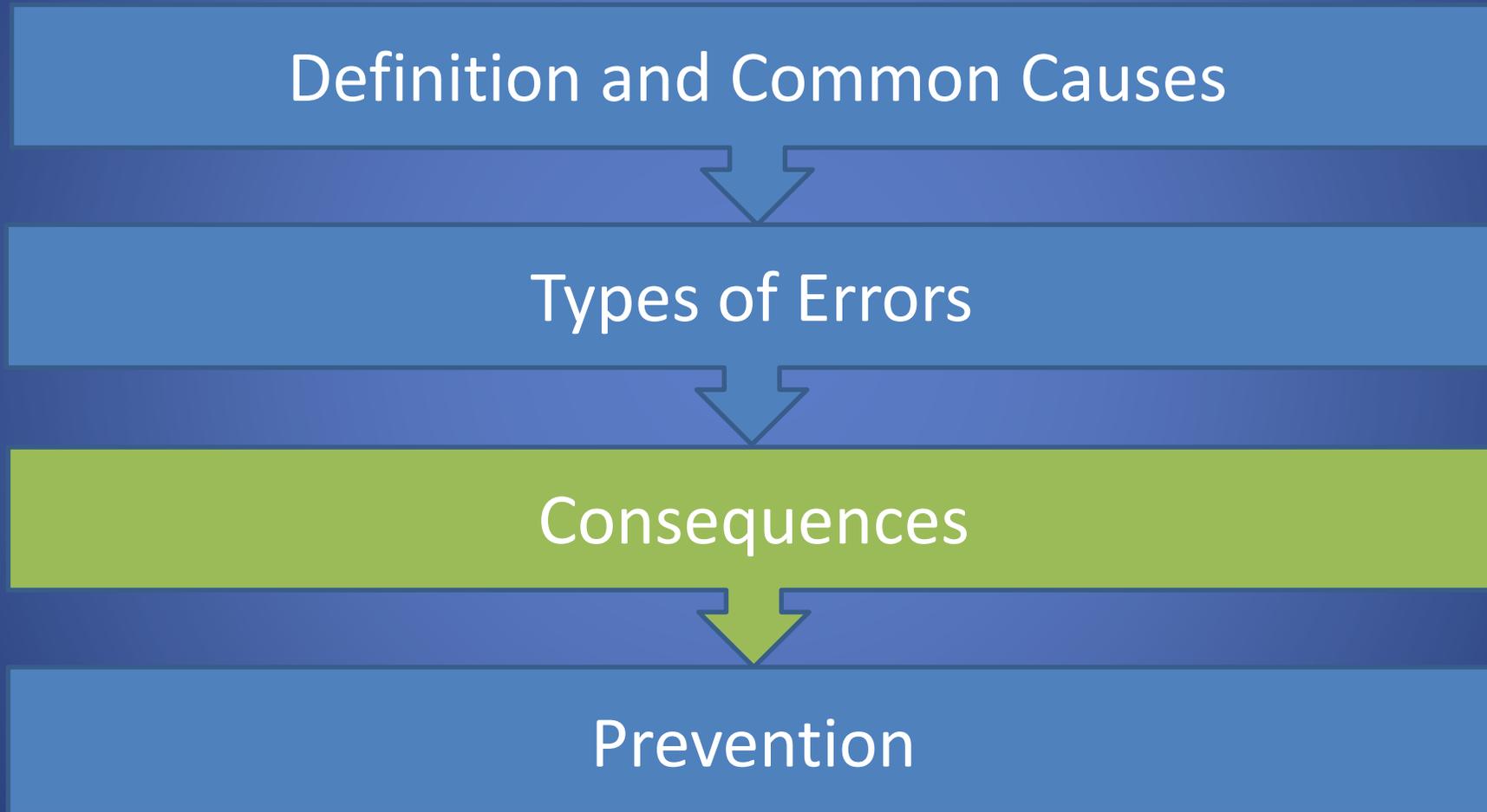
Drug Interactions: Over-The-Counter Medications

- Acid Suppressants
- Inhaled/Intranasal Corticosteroids
- Zinc, Iron, Calcium, Aluminum, Magnesium supplements

