

Arbovirosis: Investigación Clínica y colaboración científica Experiencia de la Fundación Valle del Lili

Fernando Rosso Suárez. M.D. MSc.

Medicina Interna - Enfermedades Infecciosas



**FUNDACIÓN
VALLE DEL LILI**
Excelencia en Salud al servicio de la comunidad



Certificados por nuestro con la reducción de emisiones de gases de efectos invernadero.



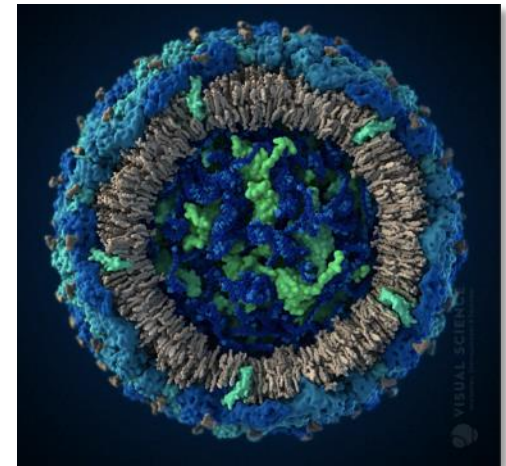
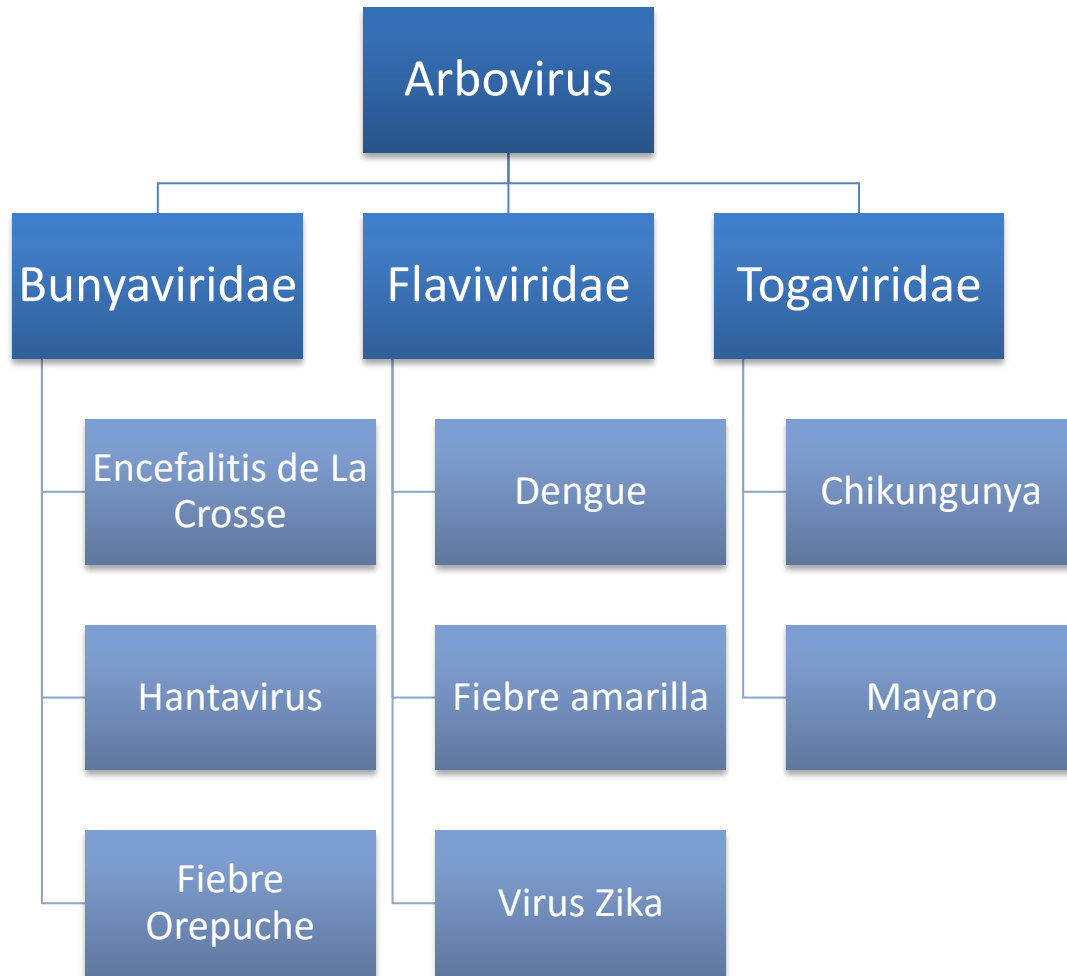
Certificación Internacional en cuidados paliativos Newpalex, otorgada por New Health Foundation



Institución Acreditada con EXCELENCIA por Icontec Internacional y reconocimiento especial por la excelente gestión desde 2012.



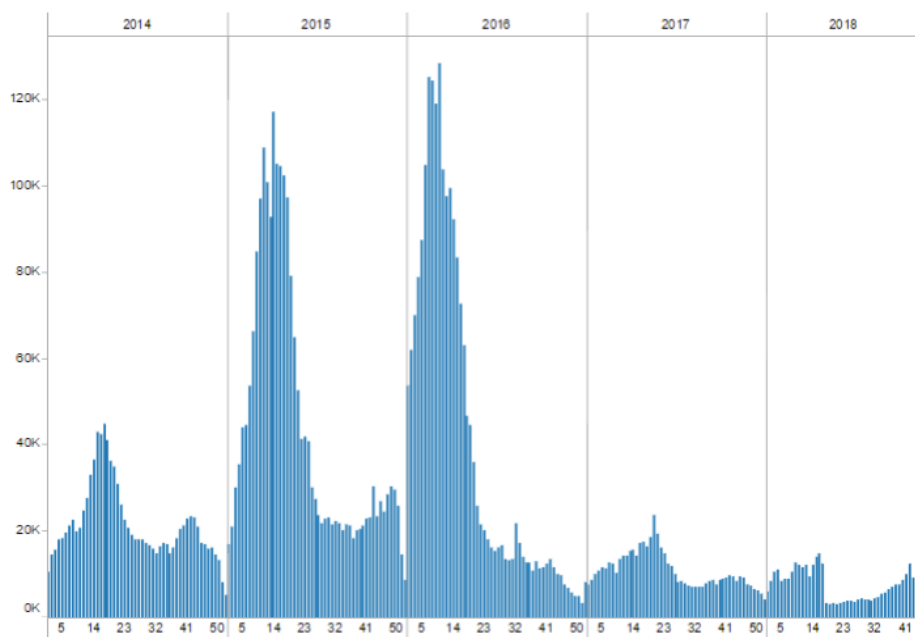
Arbovirus



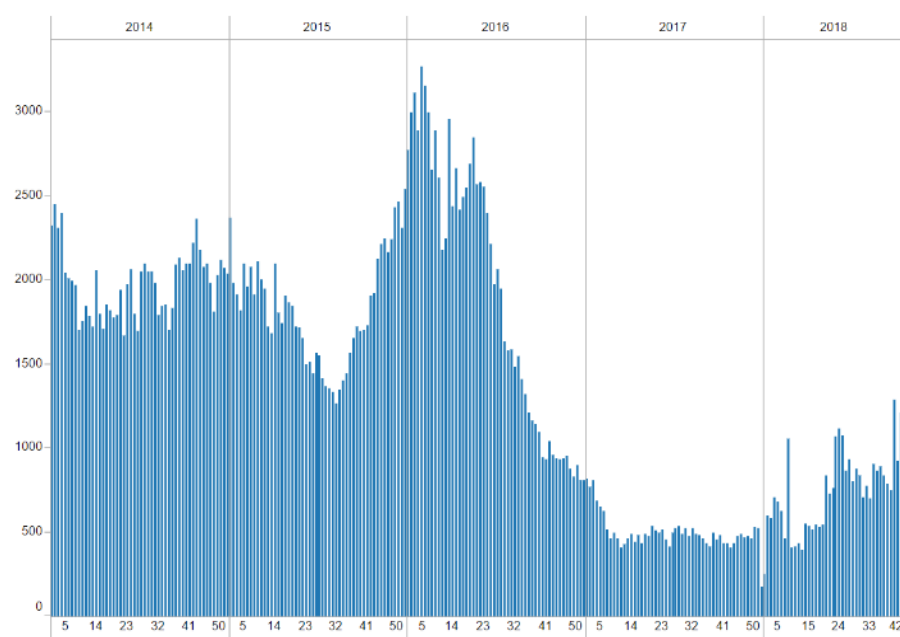
Virus del Zika

Situación epidemiológica en las Américas

Número de casos reportados de fiebre por Dengue en las Américas por semana epidemiológica y año



