

# Yellow fever

Pharmacist's actions in its  
detection, control and prevention

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Costa Rica



# Biography

- ❑ Pharmacist, University of Costa Rica
- ❑ Master in Pharmaceutical Care, University of Granada, Spain.
- ❑ Works at the University of Costa Rica as:
  - Adjunct Professor, School of Pharmacy.
  - Director, Postgraduate Program of Pharmacy.
  - Investigator, National Drug Information Center (CIMED), Institute of Pharmaceutical Research (INIFAR)



# Objectives

- ❑ Identify the role of community pharmacists in the detection, control and prevention of yellow fever.
- ❑ Recognize good technical and clinical practices of pharmacists in the prevention of the yellow fever through vaccination.

# Contents

- General aspects of yellow fever and its treatment.
  
- Pharmacist's actions in the prevention of yellow fever in community pharmacies:
  - Vaccination
  - Educational campaigns



# Yellow fever

Acute **viral**  
**haemorrhagic**  
c disease

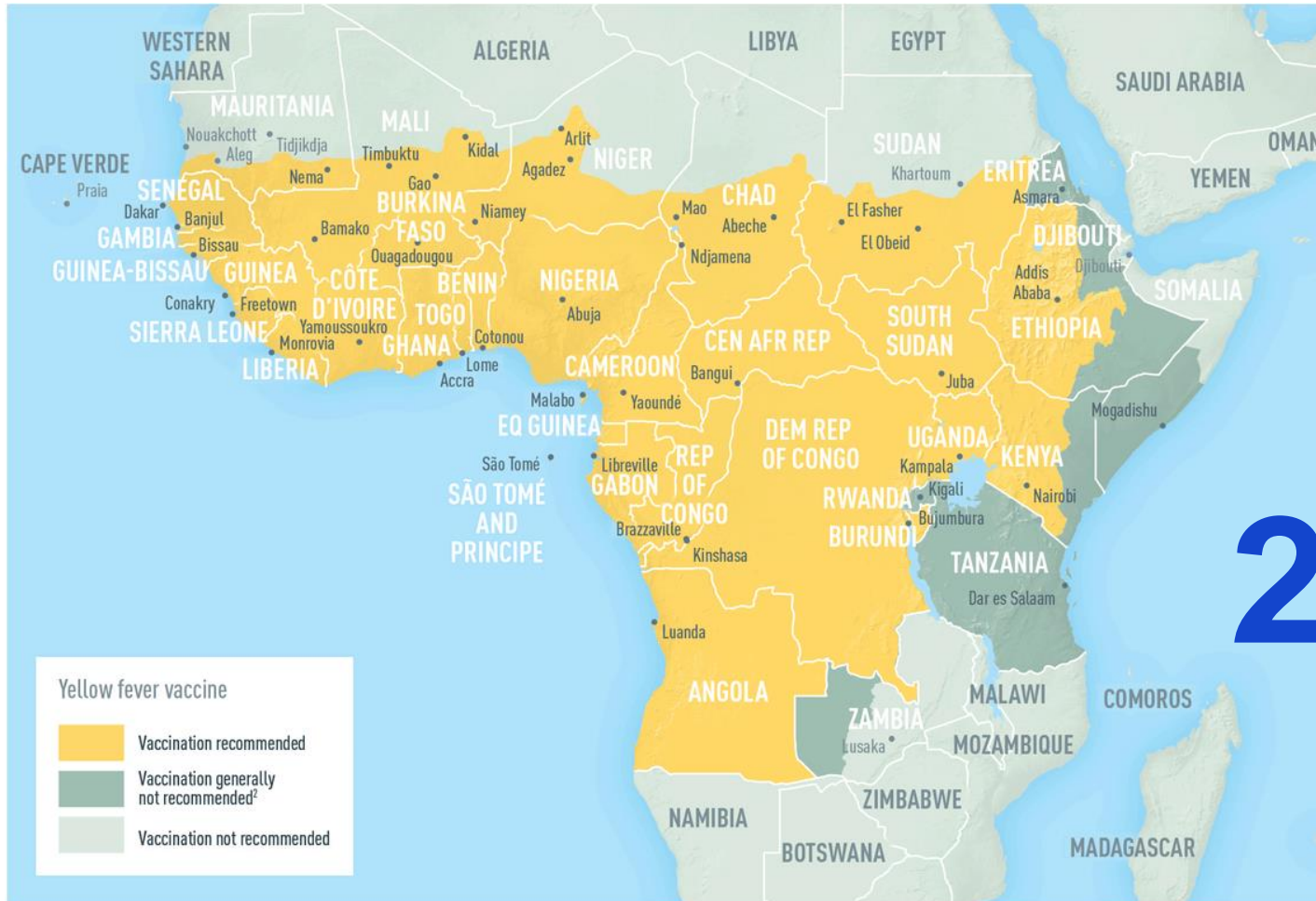
Tropical areas  
of Africa and  
Latin America