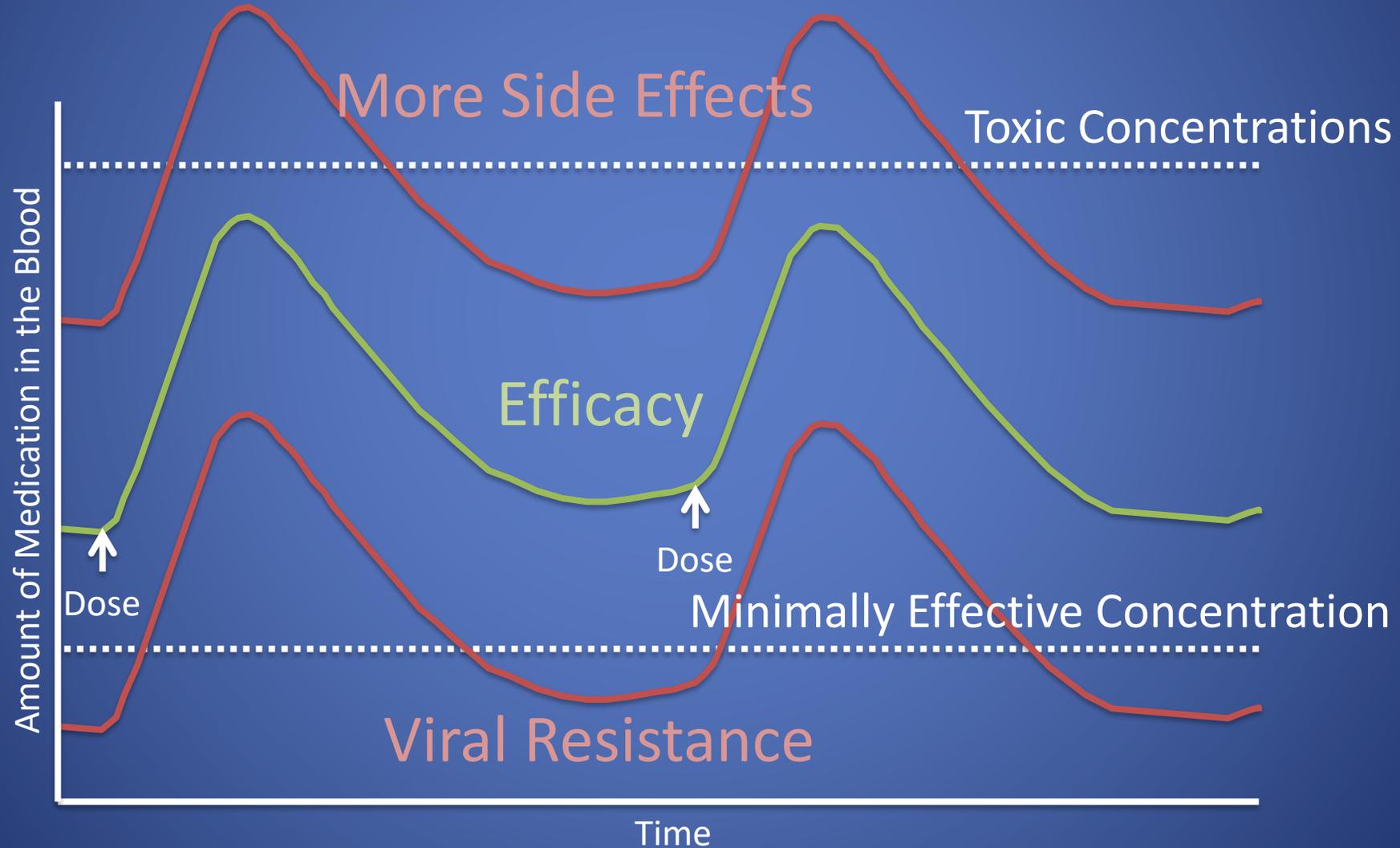
Drug Interactions: Herbal Products

- No information ≠ No interaction
 - Minimal information
 - No studies conducted
- Monitor how each medication is metabolized
 - 3A4 inducers: St. John's wort, ginkgo biloba extract, echinacea