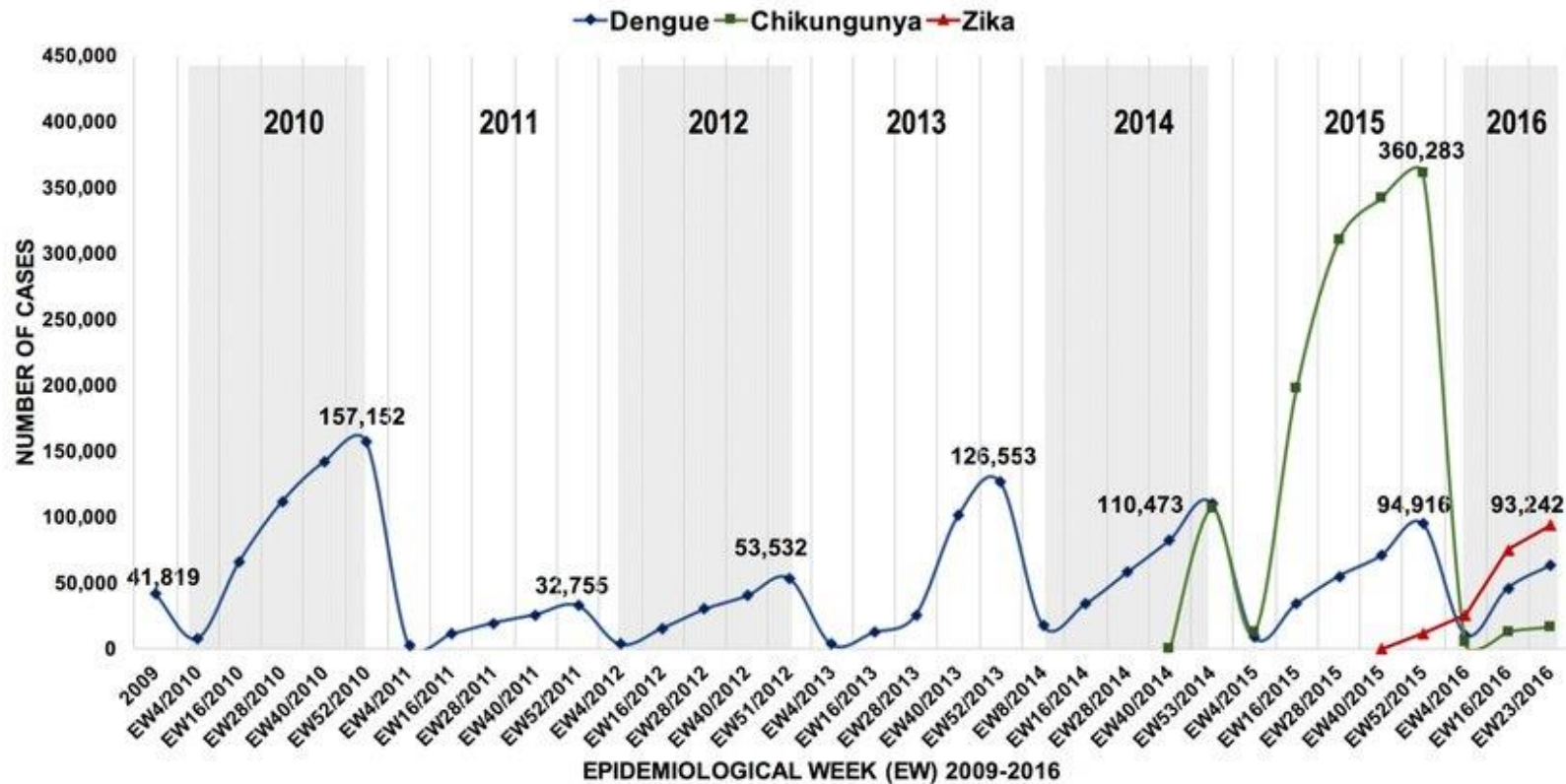
Número de casos reportados de fiebre por Dengue en Colombia por semana epidemiológica y año



Fuente: Plataforma de Información en Salud de las Américas (PLISA). Datos reportados por los Ministerios de Salud de los países.
NOTA: Número de casos reportados de fiebre por dengue incluye todos los casos de dengue: sospechosos, probables, confirmados, no-grave, grave y muertes.

Situación epidemiológica en Colombia

CUMULATIVE INCIDENCE OF DENGUE, CHIKUNGUNYA AND ZIKA VIRUSES IN COLOMBIA 2009-2016



Antecedentes

Colombia Médica

Vol. 25 N° 1, 1994

Dengue hemorrágico en el Hospital Universitario del Valle, 1990-1992

Fernando Rosso S., M.D.¹, María Teresa Restrepo de Meza, Bact.²,
Alberto Alzate S., M.D.³, Julián Muñoz, M.D.⁴, Carlos H. Moreno M., M.D.⁵

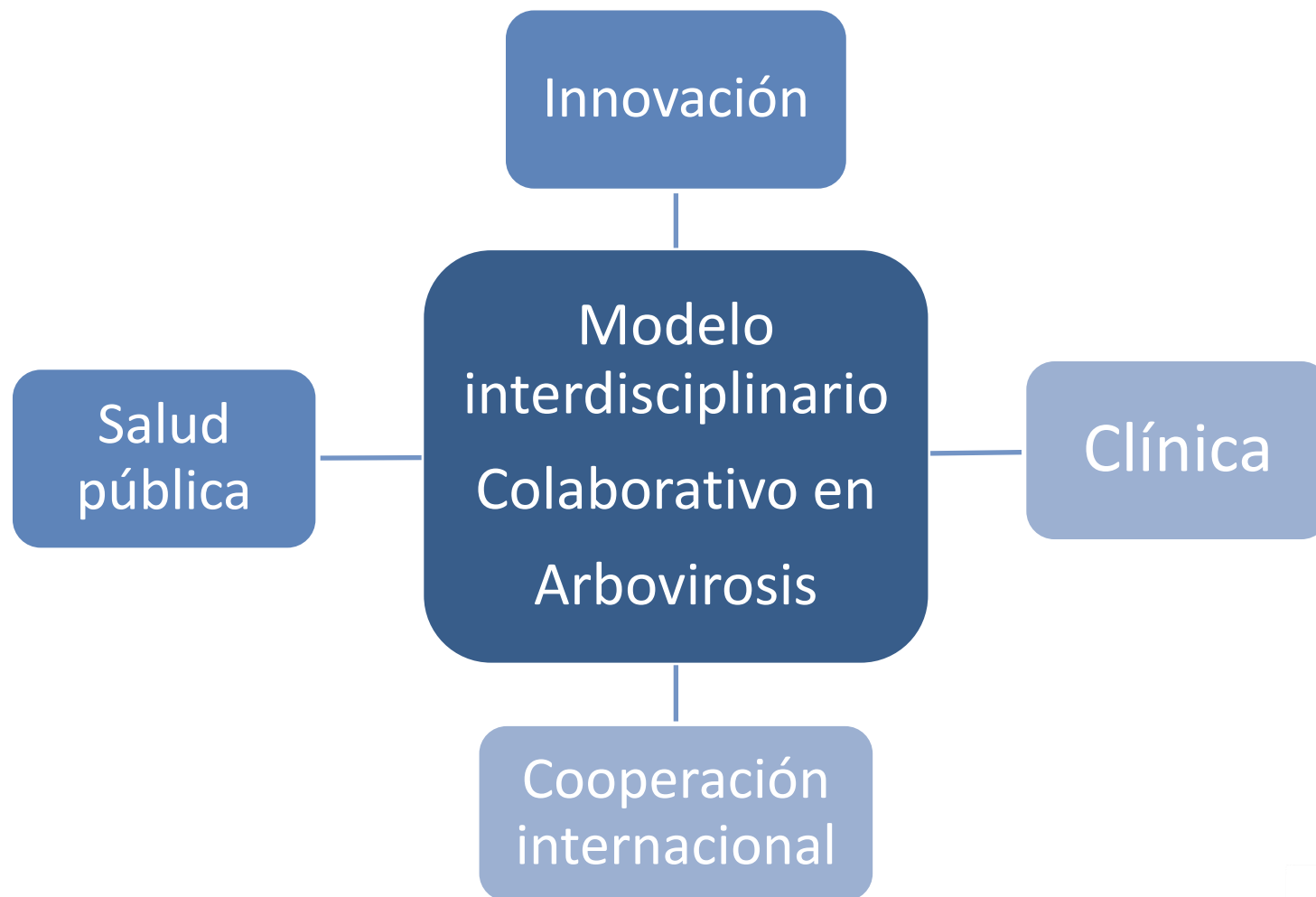
RESUMEN

Mediante una investigación clínico-epidemiológica de los casos hospitalizados en el Hospital Universitario del Valle (HUV) en Cali, Colombia, se demuestran algunas dificultades para el diagnóstico de dengue hemorrágico (FHD), cuando la enfermedad aparece por primera vez en una región. En el HUV se hospitalizaron 99 pacientes con diagnóstico presuntivo de FHD, entre los meses de enero de 1990 y noviembre de 1992. Se informan los resultados de 62 de ellos, de los cuales se pudieron obtener historias clínicas de calidad aceptable. De los 99 pacientes estudiados, 31 se confirmaron serológicamente como dengue, 3 se pudieron clasificar como dengue clásico, 10 como dengue clásico con manifestaciones hemorrágicas y 18 como dengue hemorrágico. El estrechamiento de la presión de pulso, la hepatomegalia, la hemoconcentración y la presencia de linfocitos atípicos sólo se presentaron en los casos confirmados de FHD, o en los clasificados clínicamente como FHD. Llama la atención en los pacientes con FHD la presencia de dolor abdominal como un síntoma de mayor severidad y su presencia por igual en adultos y en niños.

