Arboviral Investigation Training

with special focus on dengue investigation

“How-to” May 16th, 2023

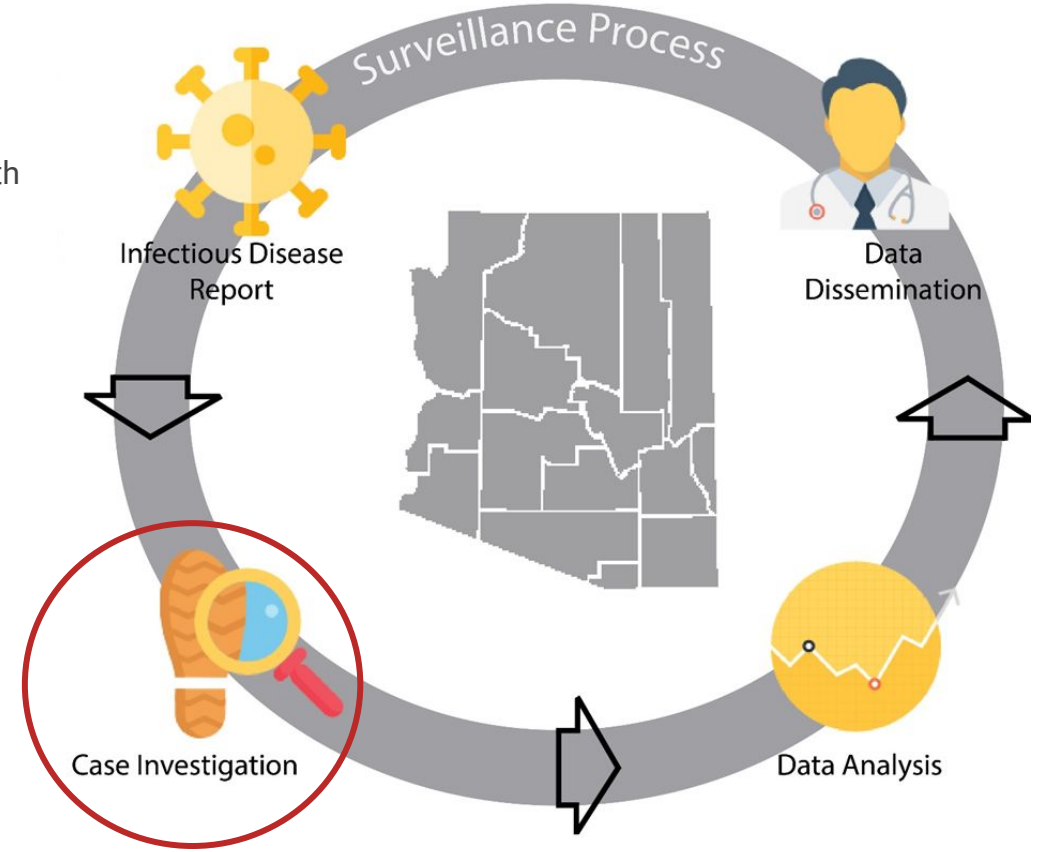
VBZD Team

What we'll cover

- Steps in a case investigation
- Required formats (DSO and/or Report Form)
- Dengue Clinical Signs and Symptoms
- Dengue testing and case classification
- Education
- Mosquito surveillance for dengue
- WNV/SLE investigation refresher

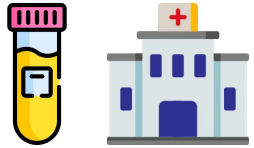
Case Investigation

- Case investigation is one step in the public health **surveillance** process.
- It relies on appropriate reporting.
- It is essential to accurately **classify and count cases.**
- It is used to provide **education** on disease prevention through case interview.
- Proper and timely case classification helps to **identify disease outbreaks and trends**.



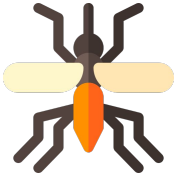
Overview of Case Investigation Steps

1. **Confirm the diagnosis**:
   - Start from the **lab report** in MEDSIS-
     - Does it meet lab criteria for the case definition for that morbidity?
     - Is additional testing recommended?
   - Obtain **medical records** to find out **symptoms** and **onset date**



2. **Conduct case interview** to:
   - Obtain/confirm onset date and symptoms
   - Use the questions in the **DSO** to obtain additional information not available from the medical records (ex.possible place of exposure, travel and vaccination history)
   - Provide education on disease prevention

3. **Initiate control measures**:
   - Communicate with the local vector control agency information on case residence or probable exposure location



Reporting to ADHS (enter the case in MEDSIS) and conducting an investigation is part of the Arizona Administrative Code (A.A.C).

Local Health Agency Reporting Requirements

Table found here.

For **dengue**

1. 'notify the dept' (= entry in MEDSIS) within **1 working day** and
2. Submit an epidemiological investigation within **30 calendar days**

For arboviral (**chik** or other but not dengue) and **WNV/SLE** infections

1. 'notify the dept' (= entry in MEDSIS) within **5 working days** and
2. Submit an epidemiological investigation within **30 calendar days**

☎➔ Amebiasis	➔ Influenza-associated mortality in a child	➔ Syphilis
➔ Anaplasmosis	①➔ Legionellosis (Legionnaires' disease)	➔ Taeniasis
☎➔✱ Anthrax	①➔ Leptospirosis	➔ Tetanus
➔ Arboviral infectio	①➔✱ Listeriosis	➔ Toxic shock syndrome
➔ Babesiosis	➔ Lyme disease	①➔ Trichinosis
➔ Basidiobolomyco	①➔ Lymphocytic choriomeningitis	①➔✱ Tuberculosis, active disease
☎➔✱ Botulism	➔ Malaria	①➔ Tuberculosis latent infection in a child five y screening test result)
➔✱ Brucellosis	☎➔✱ Measles (rubeola)	
➔ Campylobacterio	①➔✱ Melioidosis	☎➔✱ Tularemia
➔ Chagas infection and related disease (American Trypanosomiasis)	☎➔✱ Meningococcal invasive disease	①➔ Typhoid fever
➔ Chancroid (*Haemophilus ducreyi*)	①➔✱ Mumps	①➔ Typhus fever
➔ Chikungunya	☎➔ Novel coronavirus (e.g., SARS or MERS)	①➔ Vaccinia-related adverse event
➔ *Chlamydia trachomatis* infection	①➔ Pertussis (whooping cough)	①➔✱ Vancomycin-resistant or Vancomycin-intermediate *Staphylococcus aureus*
①➔ Cholera	☎➔✱ Plague	➔[1] Varicella (chickenpox)
➔ Coccidioidomycosis (Valley Fever)	☎➔✱ Poliomyelitis (paralytic or non-paralytic)	①➔ *Vibrio* infection
➔ Colorado tick fever	➔ Psittacosis (ornithosis)	☎➔✱ Viral hemorrhagic fever
➔ Creutzfeldt-Jakob disease	①➔ Q Fever	➔ West Nile virus infection
➔ Cryptosporidiosis	☎➔✱ Rabies in a human	☎➔✱ Yellow fever
➔ *Cyclospora* infection	①➔ Relapsing fever (borreliosis)	①➔✱ Yersiniosis (enteropathogenic *Yersinia*)
➔ Cysticercosis		①➔✱ Zika virus infection
①➔ Dengue		
☎➔ Diphtheria		
➔ Ehrlichiosis		
☎➔ Emerging or exotic disease		
☎➔ Encephalitis, parasitic		
①➔ Encephalitis, viral		
①➔ *Escherichia coli*, Shiga toxin-producing		
➔ Giardiasis		
①➔✱ Glanders		

Key:

☎ **Notify the Department** within 24 hours after receiving a report under R9-6-202 or R9-6-203.

① **Notify the Department** within one working day after receiving a report under R9-6-202 or R9-6-203.

➔ **Notify the Department** within five working days after receiving a report under R9-6-202 or R9-6-203.

➔ **Submit an epidemiologic investigation report** within 30 calendar days after receiving a report under R9-6-202 or R9-6-203 or notification by the Department.

1 Submit an epidemiologic investigation report only if a case or suspect case has died as a result of the communicable disease.

✱ **Ensure that an isolate** of the organism for each positive culture, if available, or a specimen for each positive test result is submitted to the Arizona State Laboratory within one working day.

http://azdhs.gov/localhealthreporting

A.A.C. R9-6-206
Effective 01/01/2018

Department-provided Formats for submitting Epidemiologic Investigation Reports

MORBIDITY	Required by rule?	How should an epi investigation be submitted by LHD?	For the DSO:	Comments	Travel info in MEDSIS should be entered i
Dengue	Y	Fill out DSO	Complete the full DSO		DSO and Travel table
St. Louis encephalitis virus	Y	Fill out DSO	Complete the full DSO		DSO and Travel table
West Nile virus	Y	Fill out DSO	Complete the full DSO		DSO and Travel table
Zika	Y	Fill out DSO	Complete the full DSO		DSO and Travel table

For dengue, WNV/SLE, Zika filling out the **DSO** in MEDSIS is required (additional forms not needed).