Transmitted via the  
bites of mosquitoes

Humans and monkeys

**Devastating outbreaks with the  
risk of international spread**



29

## Yellow fever vaccine recommendations in Africa – January 2017

<https://www.cdc.gov/yellowfever/maps/africa.html>



## 13

## Yellow fever vaccine recommendations in the Americas – May 2018



[https://www.cdc.gov/yellowfever/maps/south\\_america.html](https://www.cdc.gov/yellowfever/maps/south_america.html)



# Yellow fever

- Eliminate Yellow Fever Epidemics (EYE) Strategy 2017-2026
  - Three strategic objectives:
    - Protect at-risk populations
    - Prevent international spread of yellow fever
    - Contain outbreaks rapidly.



# Yellow fever

## □ Eye Strategy

- Five competencies of success:
  - Affordable vaccines and sustained vaccine market
  - Strong political commitment at global, regional and country levels
  - High-level governance with long-term partnerships
  - Synergies with other health programmes and sectors
  - Research and development for better tools and practices.

## □ Emergency stockpile of 6 million doses of yellow fever vaccine

Yellow Fever. WHO.. 2018 (<http://www.who.int/es/news-room/fact-sheets/detail/yellow-fever>)

Yellow fever vaccine: a global partnership. OMS ([http://www.who.int/csr/disease/yellowfev/global\\_partnership/en/](http://www.who.int/csr/disease/yellowfev/global_partnership/en/))



# Pharmacist

- Detection, control and prevention -



**Drug  
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**Pharmaceutica  
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**Health  
education**



**Pharmacovigilan  
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**Administratio  
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**Storage**