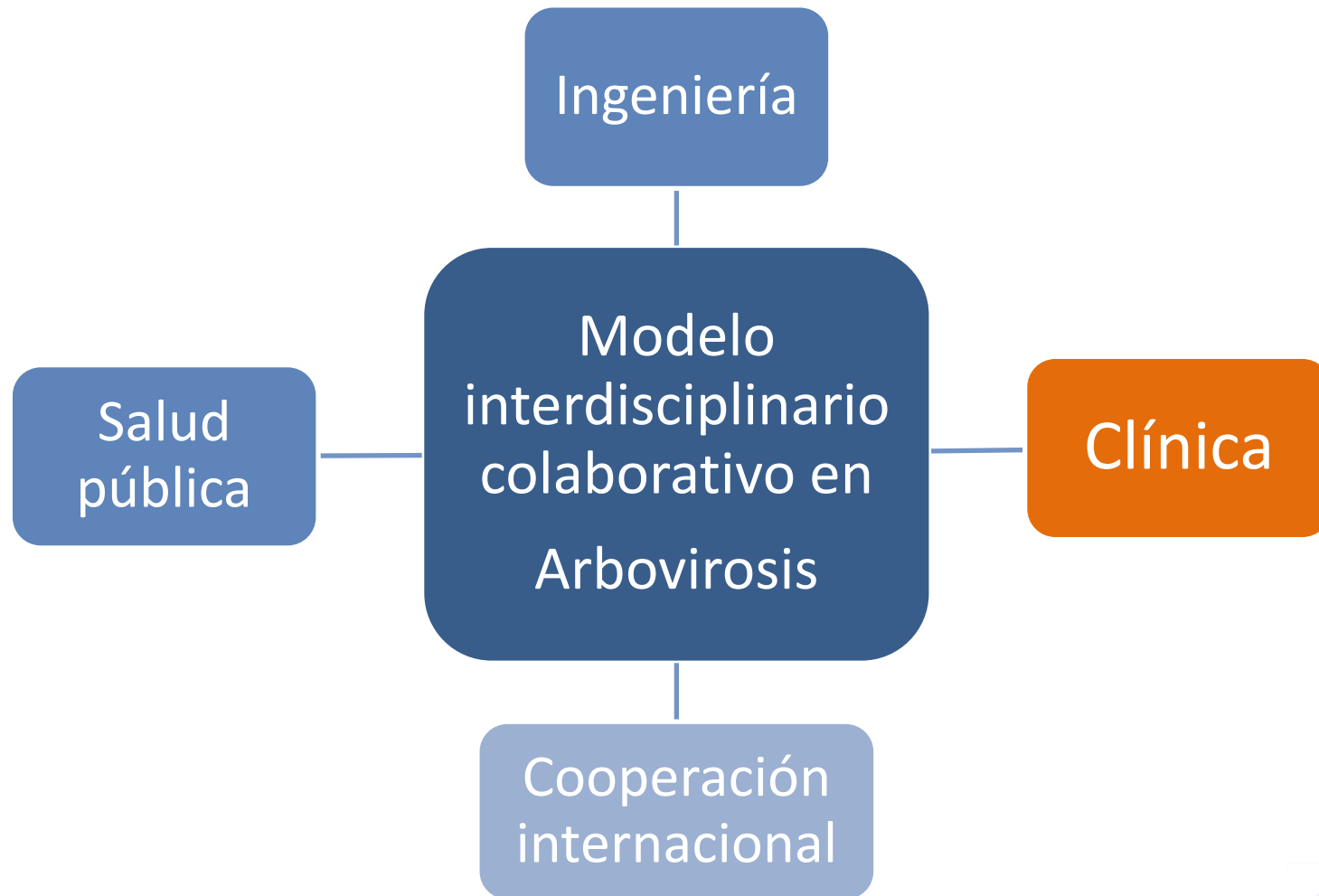
- ¿En que podríamos contribuir en el conocimiento de esta infección de interés en salud pública ?
- ¿ Se podría hacer investigación desde un hospital de alta complejidad ?
- ¿ Como ayudar a cerrar brechas de conocimiento entre salud pública y la medicina clínica?



Modelo de trabajo colaborativo en Arbovirosis

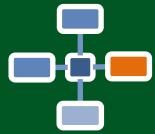


Modelo de trabajo colaborativo



- ¿ Se podría hacer investigación desde un hospital de alta complejidad? Investigación Clínica
- **Poblaciones especiales :**
Entender la dinámica de la enfermedad en estos pacientes.
 - Adulto Mayor
 - Inmunocomprometidos
 - Embarazadas
 - Malformaciones
 - Pacientes críticos





Adulto mayor

NCBI Resources How To

PubMed.gov PubMed

US National Library of Medicine
National Institutes of Health

Format: Abstract ▾

Send t

[Biomedica](#), 2016 May 3;36(0):179-86. doi: 10.7705/biomedica.v36i0.2961.

Prevalence and clinical course of dengue infection in elderly patients with acute febrile illness in a tertiary care hospital in Cali, Colombia.

Cuadro 4. Manifestaciones clínicas de la enfermedad en pacientes de 65 años o más con diagnóstico de dengue

Características	n (%)
Dengue	13 (35)
Signos de alarma durante la enfermedad	24 (65)
Dolor abdominal intenso y continuo	14 (37,8)
Vómito persistente	6 (16,2)
Hipotensión postural-lipotimia	5 (13,5)
Hepatomegalia dolorosa	2 (5,4)
Somnolencia e irritabilidad	4 (10,8)
Disminución de la diuresis (oliguria)	1 (2,7)
Hipotermia	10 (27)
Acumulación de líquidos	11 (29,7)
Ascitis	2 (18,2)
Edema periférico	6 (54,5)
Derrame pleural	6 (54,5)
Manifestaciones hemorrágicas	8 (21,6)
Petequias	6 (16,2)
Hemorragia gastrointestinal	2 (5,4)
Epistaxis	1 (2,7)
Hematuria	4 (10,8)
Dengue grave	8 (21,6)
Choque por dengue	2 (5,4)
Muerte por dengue	0 (0)
Infección asociada a la atención en salud	3 (8)
Bacteriemia	2 (5,4)
Infección de vías urinarias	2 (5,4)
Neumonía	2 (5,4)





Embarazadas



THE JOURNAL OF MATERNAL-FETAL & NEONATAL MEDICINE
<https://doi.org/10.1080/14767058.2018.1554044>

ORIGINAL ARTICLE

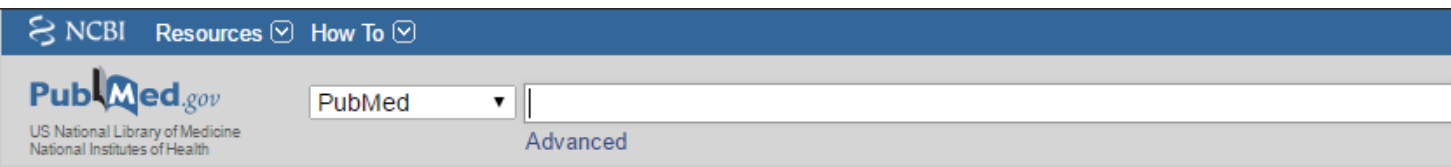


Comprehensive treatment in severe dengue during preterm and term labor: could tocolysis be useful?



María Fernanda Escobar, Bárbara Lucía Mora, Jorge Andrés Cedano, Sara Loaiza, Fernando Rosso. Comprehensive treatment in severe dengue during preterm and term labor: could tocolysis be useful?. The journal of maternal-fetal & neonatal medicine. 2018

Embarazo



Format: Abstract ▾

Sen

[Emerg Infect Dis](#), 2017 Nov;23(11). doi: 10.3201/eid2311.170480.

Pregnant Women Hospitalized with Chikungunya Virus Infection, Colombia, 2015.

[Escobar M](#), [Nieto AJ](#), [Loaiza-Osorio S](#), [Barona JS](#), [Rosso F](#).

Abstract

In 2015 in Colombia, 60 pregnant women were hospitalized with chikungunya virus infections confirmed by reverse transcription P. Nine of these women required admission to the intensive care unit because of sepsis with hypoperfusion and organ dysfunction; 11 women met the criteria for severe acute maternal morbidity. No deaths occurred. Fifteen women delivered during acute infection; some received tocolytics to delay delivery until after the febrile episode and prevent possible vertical transmission. As recommended by a pediatric neonatologist, 12 neonates were hospitalized to rule out vertical transmission; no clinical findings suggestive of neonatal chikungunya virus infection were observed. With 36 women (60%), follow-up was performed 1 year after acute viremia; 13 patients had arthralgia in >2 joints (a relapse of infection). Despite disease severity, pregnant women with chikungunya should be treated in high-complexity obstetric units to rule out adverse outcomes. These women should also be followed up to treat potential relapses.