Department-provided Formats for submitting Epidemiologic Investigation Reports

MORBIDITY	Required by rule?	How should an epi investigation be submitted by LHD?	For the DSO:	Comments	Travel info in MEDSIS should be entered i
Brucellosis	Y	Fill out DSO AND attach investigation form in MEDSIS	Complete the full DSO		DSO and Travel table
Hantavirus infection	Y	Fill out DSO AND attach investigation form in MEDSIS	Complete the full DSO		DSO and Travel table
Malaria	Y	Fill out DSO AND attach investigation form in MEDSIS	Fill out Species in DSO		Travel table
Plague	Y	Fill out DSO AND attach investigation form in MEDSIS	Complete the full DSO		DSO and Travel table
Q fever	Y	Fill out DSO AND attach investigation form in MEDSIS	Complete the full DSO		DSO and Travel table
Tularemia	Y	Attach investigation form in MEDSIS			Travel table
Typhus Fever	Y	Fill out DSO AND attach investigation form in MEDSIS	Complete the full DSO		DSO and Travel table

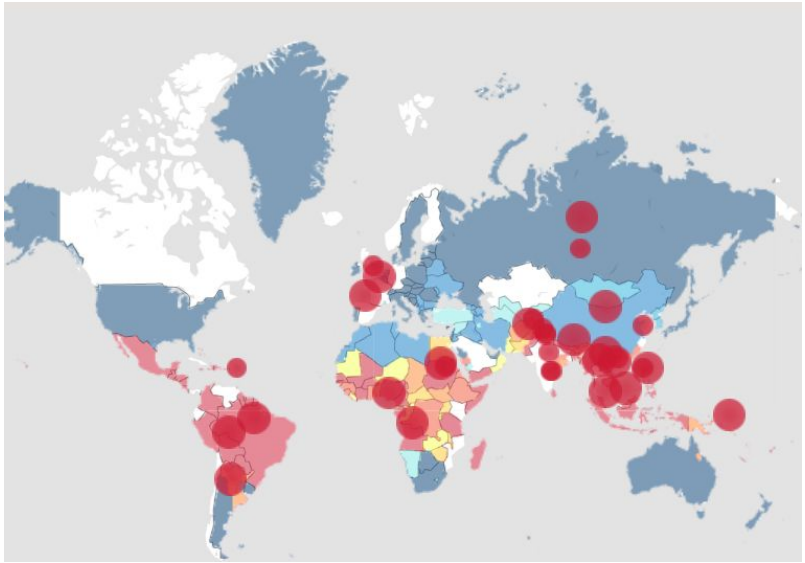
For other vector morbidities:

- Fill out the **Investigation Form AND the DSO** (full or partial).
- The Investigation Forms can be found here.

Dengue Background

Background

- Dengue aka “breakbone fever”
- Estimated 400 million infections annually
  - 100 million symptomatic
  - 21,000 deaths
- Southeast Asia represents the majority of the global disease burden
- Not endemic in the U.S. (yet) but it is in Mexico
- Transmitted by *Aedes aegypti* mosquito, which are present in AZ
- 2022: First locally-acquired cases in AZ



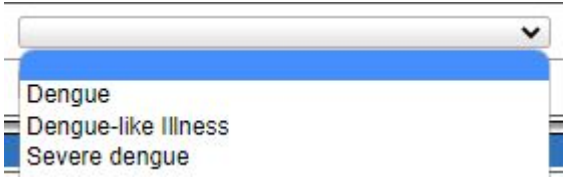
Dengue Clinical Signs and Symptoms

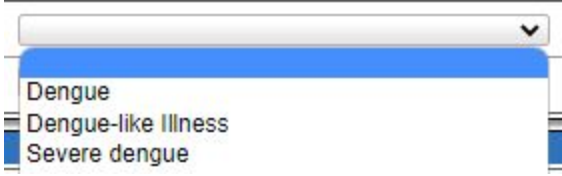
Dengue

- ~75% asymptomatic
- Incubation period: 3-10 days
- 4 serotypes: DENV I-IV
  - Life-long immunity against the same serological strain
  - Subsequent infection with a different serotype has increased risk of hemorrhagic manifestations

- Vaccine available
  - But only for children aged 9–16 years with previous infection and living in endemic countries
- Treatment is supportive
  - No cure

DSO — Clinical Presentation

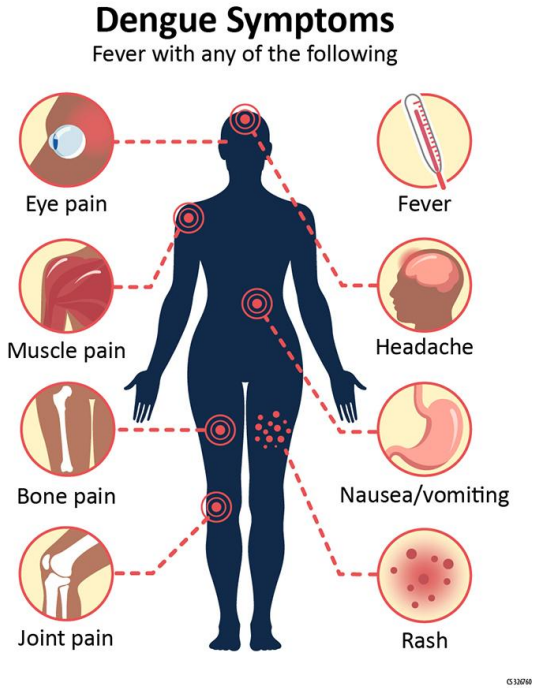




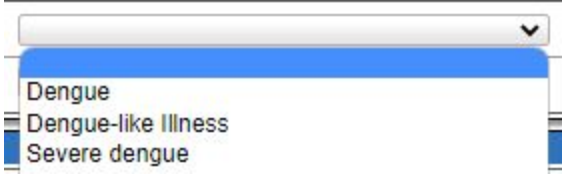
Mild Dengue

Usually lasts 2–7 days

- **Dengue-like illness**: Fever only
- **Dengue**: Fever and one or more of the following:
  - Nausea/vomiting
  - Rash
  - Aches and pains
  - Tourniquet test positive
  - Leukopenia
  - Any warning sign for severe dengue:
    - Abdominal pain or tenderness
    - Persistent vomiting
    - Extravascular fluid accumulation
    - Mucosal bleeding at any site
    - Liver enlargement >2 centimeters
    - Increasing hematocrit concurrent with rapid decrease in platelet count



Severe Dengue

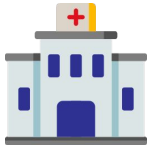


- ~5% of symptomatic cases will result in severe dengue
- Severe dengue can result in shock, internal bleeding, and even death.
- Severe symptoms often come after the fever has subsided
- One of more of the following:
  - Hemorrhagic manifestations
    - blood in vomit or stool
    - bleeding gums or nose
  - Plasma leakage evidenced by shock and/or extravascular fluid accumulation
  - Severe organ involvement
    - Elevated liver enzymes
    - Impaired level of consciousness and/or diagnosis of:
      - encephalitis, encephalopathy, or meningitis
    - Inflammation of the heart, pancreas, or gallbladder

Dengue Investigation

Dengue Case Investigation Steps

1. **Confirm the diagnosis**:
   - Start from the **lab report** in MEDSIS-
     - Does it meet lab criteria for the case definition for dengue?
     - Is additional testing recommended?



Dengue Confirmatory testing:

- RT-PCR
- NS1 antigen
- IHC (tissue)
- Virus isolation
- 4-fold or greater rise in IgM in acute (< 5 days from onset) and convalescent sample (> 5 days from onset)
- Single IgM but negative IgM or PRNT for other flaviviruses

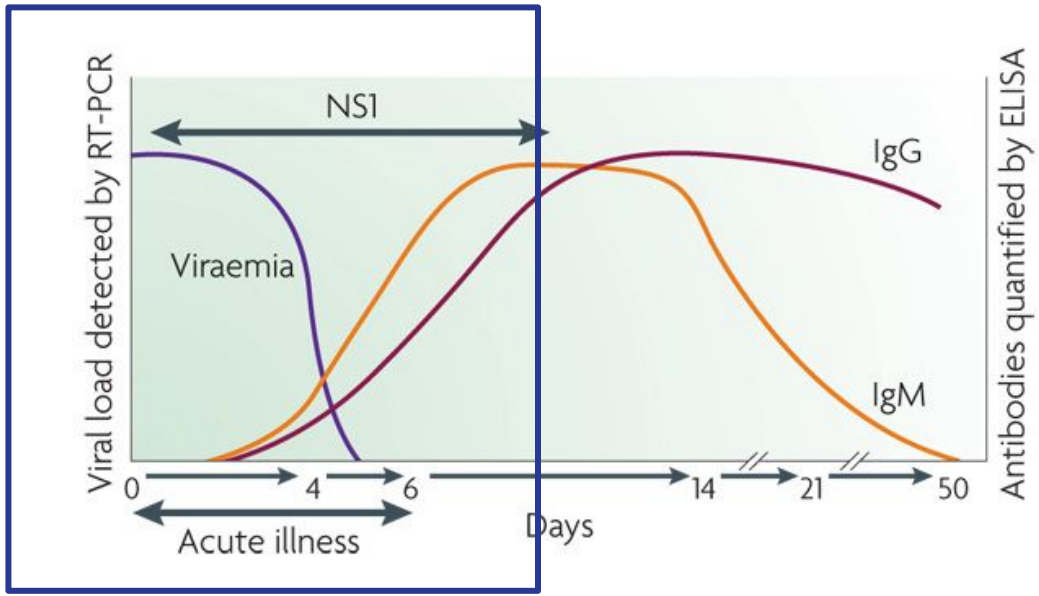
Dengue Supportive testing:

- Single IgM

https://www.cdc.gov/dengue/healthcare-providers/testing/testing-guidance.html

Acute Phase: Initial 1-7 days after symptom onset

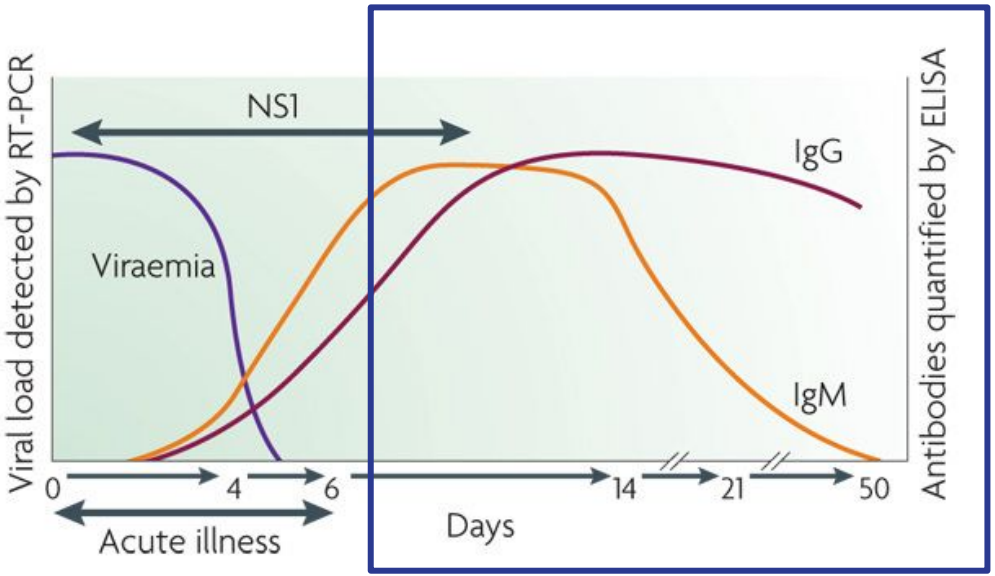
- Dengue virus RNA can be detected by **RT-PCR**.
- The non-structural protein **NS1** is a dengue virus protein that also can be detected.
- If **RT-PCR or NS1 antigen** are **positive** then the case is CONFIRMED (no cross reaction with other viruses)
- If negative by RT-PCR or NS1 antigen, but symptomatic, then test for **IgM antibody**.
- If IgM is negative or equivocal and symptomatic, test by RT-PCR or NS1 (the State Lab can test).