**Disposal**



**Health team**



# Yellow fever

Transmission

Diagnostic

Symptoms

Treatment



# Yellow fever

Transmission

Diagnostic

Symptoms

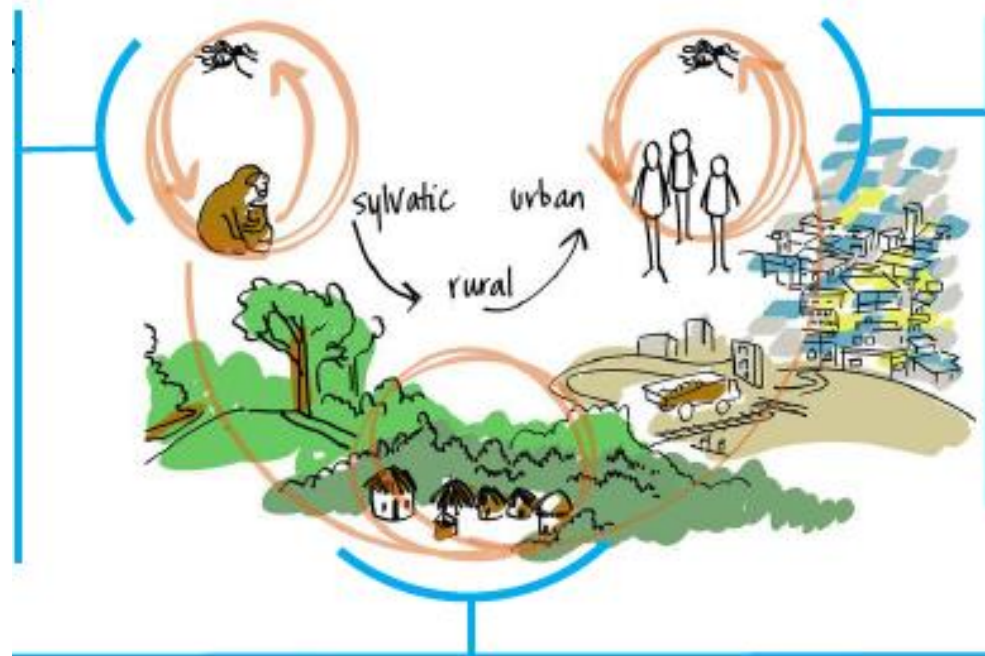
Treatment



# Transmission

## Jungle YF

- Haemagogus (Am.) and Aedes (Afr.)
- Occasionally humans infected



## Urban YF

- *Aedes aegypti*
- Human-human
- Risk of large outbreaks

Intermediate YF  