Embarazo

Pregnant Women Hospitalized with Chikungunya Virus Infection, Colombia, 2015

Maria Escobar, Albaro J. Nieto, Sara Loaiza-Osorio, Juan S. Barona, Fernando Rosso



Medscape **ACTIVITY** EDUCATION



JOINTLY ACCREDITED PROVIDER™
INTERPROFESSIONAL CONTINUING EDUCATION

In support of improving patient care, this activity has been planned and implemented by Medscape, LLC and Emerging Infectious Diseases. Medscape, LLC is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team.

Medscape, LLC designates this Journal-based CME activity for a maximum of 1.00 **AMA PRA Category 1 Credit(s)**™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

All other clinicians completing this activity will be issued a certificate of participation. To participate in this journal CME activity: (1) review the learning objectives and author disclosures; (2) study the education content; (3) take the post-test with a 75% minimum passing score and complete the evaluation at <http://www.medscape.org/journal/eid>; and (4) view/print certificate. For CME questions, see page 1940.

Release date: October 13, 2017; Expiration date: October 13, 2018

Format: Abstract ▾

Biomedica. 2018 Aug 1;38(0):127-134. doi: 10.7705/biomedica.v38i0.4413.

Microcephaly in Colombia before the Zika outbreak: A systematic literature review.





The Application of Clinical Genetics

CASE SERIES

Zika microcephaly and complete genetic assessment.

First report case with negative genetic study (array cgh, exome sequencing) in patients with vertical transmission of Zika virus infection and associated brain abnormalities





Poblaciones especiales : Reumatología

NCBI Resources How To

PubMed.gov

US National Library of Medicine
National Institutes of Health

PubMed

Advanced

Format: Abstract

Arthritis Rheumatol. 2016 Apr;68(4):1044. doi: 10.1002/art.39580.

Catastrophic Antiphospholipid Syndrome Triggered by Fulminant Chikungunya Infection in a Patient With Systemic Lupus Erythematosus.

Betancur JF, Navarro EP, Bravo Bonilla JH, Cortés AD, Vélez JD, Echeverry A, Suso JP, Cañas CA, Tobón GJ. Catastrophic Antiphospholipid Syndrome Triggered by Fulminant Chikungunya Infection in a Patient With Systemic Lupus Erythematosus. Arthritis Rheumatol. 2016 Apr;68(4):1044.

NCBI Resources How To

PubMed.gov

US National Library of Medicine
National Institutes of Health

PubMed

Advanced

Format: Abstract

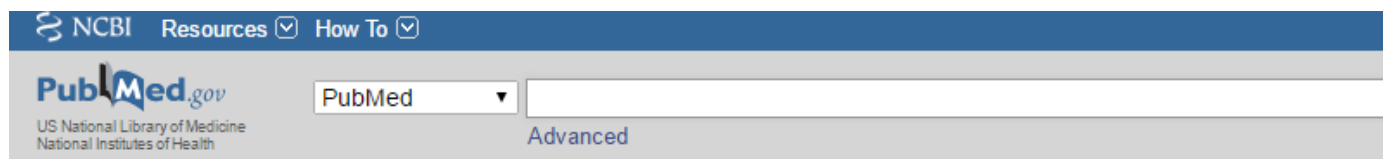
Clin Rheumatol. 2015 Nov;34(11):1989-92. doi: 10.1007/s10067-015-3040-9. Epub 2015 Aug 2.

Hyperferritinemic syndrome: Still's disease and catastrophic antiphospholipid syndrome triggered by fulminant Chikungunya infection: a case report of two patients.

Betancur JF, Navarro EP, Echeverry A, Moncada PA, Cañas CA, Tobón GJ. Hyperferritinemic syndrome: Still's disease and catastrophic antiphospholipid syndrome triggered by fulminant Chikungunya infection: a case report of two patients. Clin Rheumatol. 2015 Nov;34(11):1989-92. doi: 10.1007/s10067-015-3040-9. Epub 2015 Aug 2.



Cuidado intensivo



Format: Abstract ▾

[Rev Chilena Infectol.](#) 2016 Aug;33(4):464-467.

[Co-infection by Chikungunya virus (CHIK-V) and dengue virus (DEN-V) during a recent outbreak in Cali, Colombia: Report of a fatal case].

[Article in Spanish]

[Rosso F.](#), [Pacheco R.](#), [Rodríguez S.](#), [Bautista D.](#)

Abstract

The recent outbreaks of Chikungunya (CHIK-V) virus in endemic areas of dengue (DEN-V) could increase the risk of co-infection. CHIK infection has been considered not severe and with very unusual mortality, however DEN is associated with severe manifestations and increased mortality. Little is known about coinfection. It is possible that co-infection could generate severe cases. We present a case report of co-infection DEN-V -3 and CHIK-V in an elderly patient who developed acute renal failure, dengue shock syndrome (DSS), progresses to multiple organ failure and died. With the recent emergence of CHIK-V in Colombia, the possibility of co-infection with DEN-V should be suspected, especially in severe cases.

PMID: 27905632 DOI: [10.4067/S0716-10182016000400013](#)

Cuidado intensivo

Journal List > Open Forum Infect Dis > v.4(Suppl 1); Fall 2017 > PMC5631436

Alerts | Podcasts | Author Instructions | Submit

Open Forum Infectious Diseases

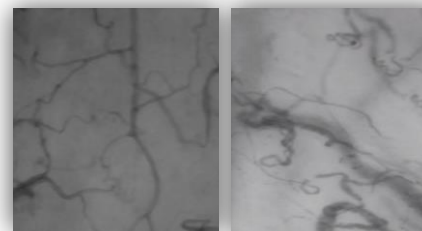


[Open Forum Infect Dis.](#) 2017 Fall; 4(Suppl 1): S360.

Published online 2017 Oct 4. doi: [\[10.1093/ofid/ofx163.875\]](https://doi.org/10.1093/ofid/ofx163.875)



Experience of Sublingual Microcirculation Evaluation in Adults Patients with Severe Dengue

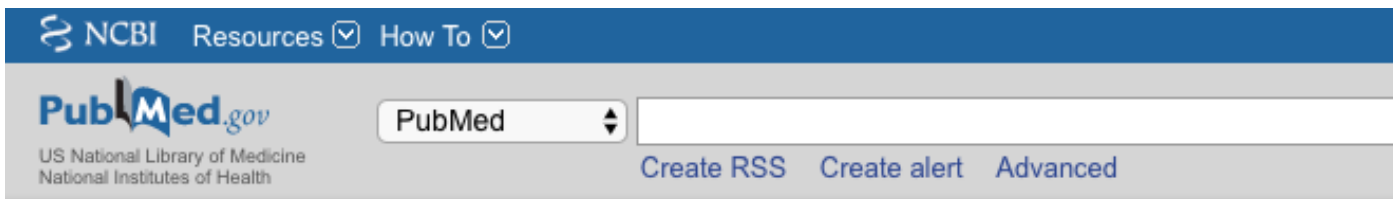


Normal microcirculation

Abnormal microcirculation



Trasplantes



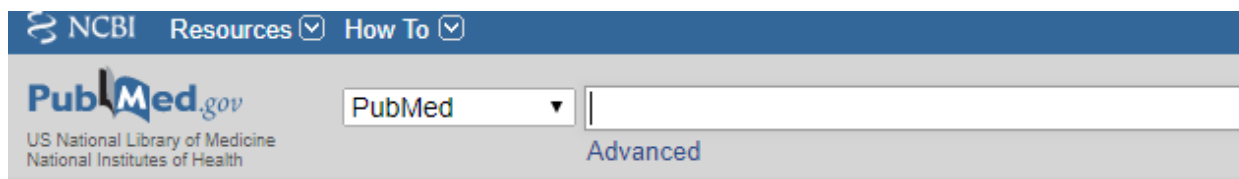
Format: Abstract ▾

See 1 citation found by title matching your search:

[Braz J Infect Dis.](#) 2018 Jan - Feb;22(1):63-69. doi: 10.1016/j.bjid.2018.01.001. Epub 2018 Jan 19.

Transmission of dengue virus from deceased donors to solid organ transplant recipients: case report and literature review.

Trasplantes



Format: Abstract ▾

[Transpl Infect Dis.](#) 2018 Aug 17:e12978. doi: 10.1111/tid.12978. [Epub ahead of print]

Chikungunya in solid organ transplant recipients, a case series and literature review.

TABLE 2 Matrix review of solid organ transplant recipients with Chikungunya virus infection

Authors	Country of report	Number of cases	Age (Years-mean)	Organs	Time from transplant to infection (Years-Mean)	Mean Platelets count/ μ L	Mean WBC count/mL
Pierrotti et al ²⁰	Brazil	4	55.2	Kidney (4)	7.2	-	6875
Girao et al ¹⁹	Brazil	13	50.8	Kidney (9)/Liver (4)	7.2	161.572	4933
Machado et al ²¹	Brazil	2	23.5	Stem cell (2)	-	150.500	-
Dalla Gasperina et al ¹⁴	Dominican Republic	1	48	Kidney	6	469.000	7640
Rosso et al.	Colombia	10	47	Kidney (5)/Liver (4)/ Multiple (1)	8	135.100	3591
Kee et al ¹⁵	Singapore	1	45	Liver	7	120.000	WNL



IDWeek 2018™

Advancing Science, Improving Care

Chikungunya in Transplant Recipients

Number of Patients	Transplant Type	Outcome	Publication
1	1 Liver	Encephalitis, resolved completely	Economopoulou A. Epidemiol Infect 2009.
2 (1 transplant)	1 Liver	Possible encephalitis	Kee ACL. Emerg Inf Dis 2010.
1	1 Kidney	Fever, 2 months of arthralgias	Dalla Gasperina D. Transpl Infect Dis 2015.
4	4 Kidney	Fever, mild arthralgias	Pierotti LC. Int J Infect Dis 2017.
13	9 Kidney, 4 Liver	Typical symptoms - Fever, headache, polyarthralgias	Girao ES. Transpl Proc 2017.
1	1 Living Donor Kidney	Living kidney donor with typical infection donated 4 months after CHIK - no infection in recipient	Moura-Neto JA. Kidney Int Reports 2017.
10	5 Kidney, 4 Liver, 1 Liver/Kidney	Arthralgia & Fever; No ICU stays, no rejection, no deaths, no recurrent arthritis	Rosso F. Transpl Infect Dis 2018.