https://www.cdc.gov/dengue/healthcare-providers/testing/testing-guidance.html

Convalescent Phase: >7 days after symptom onset

- **IgM antibody** should be present between ~ 5-7 days and + 90 days
- A clinically compatible case with a single IgM positive and no other tests is a PROBABLE case, this is because dengue IgM test can **cross-react** with other flaviviruses (WNV, SLE, Zika) or can be positive due to **recent vaccination** (Yellow Fever or Japanese Encephalitis vaccine)
- If plaque reduction neutralization test (**PRNT**) against other flaviviruses is done, then it might CONFIRM the infection.

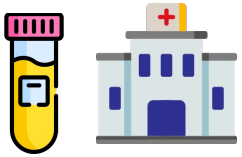


Dengue Case Investigation Steps
- Check the test/s performed

If negative results are reported, find date of onset and ensure that the correct testing was used in relation to the sample collection date.

- If **<7 days** from symptoms onset, Polymerase chain reaction (**PCR**) or **NS1** Antigen test **and IgM**
- If **≥7 days** from symptoms onset, DENV-specific **IgM** only

If the correct test was not done, then consider retesting.

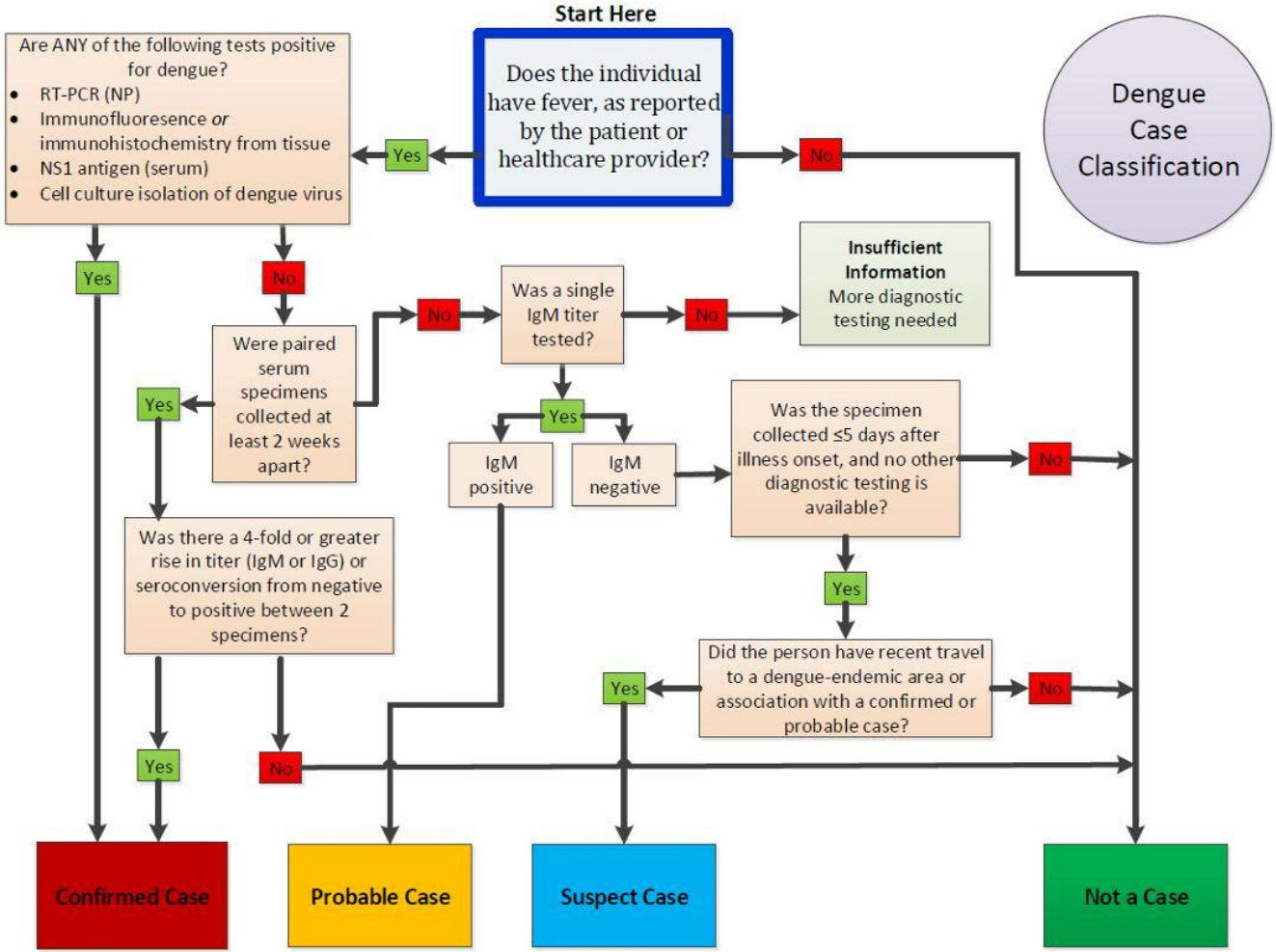


SUSPECT Case Classification:

No testing available but clinically compatible and epi-linked

Epidemiologic Linkage

- Travel to a dengue endemic country or presence at location with ongoing outbreak within previous two weeks of dengue-like illness, OR
- Association in time and place (e.g., household member, family member, classmate, or neighbor) with a confirmed or probable dengue case.



Case Classification Algorithm, available in our Arboviral Handbook:

https://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/mosquito-borne/arboviral-handbook.pdf

Criteria to Distinguish a New Case from an Existing Case

A case should be counted as SAME case if laboratory results were reported within 6 months of a previously reported infection *(assuming serotype is not known and due to the persistence of IgM anti-DENV for ~ 3 months)*.

Infection with one of the four dengue viruses will induce long-lived immunity for that specific virus.

A person with two clinical episodes of dengue occurring at least two weeks apart and shown to be due to different infecting DENV-types confirmed by molecular diagnostic testing should be classified as two different cases.

Overview of Case Investigation Steps

1. **Confirm the diagnosis**:
   - Start from the **lab report** in MEDSIS-
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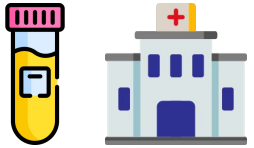
   - Obtain **medical records** to find out **symptoms** and **onset date**



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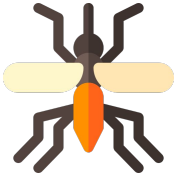
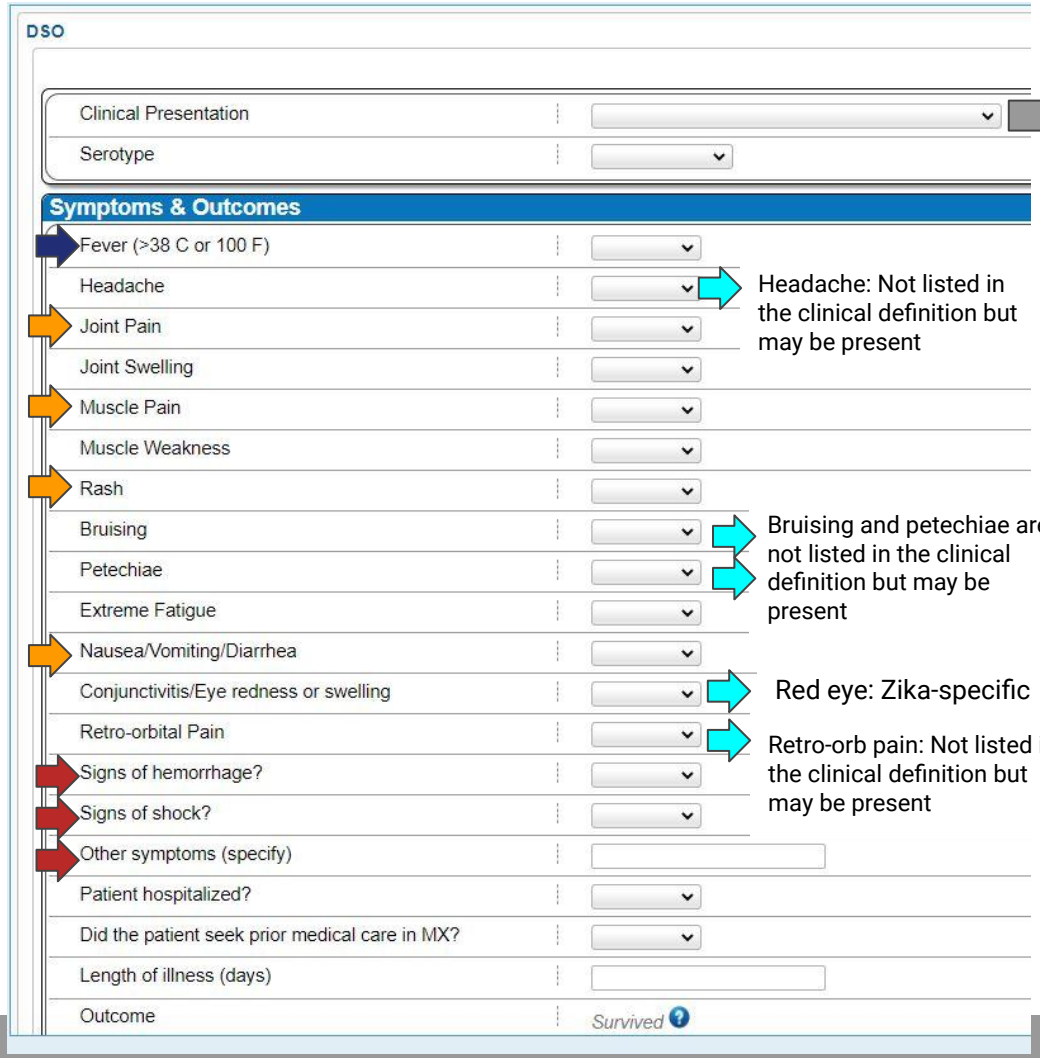
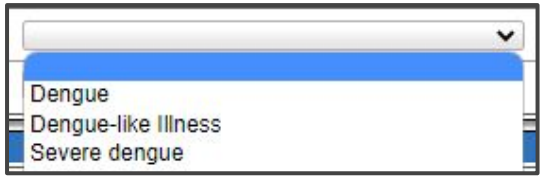
   - Use the questions in the **DSO** to obtain additional information not available from the medical records (ex.possible place of exposure, travel and vaccination history)
   - Provide education on disease prevention