Aedes  
Small-scale epidemics

Introduction to yellow fever disease – Managing infectious hazards. WHO. 2017

# Transmission

- Pharmacist's actions -



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# Yellow fever

Transmission

Diagnostic

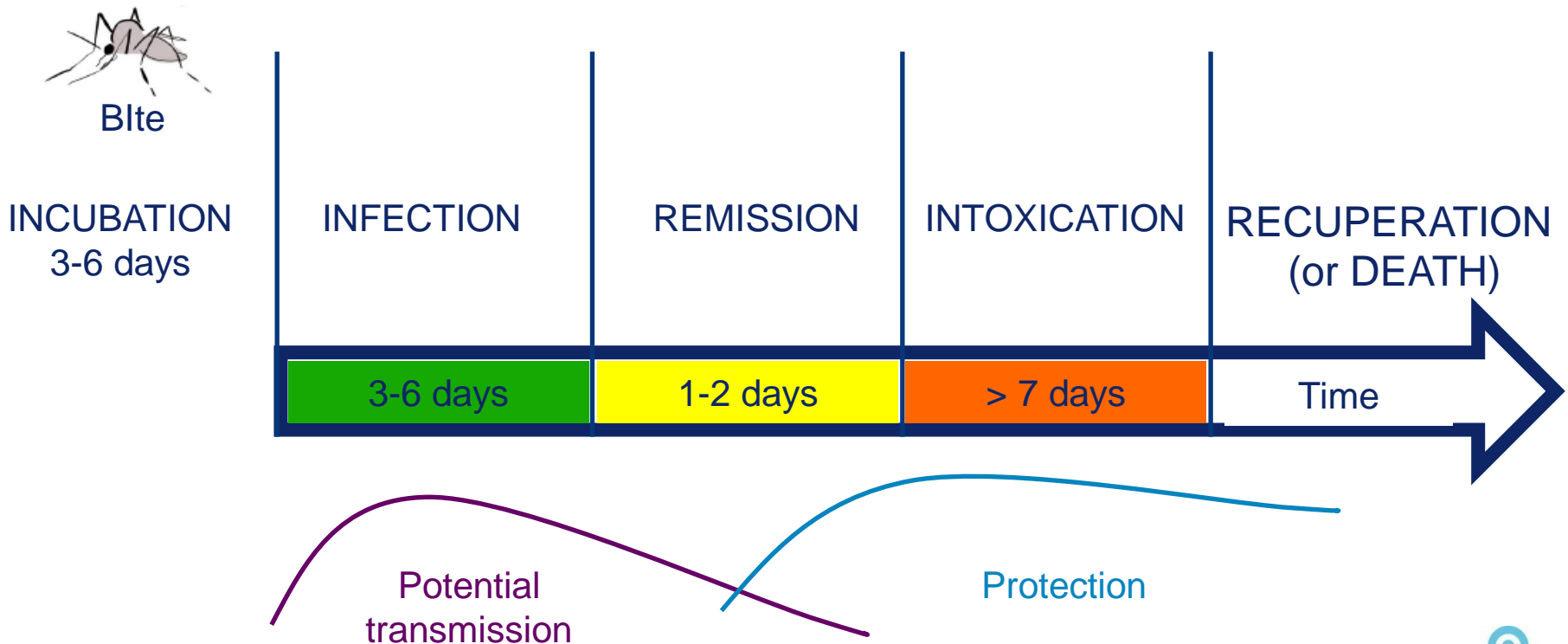
Symptoms

Treatment



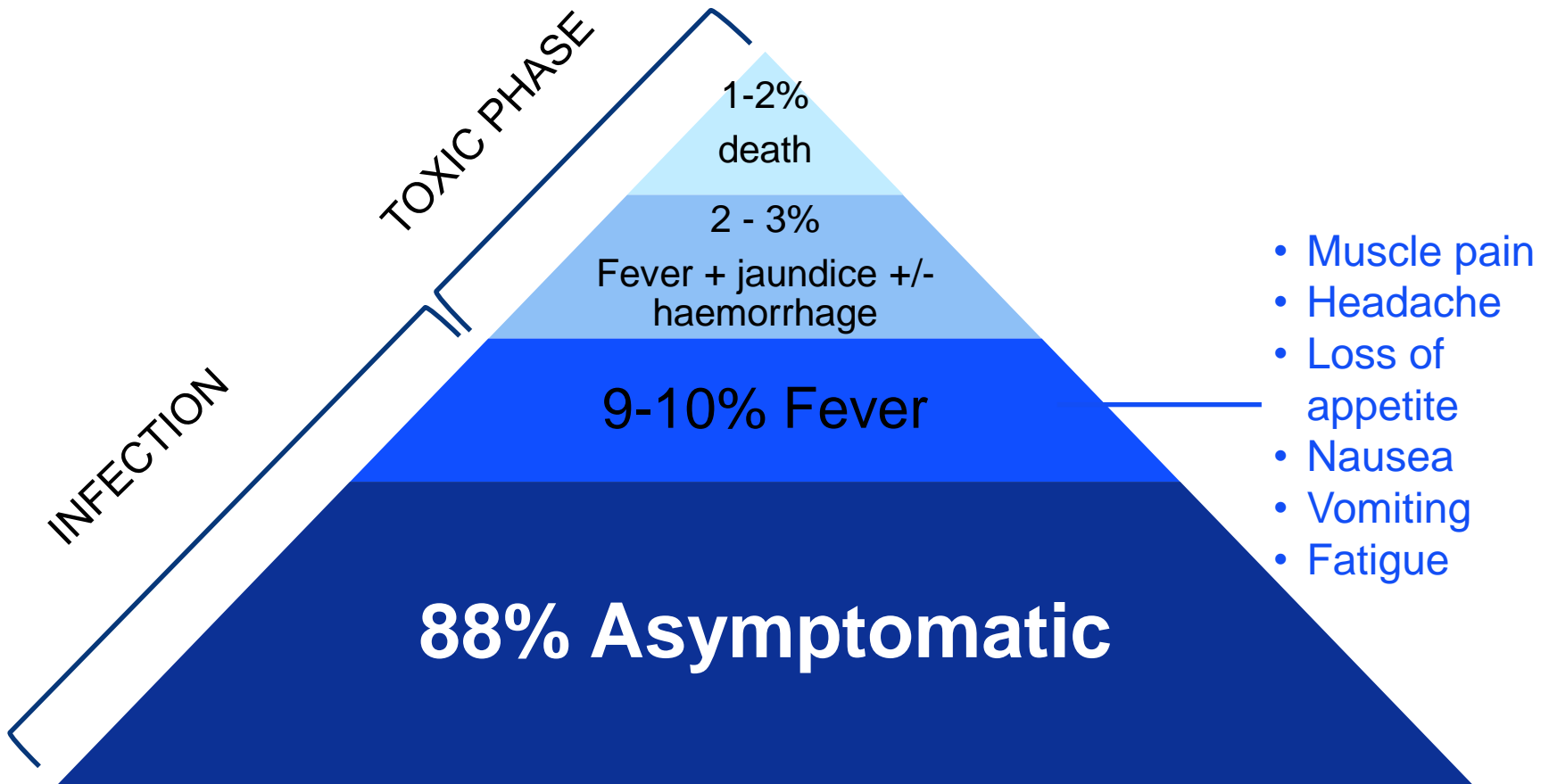
# Clinical evolution

- 3 phases:





# Signs and symptoms



# Signs and symptoms

- Pharmacist's actions -



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**Pharmaceutical advice**



**Dispensation**



**Health education**



**Health team**



# Yellow fever

Transmission

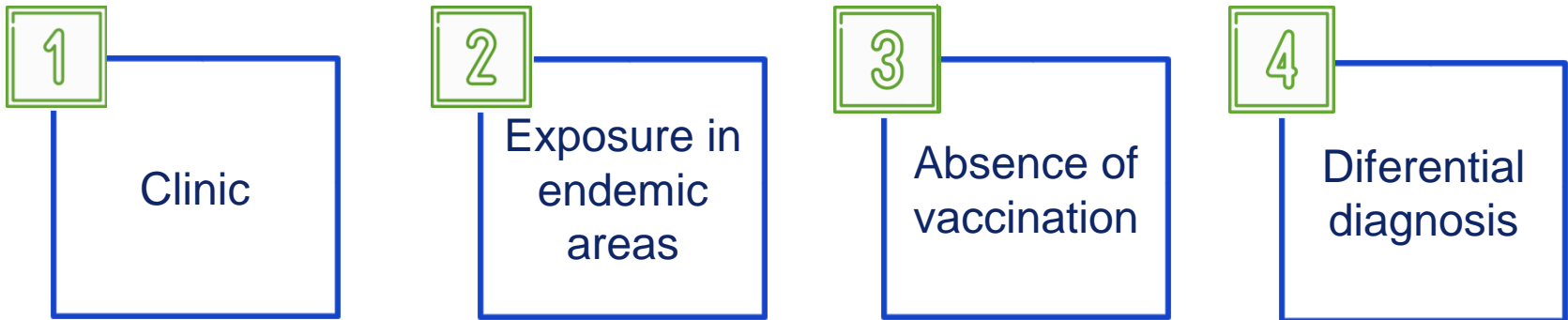
Diagnostic

Symptoms

Treatment



# Diagnosis



# Diagnosis

## □ Laboratory

- Early stages: Polymerase chain reaction (PCR)
- Later stages: ELISA or Sero-neutralization (PRNT)
- Cross-reactions with other flaviviruses.
- No distinction between infection- and vaccine-acquired antibodies.

# Diagnosis

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# Yellow fever

Transmission

Diagnostic

Symptoms

Treatment



# Treatment

- ❑ No specific anti-viral drug
- ❑ Good and early supportive treatment in hospitals improves survival rates



Dehydration



Liver and kidney failure



Fever



Nets



NSAID



# Treatment

- Pharmacist's actions -



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# Prevention



**Vaccination**



**Vector control**

# Vaccination

- ❑ Vaccine available since late 1930s
- ❑ **International Health Regulation**
  - Travelers must prove to be vaccinated to allow them to enter.
  - 2014 – World Health Assembly (of WHO) adopted recommendation
    - **One dose is valid for lifetime**
  - 2016 – Becomes effective

# Vaccination

## □ International Certificate of Vaccination or Prophylaxis (ICVP)

- Protection: 10 years → «life of person vaccinated»
- Do travellers need to obtain new IHR certificates of vaccination against yellow fever?
- Do existing certificates of vaccination need to be changed or modified to show they are valid for life?
- Does this amendment affect what measures States Parties can implement for the protection of their own populations or what doctors may advise their patients concerning vaccination?