Table 2 - Dengue transmission through transplantation of an infected organ.

Authors	Age	Organ	Days of onset	Symptoms	Mortality	Test recipient	Test donor
Gupta et al. ²⁰	40	Liver	2	Fever, thrombocytopenia	Alive	NS1+	NS1+
Lanka et al. ¹⁷	51	Bone Marrow	3	Fever, thrombocytopenia, hematochezia	Deceased (enterocolitis)	IgM/IgG- NS1+ PCR (DENV1)	IgM/IgG+ NS1+ PCR (DENV1)
Tan et al. ³	23	Kidney	5	Fever, thrombocytopenia, GI bleeding, hematuria	Alive	PCR+ (DENV 1)	No test reported
Present Study Case 1	41	Heart	8	Fever, thrombocytopenia, shock	Alive	IgM+ IgG- PCR (DENV)	IgM+ IgG+
Present Study Case 2	53	Liver	2	Fever, thrombocytopenia, anemia, hepatitis	Alive	IgM+ IgG- PCR (DENV)	
Present Study Case 3	31	Kidney	8	Fever, thrombocytopenia, diarrhea, hepatitis	Alive	IgM+ IgG+ NS1+ PCR+ (DENV4)	IgM- IgG- NS1+
Present Study Case 4	48	Kidney	4	Fever	Alive	IgM+ IgG- NS1- PCR-	

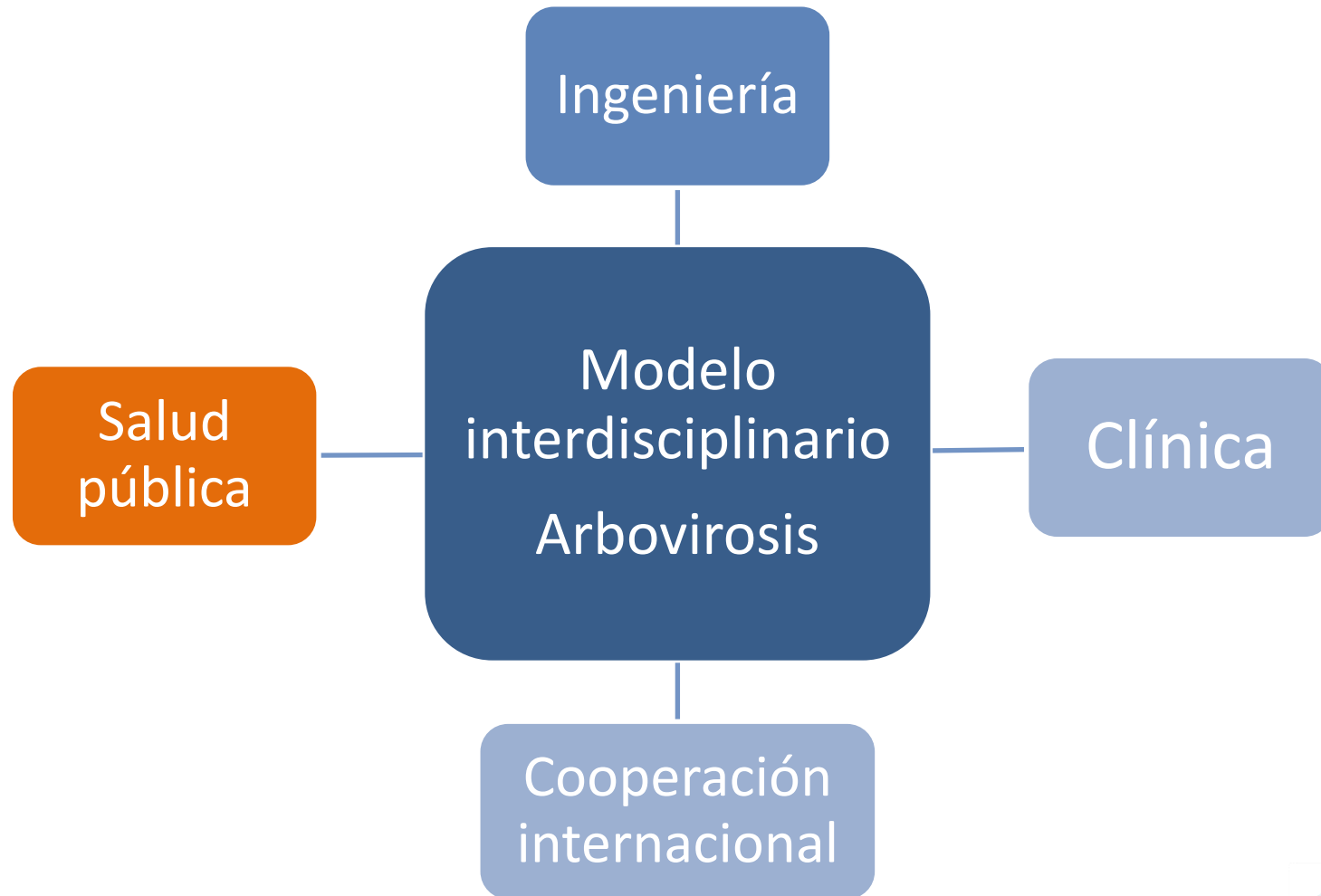
PCR, polymerase chain reaction; NS1, non-structural protein 1; DEN, dengue serotype.
 * Donor of case 1-2. Suspect with fever, thrombocytopenia first week post transplant
 b Donor of case 3-4. Consider screening donors during outbreaks with rapid NS1 antigen, IgM, IgG
 NS1 antigen present before clinical symptoms & across dengue serotypes
 Turn around time 15-20 mins for all 3 tests, high specificity/sensitivity in primary infection
 Risk vs Benefit evaluation to defer/accept donors

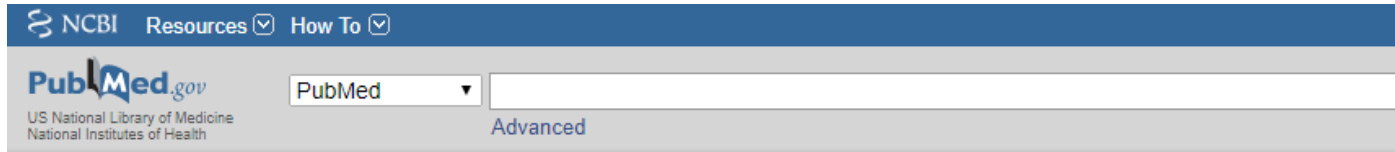
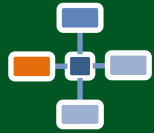
Rosso F. Braz J Infect Dis 2018;22(1):63-69.

- Symposium: When Transplant Tours the World . Saturday, October 6, 2018: 2:00 PM-3:15 PM
- Michele I Morris, MD, FIDSA, FAST University of Miami



Modelo de trabajo colaborativo





Format: Abstract ▾

PLoS One. 2017 Aug 2;12(8):e0181208. doi: 10.1371/journal.pone.0181208. eCollection 2017.

Community context and sub-neighborhood scale detail to explain dengue, chikungunya and Zika patterns in Cali, Colombia.

Krystosik AR¹, Curtis A², Buritica P³, Ajayakumar J², Squires R², Dávalos D^{4,5}, Pacheco R^{3,4,5}, Bhatta MP¹, James MA¹.

⊕ Author information

Abstract

BACKGROUND: Cali, Colombia has experienced chikungunya and Zika outbreaks and hypoendemic dengue. Studies have explained Cali's dengue patterns but lack the sub-neighborhood-scale detail investigated here.