3. **Initiate control measures**:
   - Communicate with the local vector control agency information on case residence or probable exposure location



DSO





Headache: Not listed in the clinical definition but may be present

Bruising and petechiae are not listed in the clinical definition but may be present

Red eye: Zika-specific

Retro-orb pain: Not listed in the clinical definition but may be present

Serotype obtainable with:
- RT-PCR
- PRNT

Fever only= Dengue-like illness

Fever + 1 or more = Dengue

Severe bleeding/shock or severe organ involvement = Severe Dengue

Medical History

- Diabetes?
- History of heart disease or cardiac event?
- Chronic Hypertension?
- Guillain-Barre syndrome not known to be associated with another diagnosed etiology?
- Other past medical history (including chronic or immunosuppressive conditions)?
- History of Mosquito-borne Illness (Dengue, Zika, Yellow Fever, Japanese encephalitis, WNV, SLE, Flavivirus)?

A person with diabetes has weak immunity, fragile blood vessels and a higher risk of haemorrhage thus symptoms of dengue tend to worsen in diabetics.

GBS is a complication of arboviral infections.

Recent infection with other flaviviruses may raise cross-reactive serum antibodies.

Vaccination History

- Yellow Fever
- Japanese Encephalitis
- Tick-borne Encephalitis

Recent vaccination with other flaviviruses may raise cross-reactive serum antibodies.

Risk Factor Assessment

Within 14 days of onset of symptoms

- Have any of the patient's household members experienced a similar illness or diagnosis?
- Does the patient have known mosquito exposure?
- Did the patient travel? (Mark the furthest destination point if there was more than one travel destination)

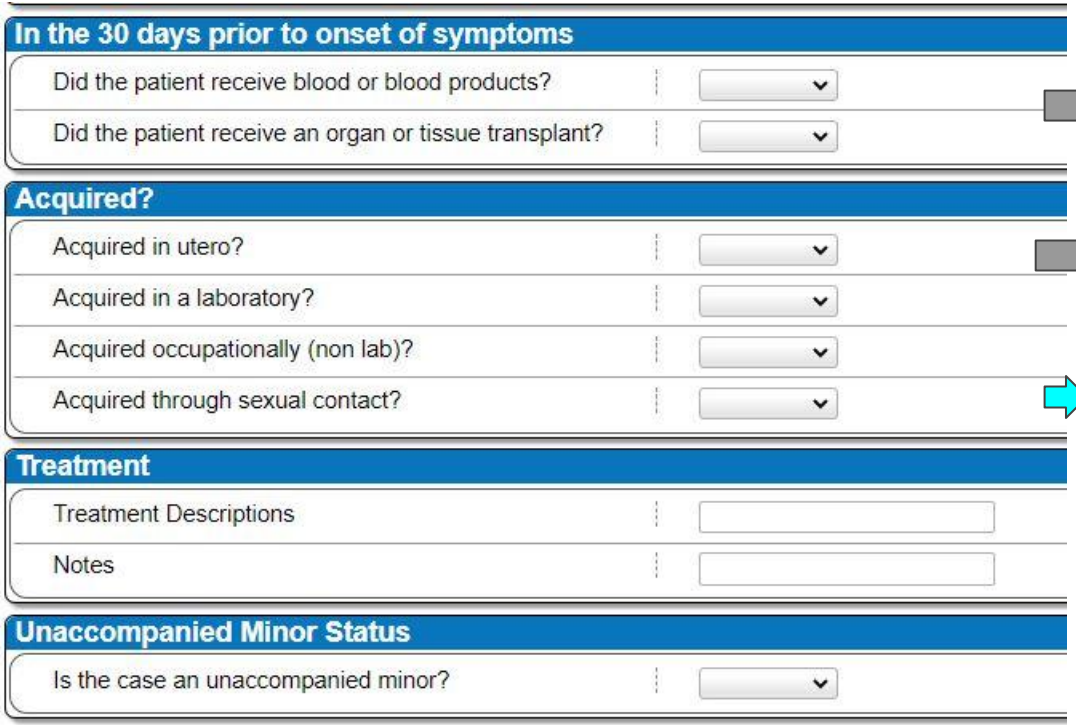
Should fill in Travel Table.

Other Potential Transmission Sources

- Donate blood within 30 days of onset/exposure?
- Donate an organ or tissue within 30 days of onset/exposure?
- Breastfeeding a child?
- Is the case a child that is currently being breastfed?

Rarely, dengue can be spread through blood transfusion or organ transplant.

To date, there has been one documented report of dengue spread through breast milk.



Rarely, dengue can be spread through blood transfusion or organ transplant.

Possible for dengue and Zika.

Mostly relevant for Zika, very rare for dengue.