Vaccine or prophylaxis	Date	Signature and professional status of supervising clinician	Manufacturer and batch No. of vaccine or prophylaxis	Certificate valid from ..... until .....	Official stamp of administering centre
1.					



# Vaccine

- ❑ Live-attenuated virus
  - 17D strain
  - Grown in embryonated chicken eggs
- ❑ 2-8 ° C
  - Protect from light
  - Do not freeze
- ❑ Heat inactivation or incineration
- ❑ Sanofi Pasteur (USA, France), Bio Manguinhos (Brazil), Institut Pasteur (Dakar-Senegal) y Celltech Group Plc (United Kingdom).



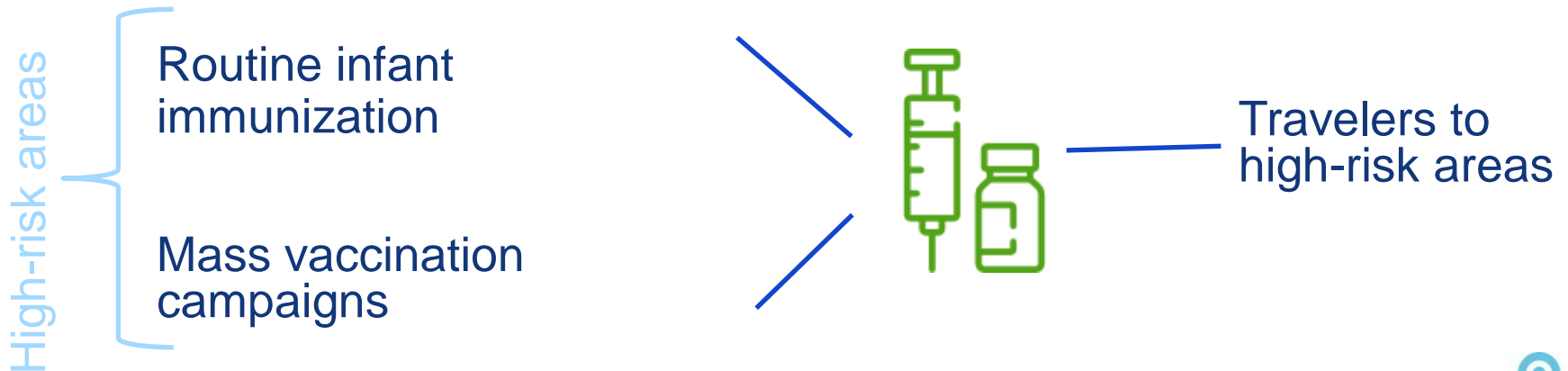
# Vaccine

- ❑ Vaccine protection > 95%
- ❑ 10 days before traveler visits an area with risk
- ❑ Reactogenicity or immune response similar among vaccines



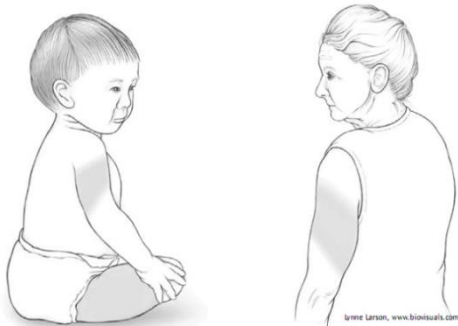
# Vaccine: indications

- ❑ > 9 months
- ❑ Not recommended by WHO in some cases
- ❑ Take into account: risk of being infected, country entry requirements, individual risk factors (e.g. age, immune status)



# Vaccine: administration

- ❑ Single dose (0,5 mL)
- ❑ SC administration: > 12 months arm, < 12 meses thigh
- ❑ Reconstituted – use immediately (1 hour)
- ❑ “Fractional doses” in case of emergency