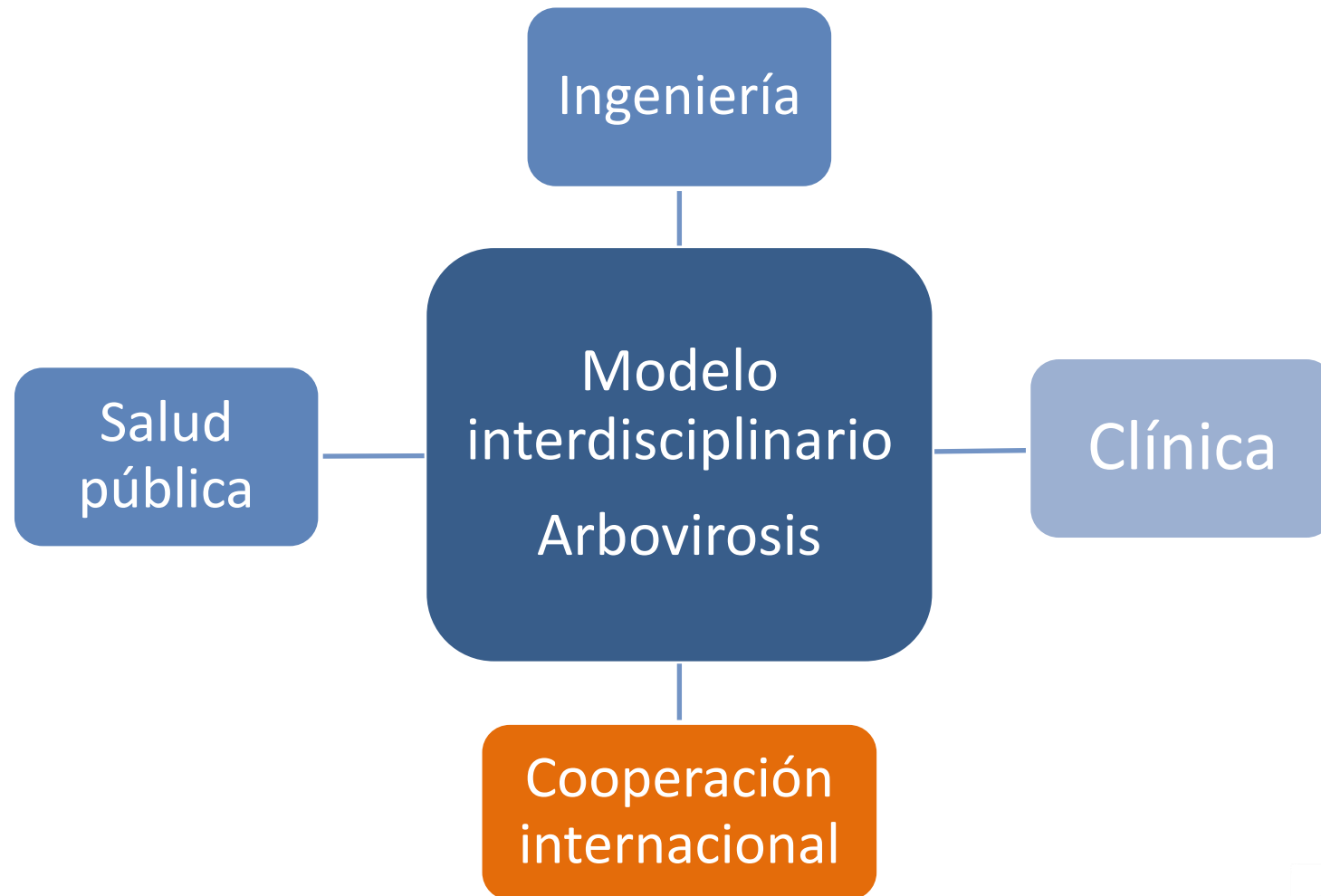
METHODS: Spatial-video geonarratives (SVG) with Ministry of Health officials and Community Health Workers were collected in hotspots, providing perspective on perceptions of why dengue, chikungunya and Zika hotspots exist, impediments to control, and social outcomes. Using spatial video and Google Street View, sub-neighborhood features possibly contributing to incidence were mapped to create risk surfaces, later compared with dengue, chikungunya and Zika case data.

RESULTS: SVG captured insights in 24 neighborhoods. Trash and water risks in Calipso were mapped using SVG results. Perceived risk factors included proximity to standing water, canals, poverty, invasions, localized violence and military migration. These risks overlapped case density maps and identified areas that are suitable for transmission but are possibly underreporting to the surveillance system.

CONCLUSION: Resulting risk maps with local context could be leveraged to increase vector-control efficiency- targeting key areas of environmental risk.



Modelo de trabajo colaborativo



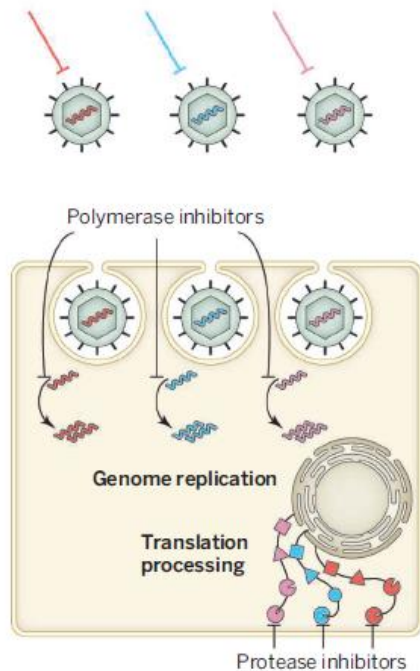
INFECTIOUS DISEASE

Combating emerging viral threats

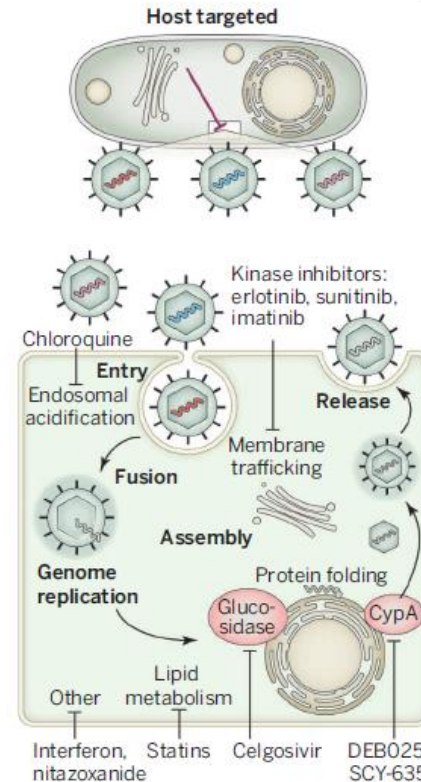
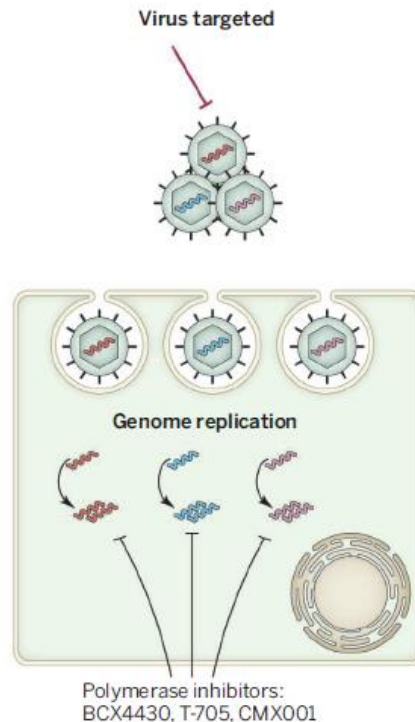
Broad-spectrum antiviral drugs are under development to treat emerging viral diseases such as Ebola and dengue for which no specific, licensed treatments exist

By Elena Bekerman and Shirir Einav

“One drug, one bug”



“One drug, multiple bugs”





Investigación básica

October 3-7 • San Francisco, CA • www.idweek.org



Advancing Science, Improving Care

2565. A Novel Prognostic Gene Set for the Prediction of Severe Dengue

Makeda L Robinson, MD, Timothy E Sweeney, MD, PhD, Rina Barouch-Bentov, PhD, Malaya K Sahoo, PhD, Ana Maria Sanz, MD, Szu-Yuan Pu, PhD, Eliana Ortiz, Clinical Laboratory Technologist, Luis Albornoz, MD, Fernando Rosso Suarez, MD, Jose G Montoya, MD, FIDSA, ... [Show more](#)

Open Forum Infectious Diseases, Volume 5, Issue suppl_1, 26 November 2018, Pages S72, <https://doi.org/10.1093/ofid/ofy209.173>

Published: 26 November 2018

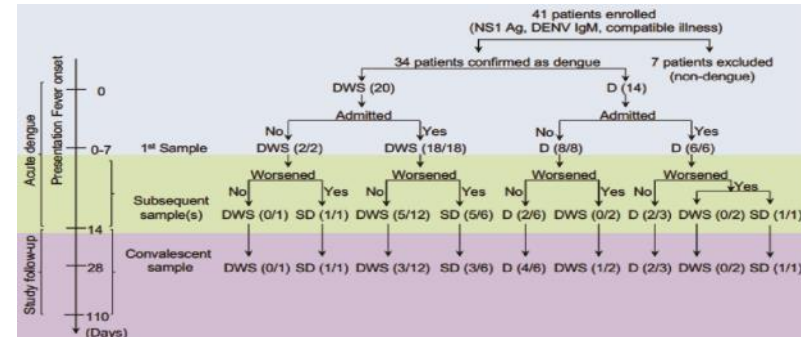
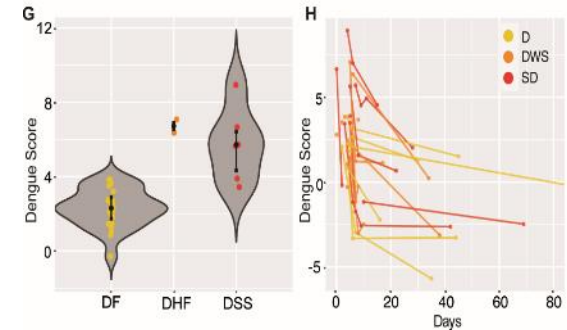