Travel Table

Travel in 14 days prior to symptom onset

No entries have been associated with this case

Add/Edit Travel Information

Travel Type | Country | State/Province | City

Date Arrived at Location | Date Departed from Location

Mode of transport

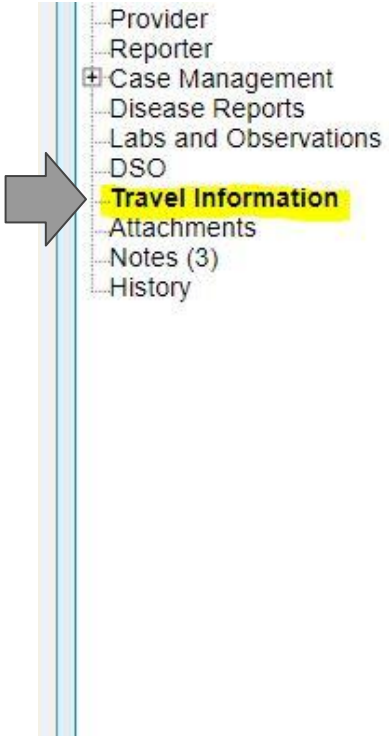
Lodging Type

Street Address | Unit | Phone Number

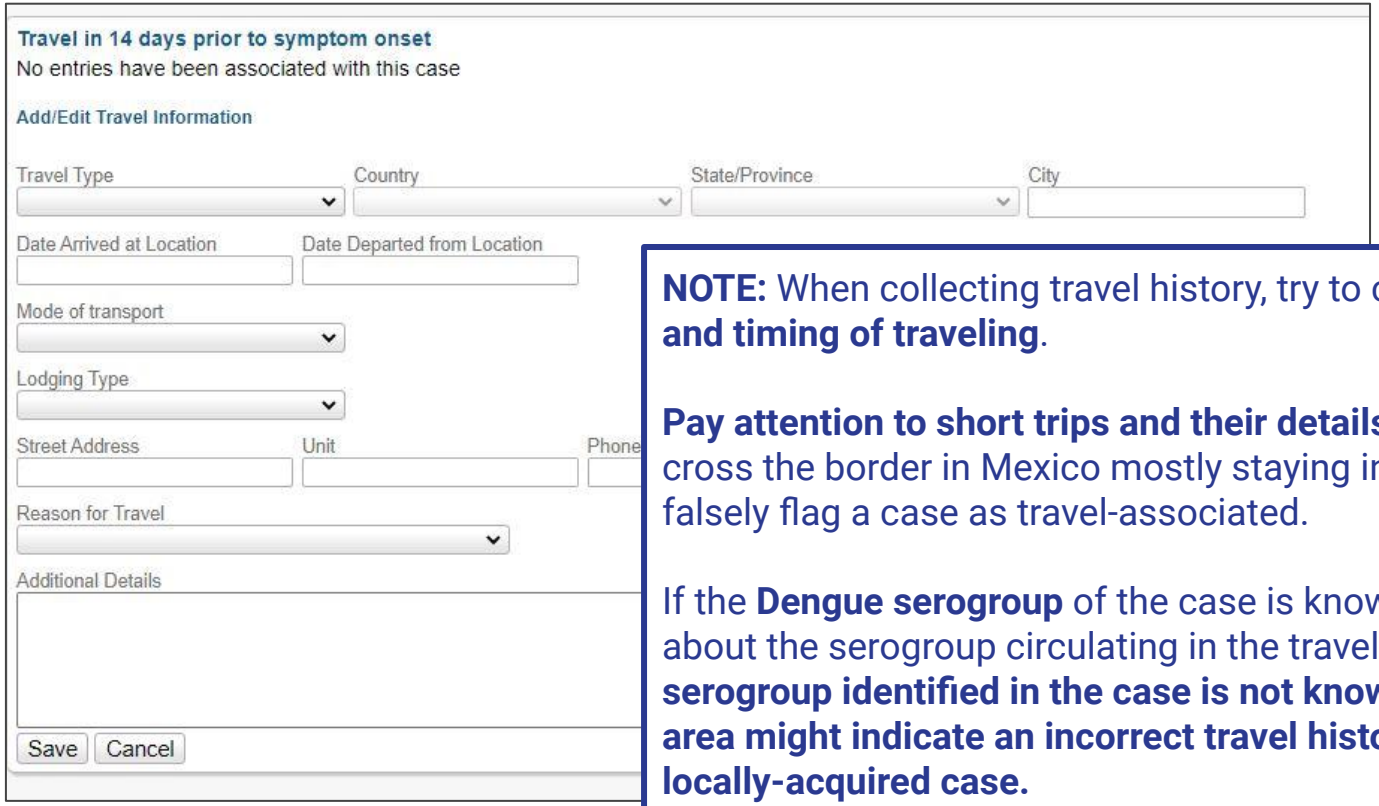
Reason for Travel

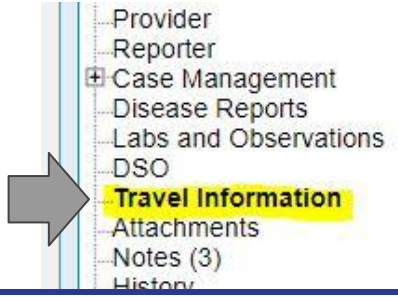
Additional Details

Save | Cancel



Travel Table





NOTE: When collecting travel history, try to collect **detailed location and timing of traveling**.

Pay attention to short trips and their details (example: less than a day cross the border in Mexico mostly staying indoor) because they may falsely flag a case as travel-associated.

If the **Dengue serogroup** of the case is known, try to find information about the serogroup circulating in the travel area. **Evidence that the serogroup identified in the case is not known to be present in that area might indicate an incorrect travel history or potentially a locally-acquired case.**

Dengue Education

Personal Protection

- Even if you do not feel sick, travelers returning to the United States from an area with risk of dengue should take steps to prevent mosquito bites for 2-3 weeks so they do not spread dengue to mosquitoes that could spread the virus to other people.
- Use an EPA-registered insect repellent.
  - Adults should spray repellent onto their hands and then apply to children's faces.
  - Insect repellent should not be used on babies younger than two months old
- Wear long-sleeved shirts and long pants.
- Use air conditioning or have intact window and door screens, to keep mosquitoes out.

Home Protection

- At least **once a week**, empty and scrub, toss or cover any items that can hold water.
- Keep your yard clean and clear from debris, to reduce potential breeding sites.
- If you cannot dump the water (and it's not drinking water), consider treating it with larvicides, like Mosquito Dunks.

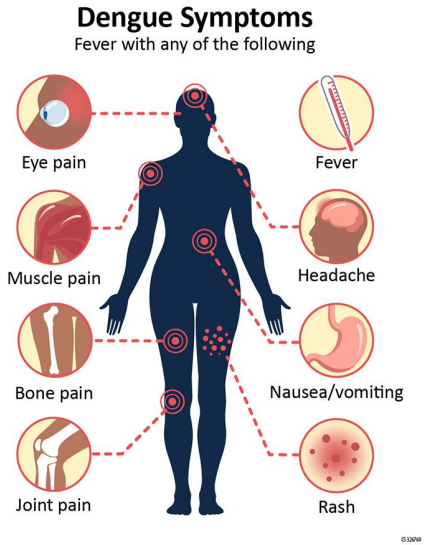
Healthcare Provider Education

Consider dengue for individuals presenting with the following symptoms, with or without travel history and report it to your local health department:

- Fever and any of: headache or retro-orbital pain, myalgia, bone pain, or arthralgia, anorexia, nausea, rash, thrombocytopenia or leukopenia.

Dengue testing is widely available through commercial laboratories.

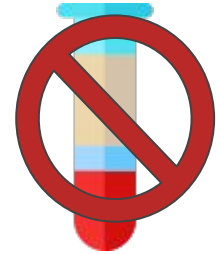
- If **<7 days** from symptoms onset, order Polymerase chain reaction (**PCR**) or **NS1** Antigen test **and IgM**
- If **≥7 days** from symptoms onset, order DENV-specific **IgM** only

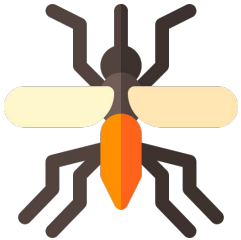


Mosquito Surveillance for Dengue

Dengue Mosquito Surveillance

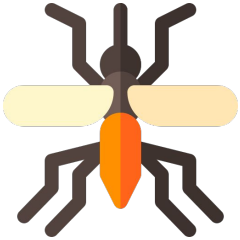
- Dengue only amplifies in humans and not birds, so **human cases are believed to be the best indicators of circulating virus.**
- **Routine dengue testing of mosquitoes has limited utility.** This is one of the major differences between West Nile virus surveillance and dengue surveillance.
- Viral testing of mosquitoes may be helpful under certain circumstances and should be considered:
  - For **clusters of travel-associated cases**
  - Around the homes of identified **locally acquired cases**
- If needed, viral testing is available at the Arizona State Public Health Laboratory.



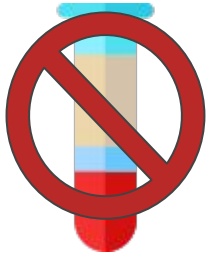


Source: ADHS Arboviral Handbook
https://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/mosquito-borne/arboviral-handbook.pdf

Scenario 1: Risk for Imported Cases



- Determine **presence or absence of *Aedes aegypti*** mosquitoes in community or region
  - Consider use of ovitraps and *Ae. aegypti*-specific adult traps (e.g., BG Sentinel traps)
- Map mosquito surveillance results with GIS technology to better understand baseline levels and distribution
  - Areas with high *Aedes aegypti* populations should be **targeted for education on source reduction and control measures**, particularly during warm, wet seasons
- **Communicate with public health partners** to learn where new or suspected human cases are located. Surveillance and control activities should be focused in these areas in addition to routine surveillance and control, and:
  - **Environmental investigation and source reduction education at case households**
  - ***Aedes aegypti* trapping in and around case households** *Aedes pools can be tested for dengue at ASPHL*
  - Adulticide spraying (handheld sprayer) in 150m radius around case households
- Collaborate with public health partners to compare maps of known *Ae. aegypti* distribution and imported human disease cases.
- **Provide public education about *Aedes aegypti* mosquitoes and source reduction**; consider community-wide cleanup campaigns to reduce or eliminate sources of standing water



Source: ADHS Arboviral Handbook
https://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/mosquito-borne/arboviral-handbook.pdf

Scenario 2: Response to locally-acquired cases

- Immediately implement enhanced vector surveillance and control in areas with known human cases
  - o **Perform *Aedes aegypti* trapping (ovitraps and adult traps) around case households and at other homes in neighborhood (at least 150m radius)** *MCDPH uses six traps within 150 m + you can test any trapped Aedes for dengue at ASPHL*
  - o **Perform environmental investigations in affected neighborhoods** to educate homeowners about source reduction
  - o **Use adulticide sprays** (handheld) in and around case households
  - o **Consider ultra-low volume spraying** in areas with large *Aedes aegypti* populations and locally-acquired cases
- Continue close communication and collaboration with public health officials to identify affected areas and focus response efforts
  - o The localized enhanced surveillance and control measures should be continued for three mosquito incubation cycles (i.e. **45 days**) following the last identified case
  - o Compare maps of known *Ae. aegypti* distribution and known human cases.

Source: ADHS Arboviral Handbook
https://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/mosquito-borne/arboviral-handbook.pdf

Dengue Resources

- ADHS Arboviral Handbook https://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/mosquito-borne/arboviral-handbook.pdf
- Dengue Investigation manual https://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/investigation-manual/vectorborne/chikungunya-and-dengue-protocol.pdf
- CDC Testing Guidance https://www.cdc.gov/dengue/healthcare-providers/testing/testing-guidance.html

WNV/SLE Investigation

- Quick refresher

Case Investigation Steps- West Nile Virus

Confirm the diagnosis:

- Start from the **lab report** in MEDSIS- Does it meet lab criteria of the case definition for that morbidity?

- Is additional testing recommended? For IgM WV positive we want to try and **rule out SLE**:
  - If SLE has been tested already -no further tests needed
  - If SLE test not done or unknown then we want to test for SLE at the State Lab so obtain serum or CSF
  - State Lab performs **MAC ELISA WNV and SLE IgM** testing, if the results cannot confirm one of the virus then Plaque Reduction Neutralization (**PRNT)** test is also performed.