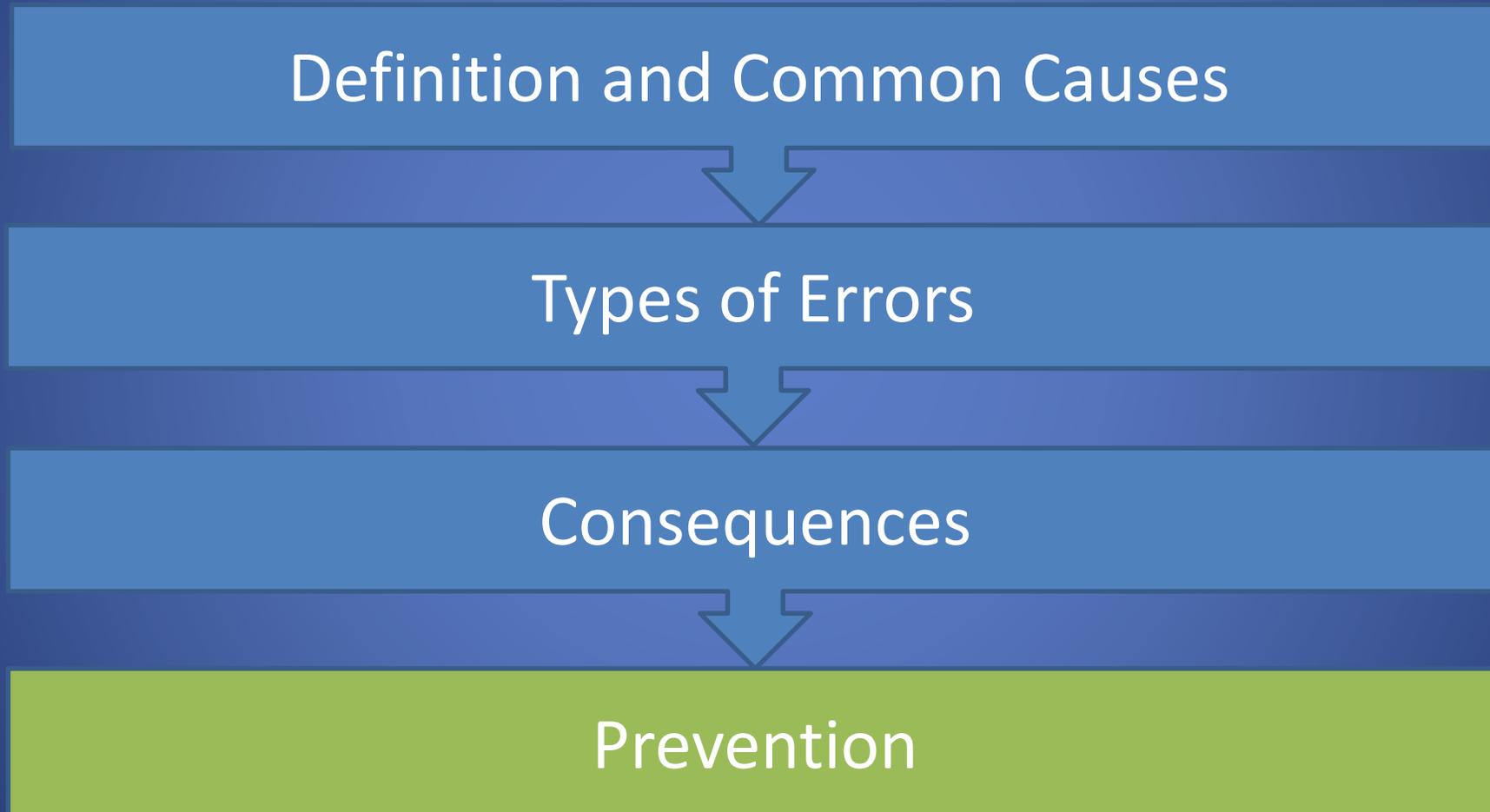
Antiretroviral Therapy (ART) Medication Errors



Consequences of Taking Medication Inappropriately



Antiretroviral Therapy (ART) Medication Errors



Prevention: What Can You Do?

- Educate yourself
- Keep communication open with all members of the patients healthcare team
- Avoid abbreviations
- Pay attention to timing and how medications should be taken
- Ask about new medications / Check for interactions

Prevention: How Can We Empower Clients?

- Education! Education! Education!
 - Goals of therapy
 - Combinations medications
 - Adherence as it relates to resistance
 - Directions (twice daily vs every 12 hours?)
 - Food requirements
 - Common drug interactions
- Encourage patients to always ask questions of ALL healthcare providers

Prevention: How Can We Implement System-Wide Processes?

- Encourage patients to have only 1 pharmacy
- As available, limit barriers to communication between health-systems, medical records, pharmacy, etc.
- Be familiar with, or have cheat sheets available of both brand and generic medication names
- When in doubt, ask the patient!



AETC Resources

- **Clinical Consultation Center**
<http://nccc.ucsf.edu>
 - HIV Management
 - Perinatal HIV
 - HIV PrEP
 - HIV PEP line
 - HCV Management
 - Substance Abuse Management
- **AETC National Curriculum**
<http://aidsetc.org/nhc>
- **AETC National HIV-HCV Curriculum**
<http://aidsetc.org/hivhcv>
- **Hepatitis C Online**
<https://www.hepatitisc.uw.edu>
- **AETC National Coordinating Resource Center**
<http://aidsetc.org>
- **Additional Training for Midwest AIDS Training and Education Center (MATEC)**
<https://matec.info>

Questions?

Email MATEC Michigan at mforsyth@wayne.edu
or call 313 962 2000