STANFORD UNIVERSITY



FUNDACIÓN VALLE DEL LILI

Excelencia en Salud al servicio de la comunidad





Cooperación internacional

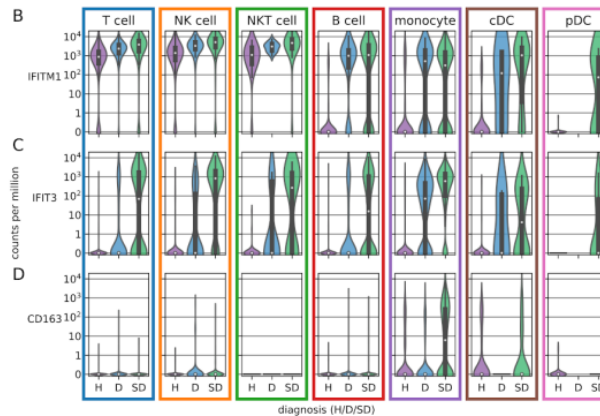
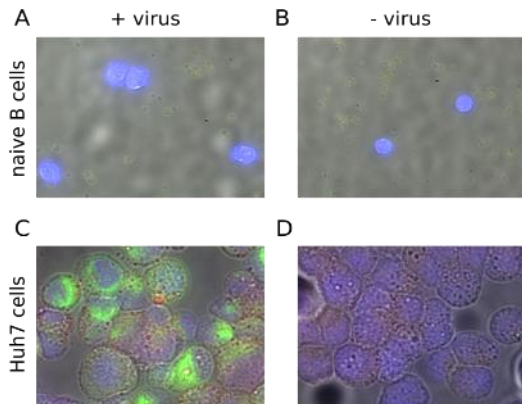
Investigación básica

PNAS Proceedings of the National Academy of Sciences of the United States of America

Virus-inclusive single cell RNA sequencing reveals molecular signature predictive of progression to severe dengue infection

ib Fabio Zanini, Makeda Robinson, Derek Croote, Malaya Kumar Sahoo, Ana Maria Sanz, Eliana Ortiz-Lasso, Ludwig Luis Albornoz, Fernando Rosso Suarez, Jose G Montoya, Benjamin A Pinsky, Stephen Quake, Shirir Einav

doi: <https://doi.org/10.1101/388181>





Alianza grupos de investigación



Dr. Luis Villar

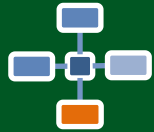


Red de Conocimiento y Cooperación



Universidad
Industrial de
Santander





NCBI Resources How To

PubMed.gov

US National Library of Medicine
National Institutes of Health

PubMed

Mother-to-child transmission of Chikungunya virus: A systematic review and meta-analysis

Create RSS Create alert Advanced

Format: Abstract

Send to

See 1 citation found by title matching your search:

PLoS Negl Trop Dis. 2018 Jun 13;12(6):e0006510. doi: 10.1371/journal.pntd.0006510. eCollection 2018 Jun.

Mother-to-child transmission of Chikungunya virus: A systematic review and meta-analysis.

Contopoulos-Ioannidis D¹, Newman-Lindsay S², Chow C³, LaBeaud AD¹.

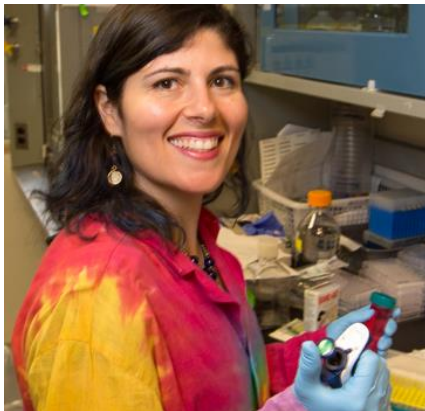
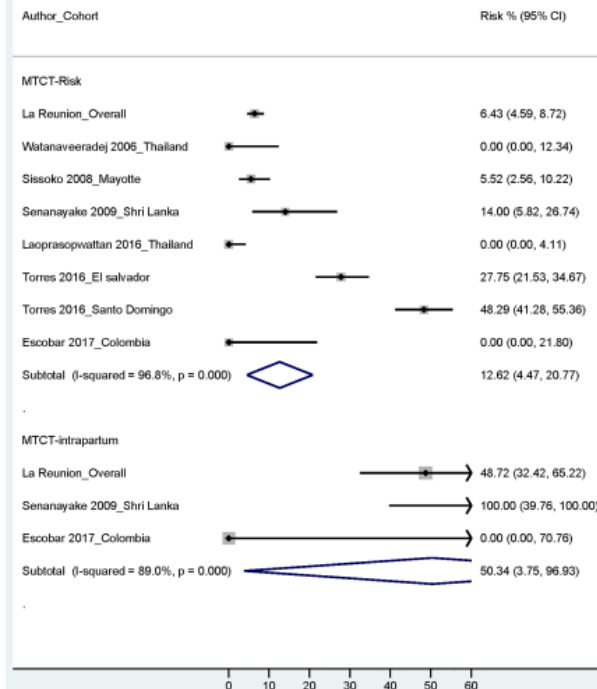
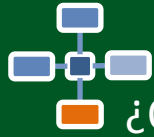


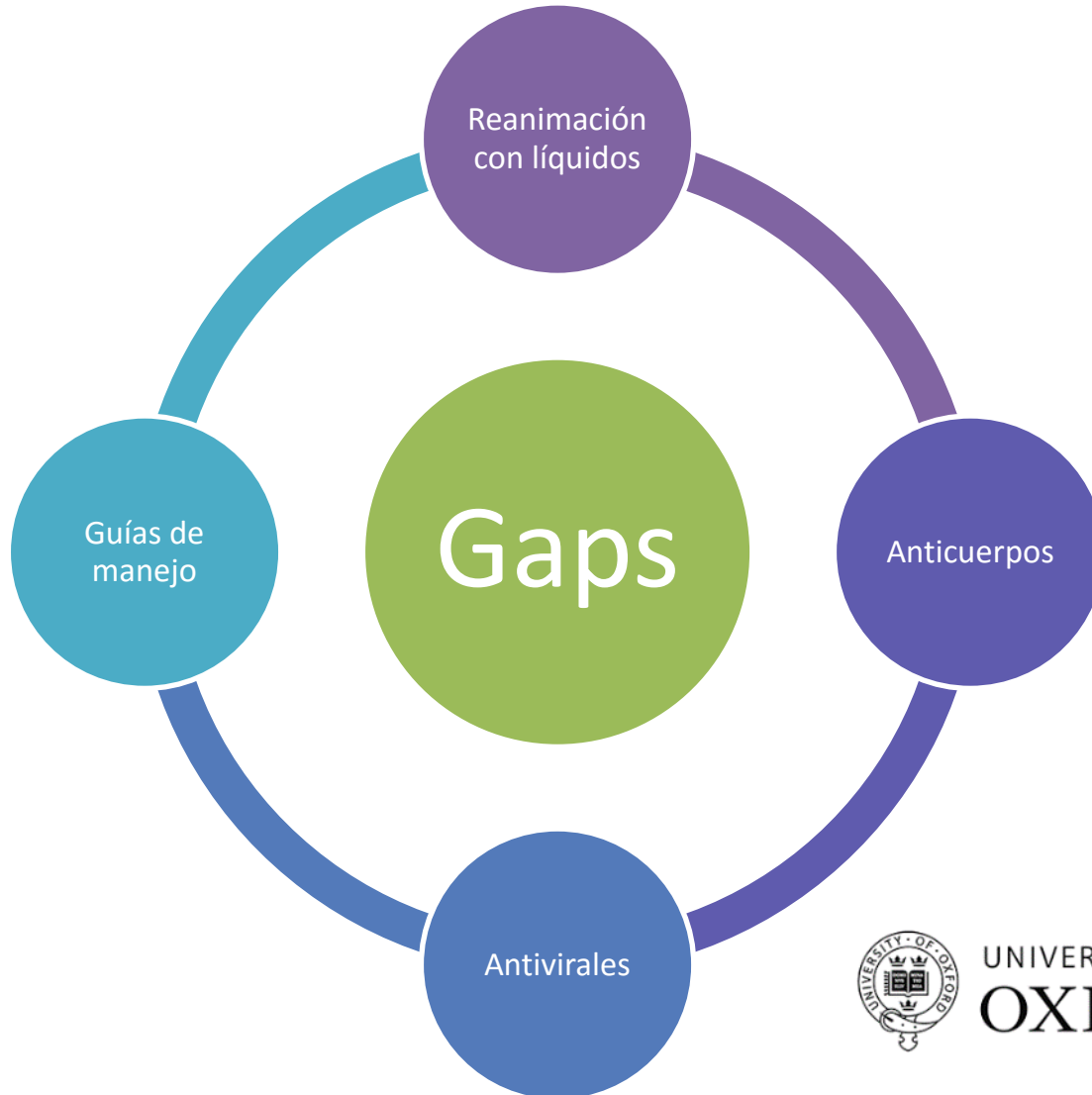
Fig 2. Mother-to-child-transmission (MTCT) risk: Overall and among intrapartum maternal infections. (For studies that did not report data on all (symptomatic and asymptomatic) neonatal infections, we extrapolated the data from the symptomatic neonatal disease cases [27, 51, 55]; and we considered that the MTCT-risk was at least the risk of symptomatic neonatal disease. Most cohorts that reported neonatal infections had reported only symptomatic cases [27, 51, 55] [S3 and S4 Tables]).