Labs that forward specimen to ASPHL

- The following labs have an agreement with us and, during WNV season, automatically forward to the ASPHL any WNV IgM+ specimens
  - LabCorp
  - ARUP
  - Quest Diagnostics (from June 2022)

- For all other commercial labs, the local investigator has to call and request a specimen being sent to ASPHL

Most Common Case Scenarios-

Refer to WNV/SLE Case Classification Algorithm

- Blood donor (PCR+) (** Ensure that DSO field 'Diagnosis at presentation'= 'Viremic Blood Donor' ***)
  - with symptoms = **Confirmed**
  - without symptoms = Not a Case

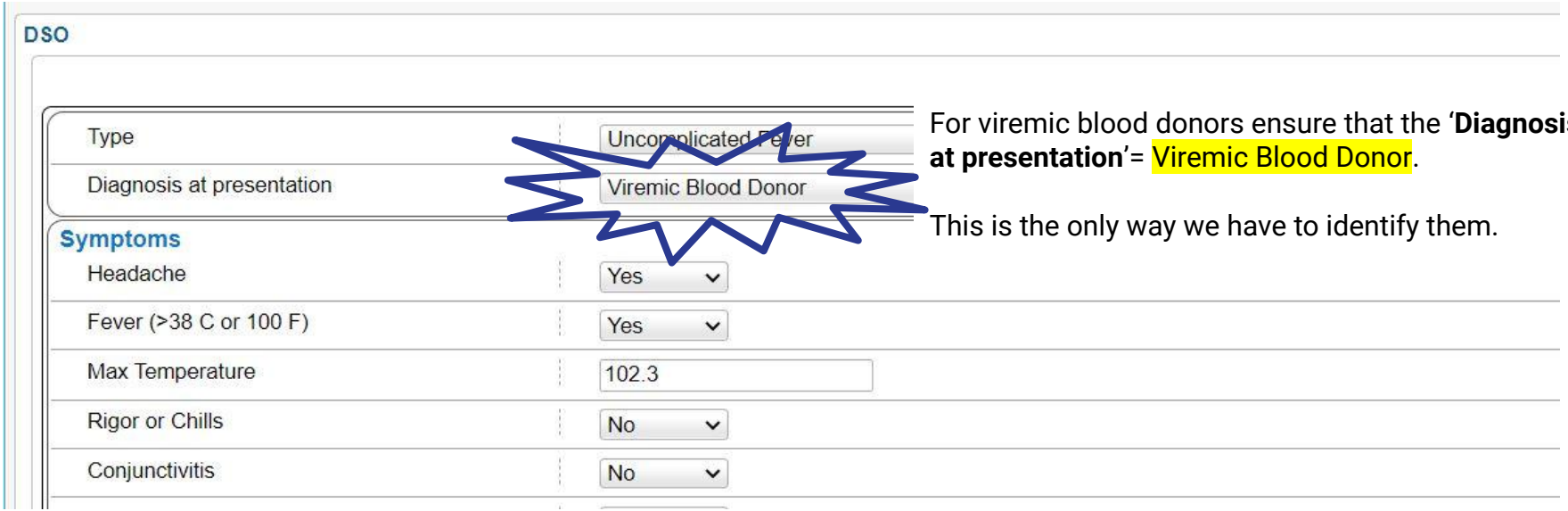
- Serologic testing
  - in **serum** without plaque reduction neutralization (PRNT) testing = Probable (ASPHL WNV/SLE P/N >3)
  - in **CSF** for only one virus = Probable
  - in **CSF** for both viruses, when testing was only positive for a single virus = **Confirmed** (ASPHL WNV/SLE P/N >3)

- For ASPHL WNV/SLE P/N ratio <3, then PRNT is done:
  - If PRNT testing was performed and definitive for a single virus = **Confirmed**
  - If PRNT testing cannot distinguish between viruses = Probable Unspecified Flavivirus Group 1

- Note that we do **not** use the Suspect case classification

- The investigator may mark cases temporarily as '*suspect*' if **IgM+ but pending clinical information and/or additional testing** (this helps us have a better estimate of the number of cases, rather than keeping the case without a classification)

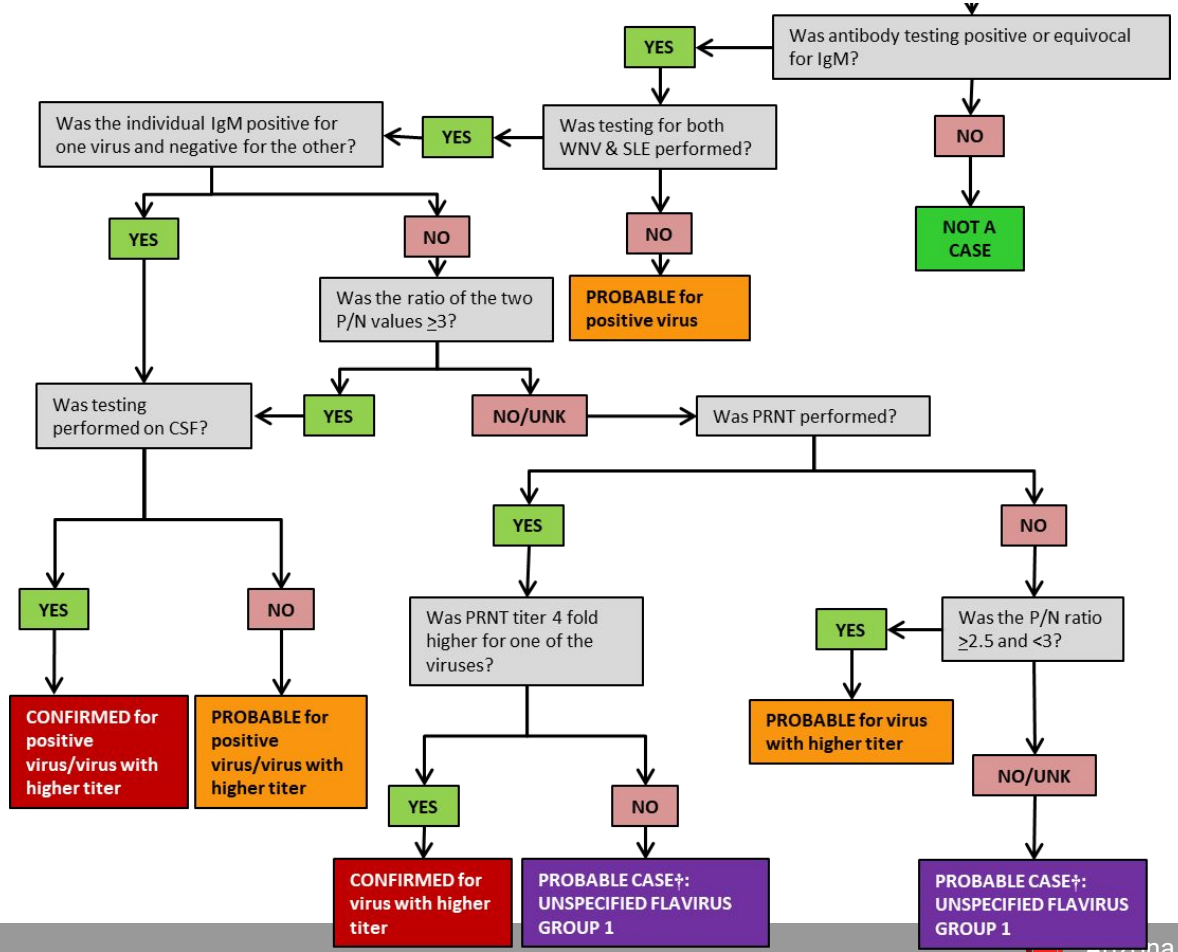
Viremic Blood Donors

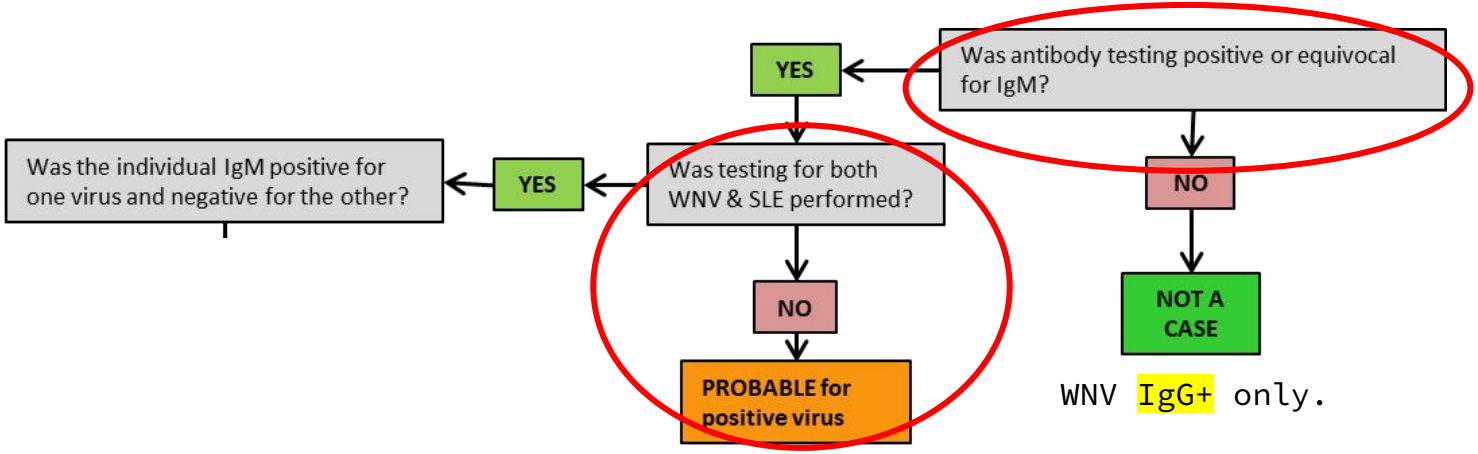


For viremic blood donors ensure that the '**Diagnosis at presentation**'= Viremic Blood Donor.

This is the only way we have to identify them.