The Pink Book: Epi and Prev of VPD, 13th Edition. 2015





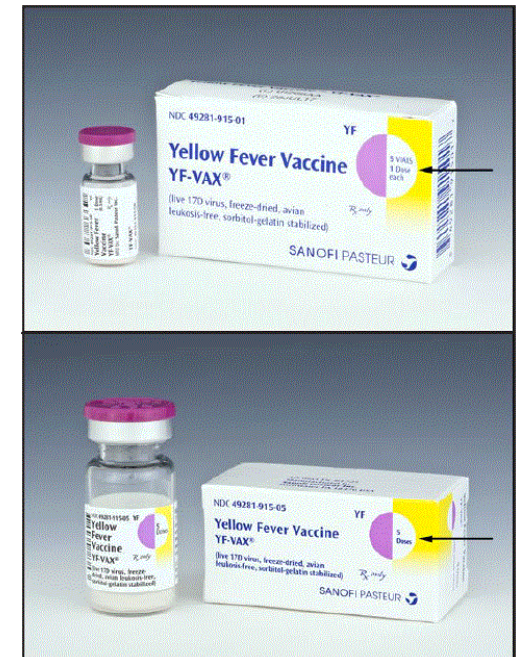
# Vaccine: administration

## □ Additional doses:

- Women who were **pregnant** when they received their initial dose
- People who received a **hematopoietic stem cell transplant** after receiving a dose
- People who were infected with **HIV** when they received their last dose of yellow fever vaccine
- People who stays at a high-risk area for **long periods of time**

# Vaccine: security

- ❑ 10-30% mild adverse reactions:
  - Fever
  - Headache
  - Myalgia
  
- ❑ Vaccination error
  
- ❑ Report Events Supposedly Attributable to Vaccines and Immunization (**ESAVI**)



# Vaccine: security

## ❑ Severe reactions

Hypersensitivity

YF Vaccine–  
Associated  
Neurologic  
Disease  
(YEL-AND)

YF Vaccine–  
Associated  
Viscerotropic  
Disease  
(YEL-AVD)

# Vaccine: contraindications

- Infants  $\leq$  9 months
- Pregnant women
- People with severe allergies to egg
- People with severe immunodeficiency due to symptomatic HIV/AIDS or other causes, or who have a thymus disorder.

# Vaccine: contraindications

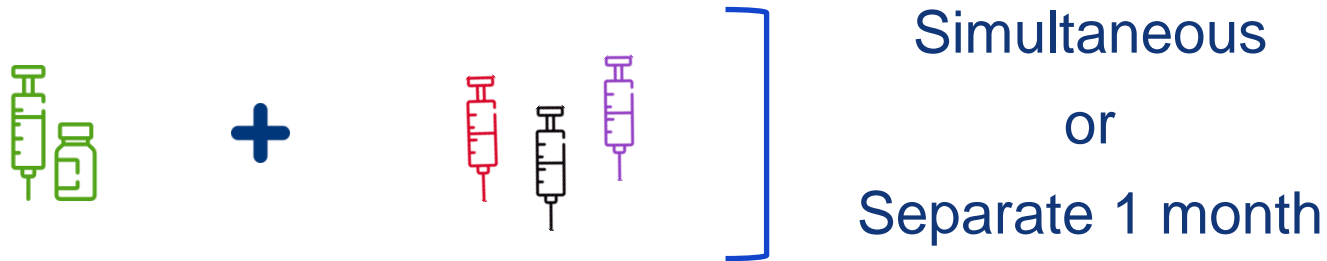
- Family members of people with altered immune status
  
- Medical Waivers for traveler who require an ICVP\*

# Vaccine: precautions

- Infants aged 6-8 months\*
- Adults aged  $\geq 60$  years\*
- Asymptomatic HIV infection with moderately decreased CD4+ counts\*
- Pregnancy\*
- Breastfeeding

