

Prevention of sylvatic human rabies with massive rabies prophylaxis

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SUMMARY

- Vampire bat rabies is enzootic in the Peruvian Amazon River Basin. Hematophagous bat bites to humans are everyday events among populations in the Amazon Basin.
- Condorcanqui Province, at Amazonas Department in Peru, was the source of most of the sylvatic rabies cases in the Americas from 2007 to 2011.
- Amazonian indigenous populations are at high risk for the disease because their lifestyle and limited access to post exposure rabies prophylaxis.
- In 2011, Peru implemented the Plan of Massive Rabies Pre-Exposure Prophylaxis (Pre-EP) for high rabies risk communities in the Amazon region, the Plan considered the application of cell-culture vaccines to all population in the provinces of Condorcanqui and Bagua.
- By 2012, human rabies cases in Amazonas Department, dropped from approximately 20 children annually to only 2 adults, those two cases had refused to get Pre-EP during the vaccination campaign at the end of 2011.
- From this experience 3 more regions of Peru joined the Plan, resulting in 90,877 persons immunized in the Peruvian Amazonian region to date.
- In 2015, a human rabies outbreak in a different part of the Peruvian Amazon basin was responded with a massive rabies post exposure prophylaxis for the affected towns and Pre-EP for the neighboring ones.
- While no other intervention tools, are available for rabies control in hematophagous bats, and bat bites continue as a common event in high risk areas for sylvatic rabies, massive rabies prophylaxis appears as the solely effective intervention to prevent rabies deaths.

BACKGROUND

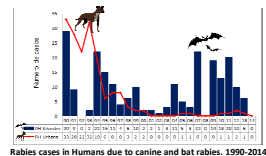
ESPECIE RESPONSABLE DE MUERTES HUMANAS 1975-2013 PERU

REGIONES AFECTADAS	MURCIÉLAGO	CHOTNA	BURRO	BOVINO (casos)	TOTAL
AMAZONAS	106	0	0	0	106
PIURA	5	0	0	0	5
SAN MARTÍN	0	0	0	0	0
LORETO	21	0	0	0	21
MOQUEGUA	0	0	0	0	0
CUSCO	0	0	0	0	0
AREQUIPA	0	0	0	0	0
APURIMAC	7	1	0	0	8
AYACUCHO	0	0	0	0	0
JUNÍN	0	0	0	0	0
PUNO	0	0	0	0	0
CALAMARCA	0	0	0	0	0
TOTAL	139	1	0	0	140

Geographical distribution of human rabies in Peru by bites species

Common vampire bat: *Desmodus rotundus*

Wounds due to vampire bat bites in children



- Persistence of human rabies outbreaks due to vampire bat transmission through bites in the Amazonas department was evident since 1975.
- Traditional outbreak response used nervous tissue vaccine for people regarded bitten. Never covered >20% of populations, leaving 80% of them susceptible.

Pre-EP INTERVENTION

- In 2011, a MoH decision to intervene susceptible population in Amazonas lead to the Massive Rabies PreEP Plan, targeting all population in the Condorcanqui and Bagua provinces initially, and later extended to other risk areas.
- The plan was justified by persistent human rabies outbreaks in children, and vampire bat bites statistics from MoH and collaborative research with the CDC, that documented high rates of exposures among all population, characterizing the Peruvian Amazon Basin as a very high risk area for sylvatic rabies.
- A MoH decree was issued, a vaccine donation of HDVC Rabies vaccine was accepted, and funds for obtaining PVCV were authorized.
- As a coincidence Peru MoH started a decentralization process, giving autonomy to Regional Health Offices.

Evidence that justifies intervention

PERSONAS MORIBUNDAS POR MURCIÉLAGOS REGIONES DE RIESGO 2009-2013 PERU

REGION	2009	2010	2011	2012	2013	TOTAL
AMAZONAS	1576	5716	2245	2193	833	12013
CUSCO	50	169	36	44	20	716
LORETO	1122	856	1458	1380	590	5406
JUNIN	119	435	179	142	29	894
MOSTO PAND	485	224	270	229	41	1254
TOTAL	3332	7379	4313	3885	1513	20263