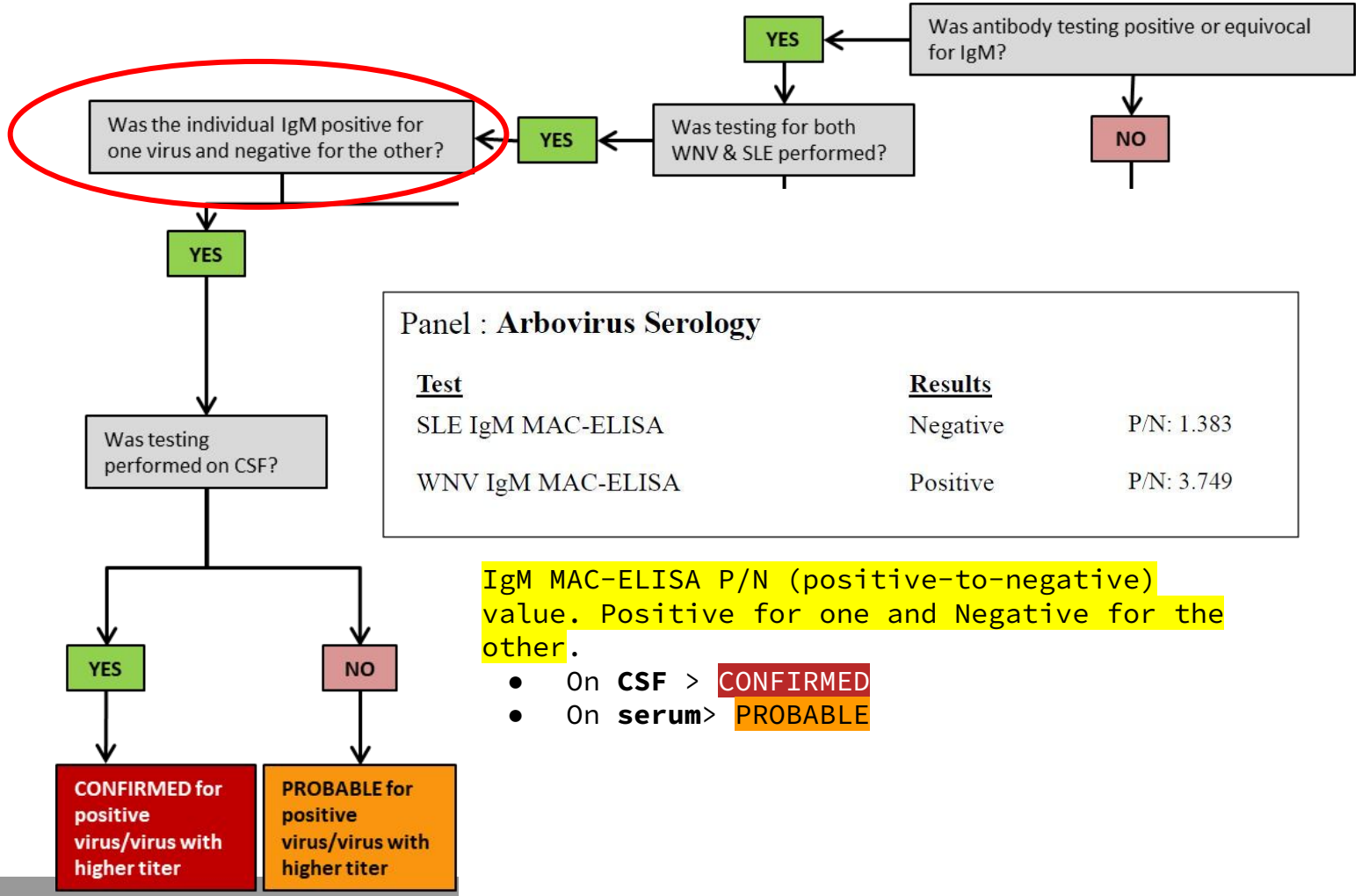
WNV/SLE Case Classification Algorithm





WNV IgG+ only.

If you only have a + WNV IgM and are not able to do additional testing.

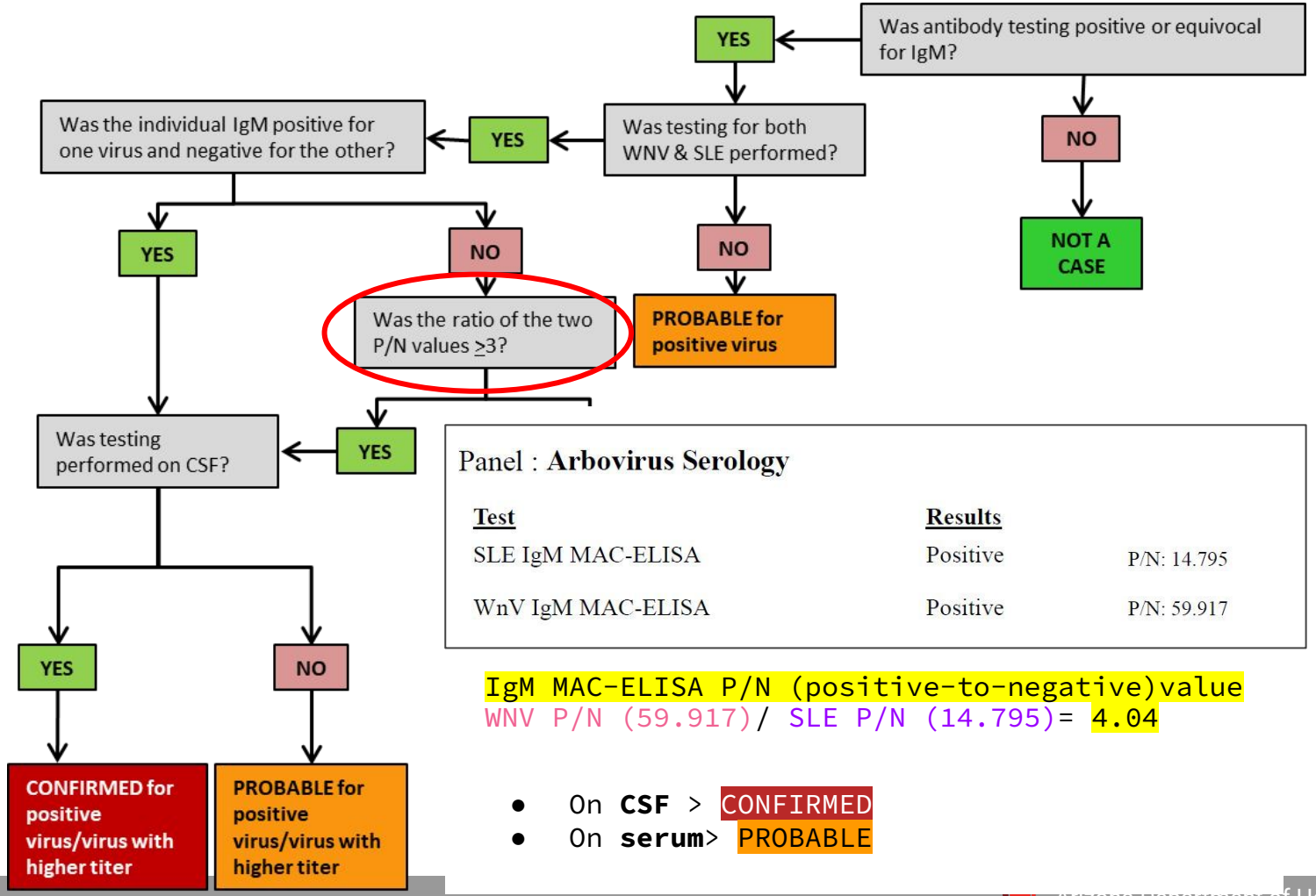


Panel : **Arbovirus Serology**

Test	**Results**	
SLE IgM MAC-ELISA	Negative	P/N: 1.383
WNV IgM MAC-ELISA	Positive	P/N: 3.749

IgM MAC-ELISA P/N (positive-to-negative) value. Positive for one and Negative for the other.

- On **CSF** > CONFIRMED
- On **serum**> PROBABLE



Panel : **Arbovirus Serology**

Test	Results	
SLE IgM MAC-ELISA	Positive	P/N: 14.795
WnV IgM MAC-ELISA	Positive	P/N: 59.917

IgM MAC-ELISA P/N (positive-to-negative)value
WNV P/N (59.917)/ SLE P/N (14.795)= 4.04

- On **CSF** > CONFIRMED
- On **serum**> PROBABLE

Test	Result
St. Louis Encephalitis Plaque Reduction Neutralization*	1:4 Titer

Comments and Disclaimers

* Serum titer <10 is negative, ≥10 is positive. CSF titer <2 is negative, ≥2 is positive. Test has not been cleared or approved by the FDA. The Performance characteristics have been established by (ADB Diagnostic & Reference Laboratory, Fort Collins, CO)

Test	Result
West Nile Plaque Reduction Neutralization*	1:32 Titer

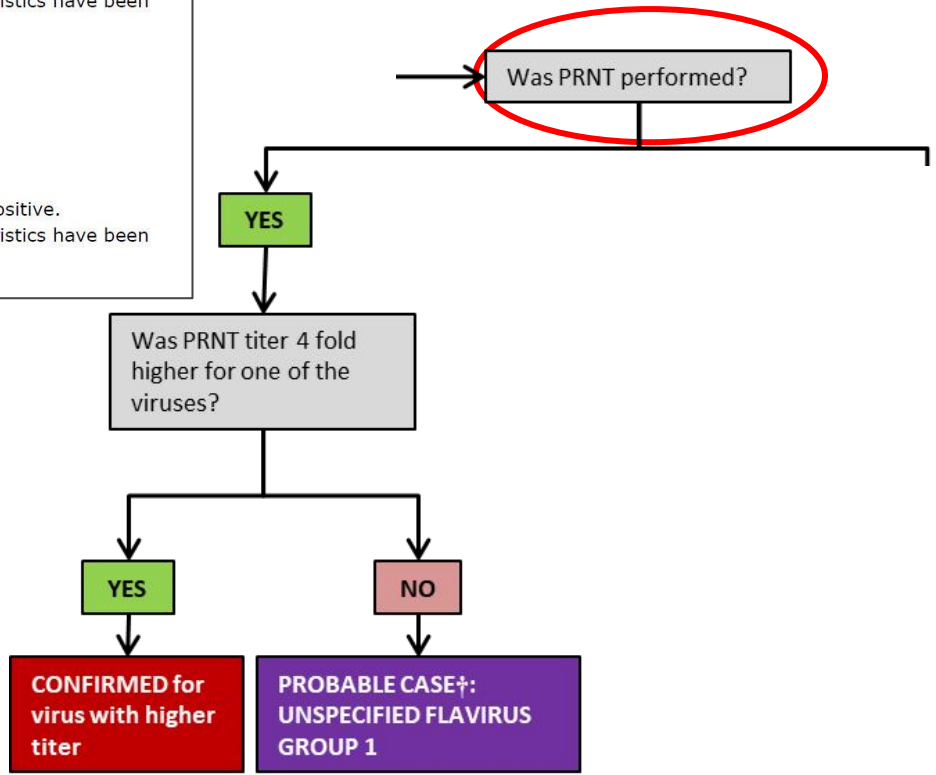
Comments and Disclaimers

* Serum titer <10 is negative, ≥10 is positive. CSF titer <2 is negative, ≥2 is positive. Test has not been cleared or approved by the FDA. The Performance characteristics have been established by (ADB Diagnostic & Reference Laboratory, Fort Collins, CO)

PRNT SLE 1:4

PRNT WNV 1:32

32/4=8 X higher for WNV so CONFIRMED WNV



Clinical Classification

Non-neuroinvasive disease (MEDSIS DSO Type='Uncomplicated Fever')

- **Fever or chills** as reported by the patient or a health-care provider, AND
- Absence of neuroinvasive disease, AND
- Absence of a more likely clinical explanation. Other clinically compatible symptoms of arbovirus disease include: headache, myalgia, rash, arthralgia, vertigo, vomiting, paresis and/ or nuchal rigidity.