Scoping Review – Tratamiento de Dengue

¿Qué tanto se ha investigado sobre el tratamiento del dengue?



Investigadores senior:

- Fernando Rosso, FVL
- Bridget Wills, Oxford

Investigadores asociados:

- Luis Gabriel Parra, FVL
- Jonny García, CIDEIM
- Alejandra Del Castillo, CIDEIM
- Juan Camilo Hernandez, ESE Suroriente
- Maria Elena Tello, Univalle
- Brenda Coll, Univalle
- Cristhian Garcia, Univalle
- Laura Aguirre, Univalle



UNIVERSITY OF
OXFORD

wellcome trust





Investigación básica



Manifestaciones neurológicas de arbovirus Chikungunya, Dengue y Zika en Colombia

Estudio multicéntrico de casos y controles.

Objetivo: conocer acerca de las complicaciones neuro-inflamatorias asociadas con los arbovirus: Dengue, Chikungunya y Zika.

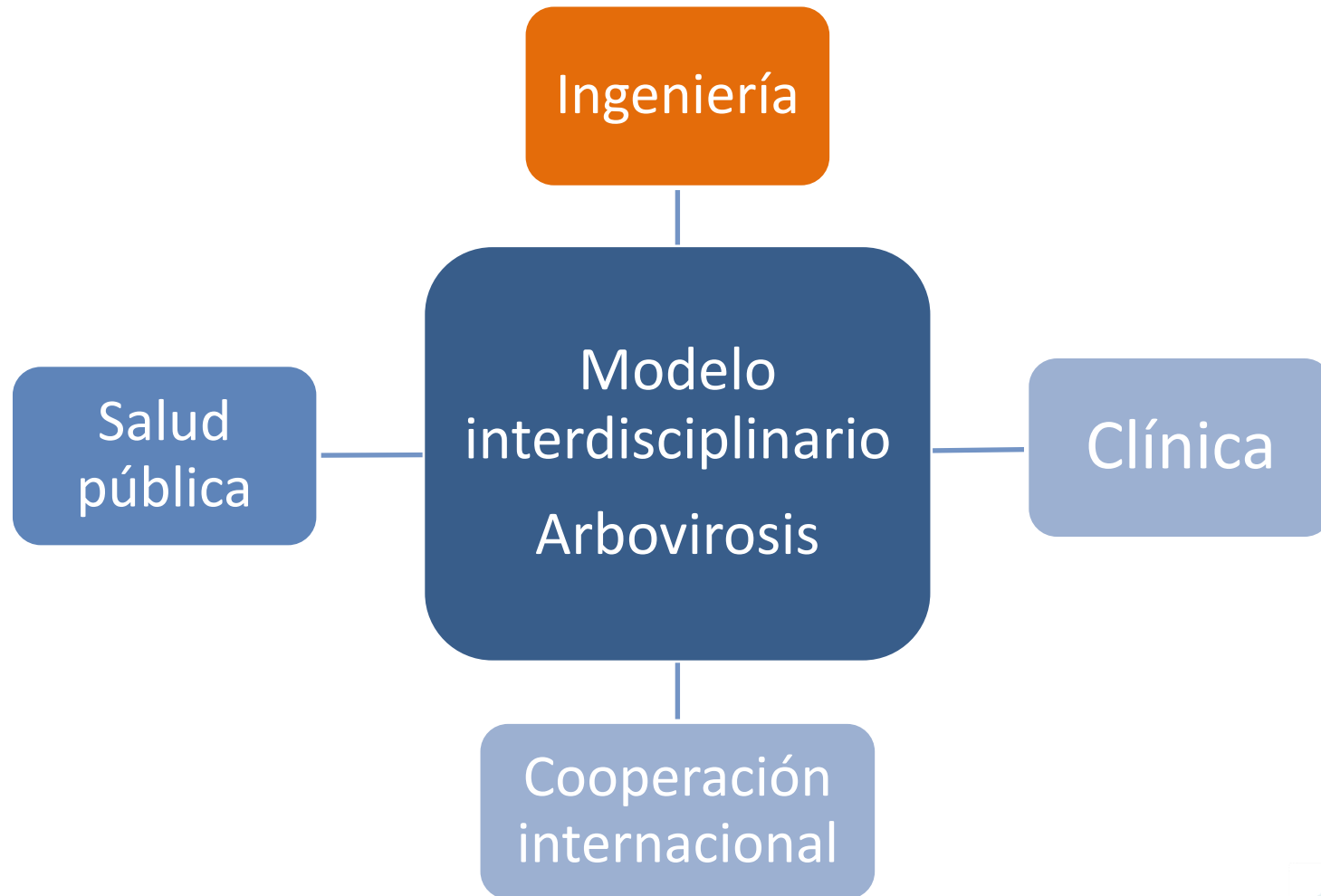


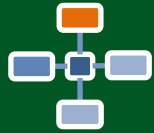
¿Existe una asociación entre las enfermedades neuroinflamatorias y la infección por arbovirus?

¿Cuáles son las características genéticas y de la respuesta inmune desencadenadas



Modelo de trabajo colaborativo

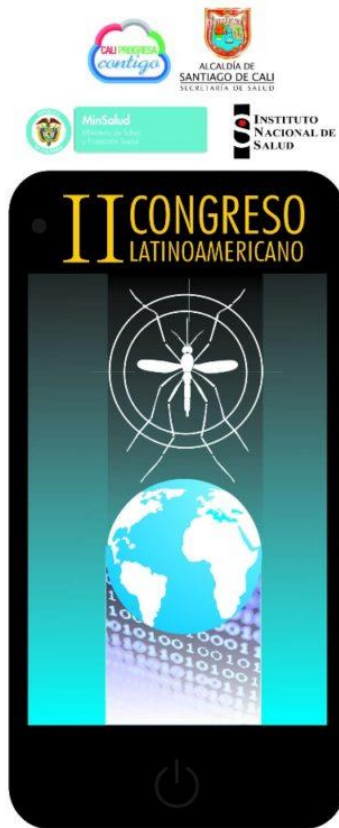


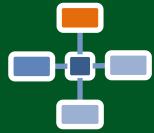


Tecnología – Salud móvil



LA TECNOLOGIA EN EL CONTROL DEL VECTOR *Aedes aegypti*





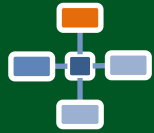
**A mobile application for, management and surveillance of vector-borne diseases in Cali,
Colombia: an evaluation of usability and acceptability in a hospital setting**

Sarita Rodríguez¹, Ana María Sanz¹, Gonzalo Llano², Andrés Navarro², Luis Gabriel Parra¹,
Krystosik, A. R, Fernando Rosso^{2,3}



En revisión *





Ingeniería

Unicesi | Instituto de Ingeniería / FACULTAD DE INGENIERÍA / EUNGS

FEVER dx

la aplicación que interviene en el manejo oportuno del dengue

El dengue es una enfermedad transmitida por vectores (ETV) que genera una alta morbilidad y que puede ser mortal, es hiperendémica en nuestra región y requiere, de manera obligatoria, notificación al sistema de vigilancia del gobierno.

Investigadores del proyecto: Grupo de Investigación IZ de Icesi: Doctor Gonzalo Linao Ramírez (Director de la Maestría en Informática y Telecomunicaciones de la Universidad Icesi – Investigación), estudiantes de la Maestría e Ingenieros Andrés Aguirre y Gustavo Álvarez, y el Doctor Andrés Navarro Director de IZT.

Por parte de la Fundación Valle del Lili, el Doctor Fernando Rosso Infectólogo y Director del Centro de Investigaciones Clínicas, La Médica e Ingeniería Telemática Sarita Rodríguez, Coordinadora de este proyecto en el área de Proyectos de Tecnología y Salud Médica del Centro de Investigaciones. Los médicos Luis Gabriel Parra y Ana María Sane.

[41] Inv_Tercera edición



Agradecimientos

Colaboración Nacional

Harry Pachajoa
Gustavo Ospina
María Fernanda Escobar
Luis Armando Caicedo
Pablo Andrés Moncada
Juan Diego Vélez

Luis Ángel Villar

Lyda Osorio
Beatriz Parra

Diana María Dávalos
Andrés Navarro
Gonzalo Llano



Colaboración Internacional

Shirit Einav
Benjamin Pinsky
Amy R. Krystosik
Desiree LaBeaud

Bridget Wills





“La mente no preparada no puede ver
la mano extendida de la oportunidad”

Alexander Fleming