Tabla 1- DISTRITO DE RIESGO A INTERVENIR

REGIÓN	PROVINCIA	DISTRITO
AMAZONAS	CONDORCANQUI	NO SOYOSO
	CONDORCANQUI	PEREYEA
AMAZONAS	BAGUA	NEBA
	BAGUA	ABANICO
CUZCO	LA CONVENCIÓN	CHAMARÉ
LORETO	DATÉN DEL MARAÑÓN	PEREYEA
LORETO	DATÉN DEL MARAÑÓN	BARBUDICE

Massive PreEP Activity

RESULTADOS VACINACIÓN PRE-EXPOSICIÓN 2011-2013

REGION	POP. A	2011	2012	2013	POP. VAC.	CUB.
AMAZONAS	82365	2537	2938	2935	5469	66.29
JUNIN	1800	-	2936	2935	5870	282.50
CUSCO	25046	-	-	9645	9645	64.30
LORETO	21886	-	-	4760	4760	21.75
TOTAL	122232	2537	22146	17079	74182	61.59



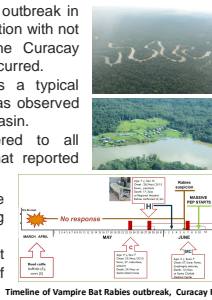
- Success of the intervention was observed in 2012, when only 2 human cases were reported in Condorcanqui, both were adults that refused PEP.
- Evidence indicated rabies circulation and bite exposures persisted but no cases were observed among the population that received PEP.
- The Pre-EP intervention was extended in 2013 to three more Departments with high sylvatic risk areas.
- The current intervention does not cover yet all Peruvian Amazon Basin, because some departments with not previously reported rabies outbreaks don't feel it is necessary to join the Plan.
- Current rabies epidemiology, with new rabies areas and increased colonization of the tropical forest justifies continuation and expansion of the intervention.

Sylvatic rabies risk areas in Peru and its expansion in recent years.

Departamento	Provincia	Distrito	2010	2011	2012	2013
Amazonas	Bagua	Imaza	2	1	20	1
	Condorcanqui	BT Cerepa	2	1	20	1
Amazonas	Bagua	Nieba	10	10	10	10
	Bagua	Rio Santiago	1	1	1	1
Apurimac	Abancay	Abancay	1	-	-	-
Ayacucho	La Mar	Chungay	-	-	-	1
Cajamarca	Chota	Chimban	-	-	-	1
Cusco	La Convención	Echarate	-	-	7	-
Peru	Peru	Peru	-	-	1	-
Loreto	Datén del Marañón	Andoas	KAP	14	20	10
Total de casos de rabia silvestre						

PEP OUTBREAK RESPONSE

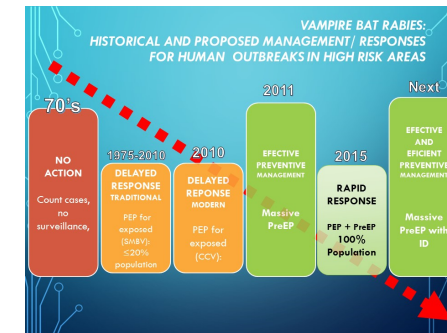
- In May 2015, a human rabies outbreak in Loreto, was reported in an location with not previous rabies reports at the Curacay River. Only 3 human deaths occurred.
- Presentation and setting was a typical vampire bat rabies outbreaks as observed in other areas of the Amazon Basin.
- Rabies PEP was administered to all population in the locations that reported human rabies deaths.
- Pre-EP was indicated for the population of neighboring towns.
- PVCV was used. RIG was not available at the time of intervention.



Locality	Intervention	Initiated	Completed	Only Missed			Booster Coverage
				1 dose	2 doses	Missed	
Solitario	PEP (5 doses)	121	129	0	2	0	98.74%
Tipicala	PEP (5 doses)	132	117	0	14	1	88.64%
Libertad	PEP (5 doses)	58	48	0	8	2	82.76%
San Rafael	PreEP (3 doses)	171	171	0	0	0	100.00%
Hospital R.L.	PEP (5 doses)	4	4	0	0	0	50.00%
Total		500	469	0	24	1	93.80%

Population vaccinated in the location s affected by a vampire bat rabies outbreak. After the intervention no more human cases were reported in the Curacay River Basin.

CONCLUSIONS



- Massive rabies prophylaxis is the only effective tool available to prevent human deaths due to sylvatic rabies transmitted by hematophagous bats among the Amazon Basin human populations.
- The massive rabies prophylaxis strategy can be useful for populations other than the Amazon Basin, with similar barriers to access rabies biologics and are continuously exposed to rabies.

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