MEDSIS DSO Type='**Uncomplicated Fever**' if fever or chills reported, meets clinical criteria

MEDSIS DSO Type='**Other clinical**' if NO fever/chills reported: it does not meet clinical criteria so should be classified as '**Not a Case**'

Notes:

- Ensure the person denies fever/chills and
- Was not on fever-reducing medications

WNV/SLE Case Classification Algorithm

Headache, stiff neck AND pleocytosis (increase in white blood cell count) in CSF with or without fever.
It should NOT present with altered mental status or focal neurologic deficits.

→ MEDSIS DSO Type= **'Meningitis'**

Meningitis is infection or inflammation of the tissues that cover the brain (i.e., the meninges).

Headache AND altered mental status (from confusion to coma) with or without fever.
Many patients can become confused or have altered mental status due to their fever or other conditions or medicines.
Ensure there are some signs or evidence of infection or inflammation of the brain.

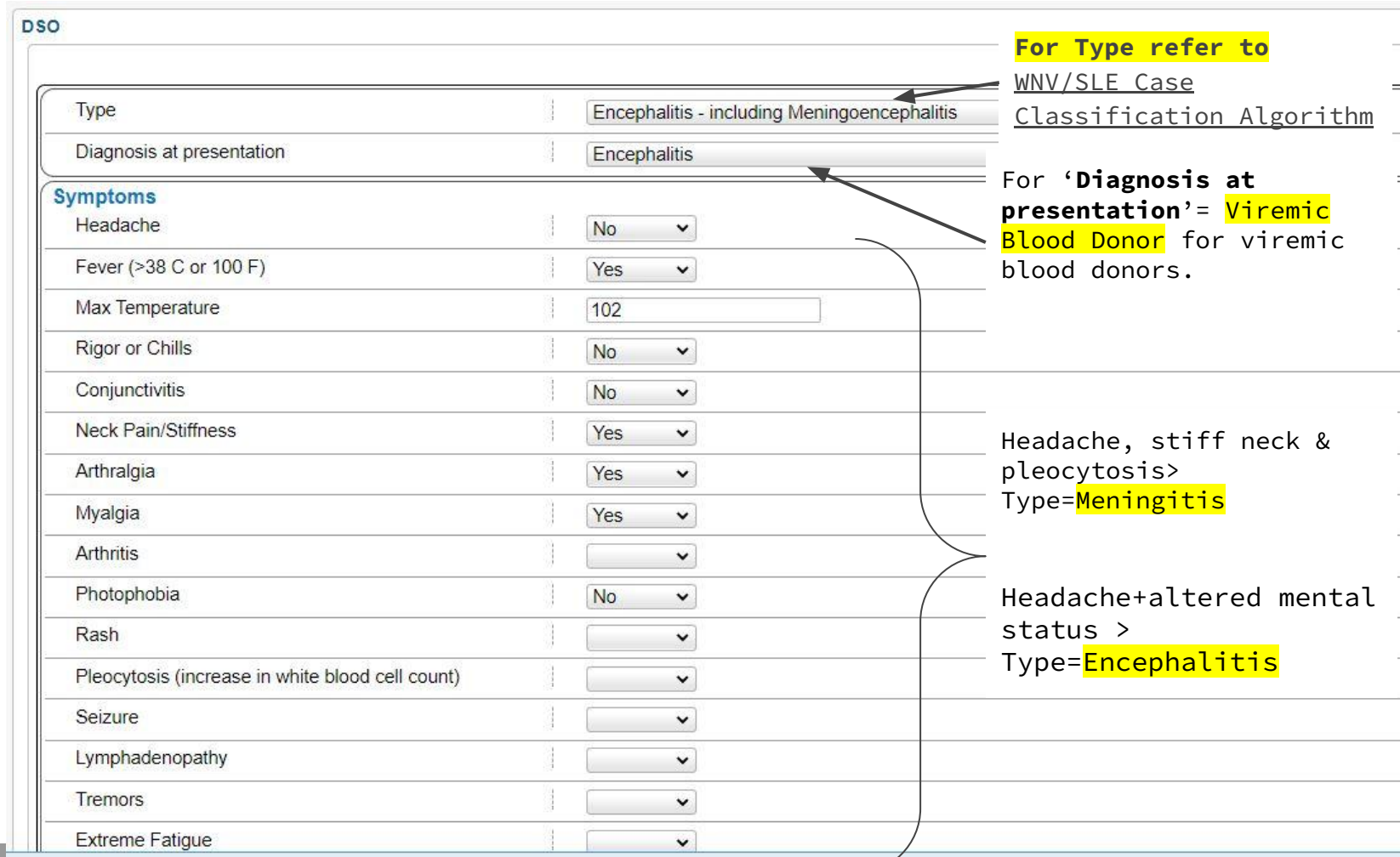
→ MEDSIS DSO Type= **'Encephalitis-including Meningoencephalitis'**

Encephalitis is infection or inflammation of the brain tissue.

'Encephalitis-including Meningoencephalitis'

- It may be associated with CSF **pleocytosis**
- It may co-exist with meningitis resulting in a **meningoencephalitis**
- Altered mental status examples: focal numbness/weakness, confusion, falls, seizures, etc.

Case Interview



Past medical history

- ☐ Cancer
- ☐ Diabetes
- ☐ Viral Hepatitis
- ☐ Pulmonary Disease
- ☐ Heart Disease
- ☐ Mosquito-borne Illness (Dengue, Yellow Fever, Japanese encephalitis, WNV, SLE, Flavivirus)
- ☐ Hypertension
- ☐ Immunosuppressive Condition

Vaccination History

- ☐ Yellow Fever
- ☐ Japanese Encephalitis
- ☐ Tick-borne Encephalitis

It helps to interpret test results because IgM can cross-react with similar viruses or vaccination.

Risk Factor Assessment

Within 14 days of onset of symptoms, did the patient?

Have known mosquito exposure?	Yes
Date	6/28/2021
Location	Desert park
Date	
Location	
Travel? (Mark the furthest destination point if there was more than one travel destination)	
Donate blood?	
Donate an organ or tissue?	

Incubation period: 3-14 days.

WNV cases should not donate blood for 120 days. Blood donations are routinely screened for WNV but organs are not.

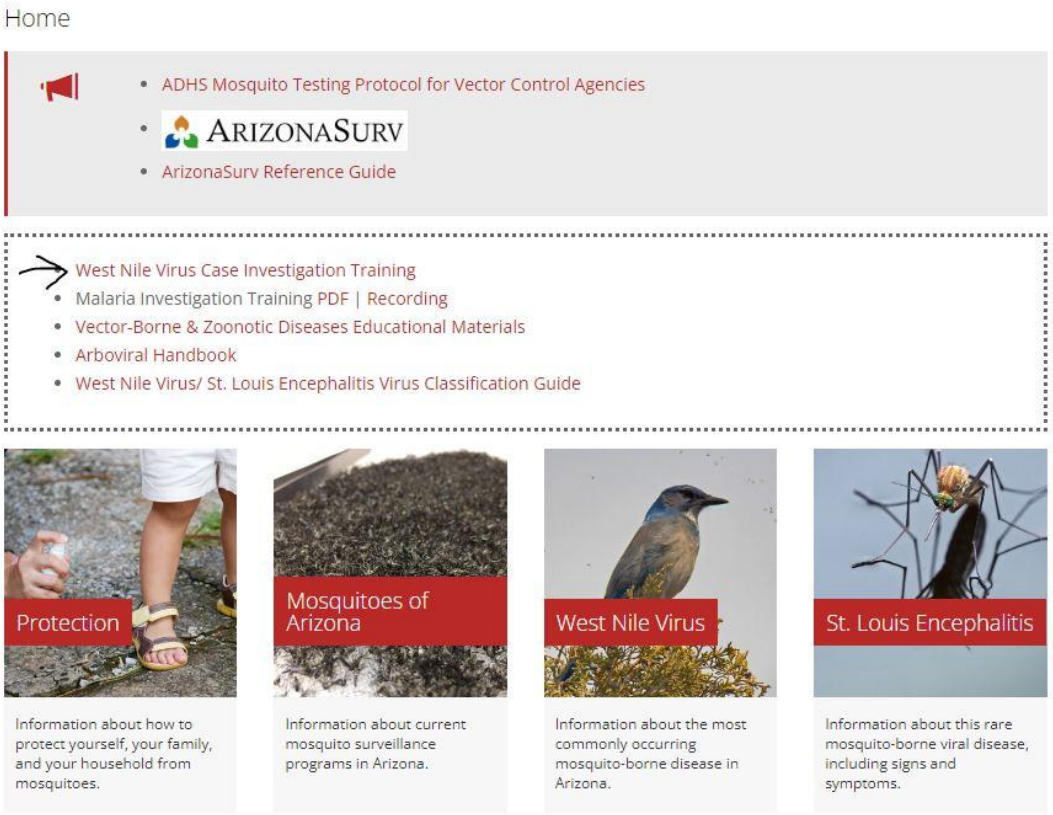
In the 30 days prior to onset of symptoms

Did the patient receive blood or blood products?	
Did the patient receive an organ or tissue transplant?	

Although rarely,WNV can be transmitted via blood transfusion or organ transplant

Resources

- WNV Case Investigation Training
- WNV & SLE investigation manual
- WNV/SLE Case Classification Algorithm
- WNV Data
- SLE Data



Questions?

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