# Vaccine

- Simultaneous administration of other vaccines



# Vaccination

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# Vector control

- Pharmacist's actions -



**Air  
conditioned**



**Nets**



**Repellent**



**Appropriate  
clothes**



**Eliminar  
criaderos**



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# Travel health

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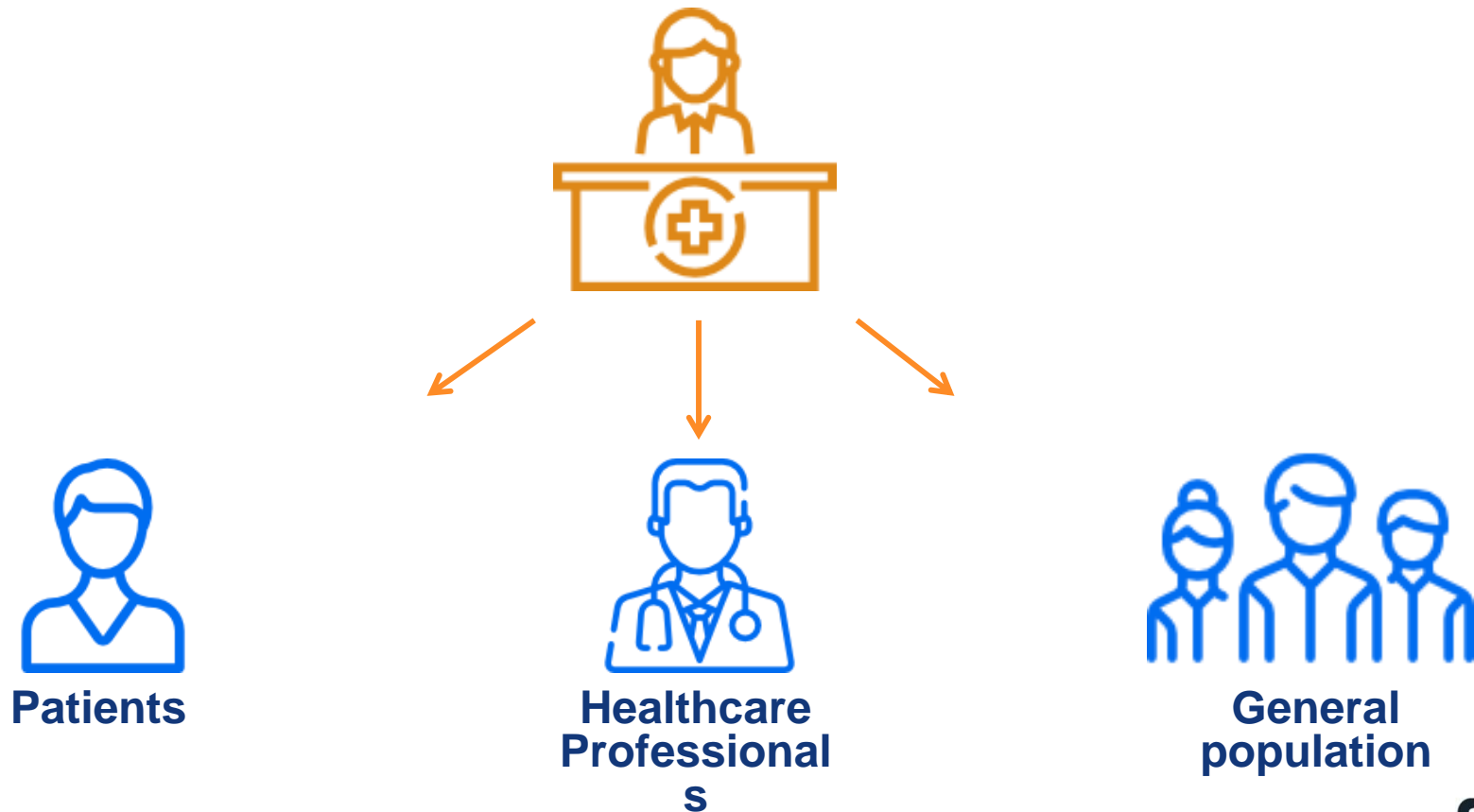
**Disposal**

Pharmacists' scope of practice in travel health: A review of state laws and regulations. JAPhA. 58 (2018).  
Multidisciplinary Approach in Travel Medicine: The Pharmacist Perspective, Journal of Travel Medicine. 18 (2011).



# Yellow fever

- Pharmacist's actions -



# Thank you

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