DRIVING PROGRESS TOWARDS RABIES ELIMINATION

Results of Gavi's Learning Agenda on rabies and new WHO position on rabies immunization

Meeting Report
1–3 May 2018, Kathmandu, Nepal

World Health Organization

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ACRONYMS & ABBREVIATIONS

ADG	Assistant Director General
ARACON	Asian Rabies Control Network
ASEAN	Association of South-East Asian Nations
CDC	Centers for Disease Control and Prevention
eRIG	equine rabies immunoglobulin
FAO	Food and Agriculture Association of the United Nations
GARC	Global Alliance for Rabies Control
HRH	Her Royal Highness
hRIG	human rabies immunoglobulin
IBCM	integrated bite case management
ID	intradermal
IDSP	Integrated Disease Surveillance Programme
IM	intramuscular
MoA	Ministry of Agriculture
MoH	Ministry of Health
NCDC	National Centre for Disease Control
NTD	neglected tropical disease
NTV	nerve tissue vaccine
OH	One Health
OIE	World Organisation for Animal Health
PARACON	Pan-African Rabies Control Network
PEP	post-exposure prophylaxis
RIG	rabies immunoglobulin
SAARC	South Asian Association for Regional Coordination
SAGE	Strategic Advisory Group of Experts on Immunization
SARE	Stepwise Approach to Rabies Elimination
SIRVERA	Regional Rabies Surveillance System in the Americas
VIS	Vaccine Investment Strategy
WHO	World Health Organization

SETTING THE SCENE

"Rabies is entirely preventable, and should not take lives… It is an enemy we can defeat. Let's work together for a rabies-free world" - Dr Ren Minghui (Assistant Director General (ADG), Communicable Diseases, WHO)

Rabies is one of the oldest and most terrifying diseases known to man and is still responsible for almost 60 000 deaths every year. Up to 99% of human cases are transmitted through dog bites. Most human deaths occur in Africa and Asia; approximately 80% of cases occur in rural areas, and around 40% of cases occur in children under the age of 15. Although it is fatal, rabies is preventable through three pillars:

- Awareness of rabies disease, and what to do in case of a bite;
- Access to timely, affordable post-exposure prophylaxis (PEP) for people; and
- Mass dog vaccination to prevent disease at its source.

The tools for prevention exist: we need to work with countries to show value in interventions, build ownership, and reach communities most at risk. Since 2016, the Gavi Learning Agenda has provided an opportunity for countries to gather programmatic experiences and necessary data to support consideration of rabies vaccines in the 2018 Gavi Vaccine Investment Strategy (VIS). In May 2018, participating countries gathered to:

(i) Disseminate new SAGE recommendations on human rabies immunization;
(ii) Discuss results of studies under the Gavi Learning Agenda on rabies; and
(iii) Determine needs and next steps to reach zero human deaths by 2030, worldwide "Zero by 30".

Her Royal Highness (HRH) Princess Chulabhorn Mahidol of the Kingdom of Thailand opened the meeting, highlighting the high-level commitment for rabies elimination in the Asia region. "*It is my hope that the work that has been undertaken… [in Thailand] will benefit not only the people and animals at risk of rabies in Thailand, but also other countries who need to implement control and preventive measures*" -HRH Princess Chulabhorn.

HRH was supported by Dr Ren Minghui (WHO ADG, Communicable Diseases) and local officials and dignitaries, including the Secretary of the Ministry of Health and Population Dr Pushpa Chaudhary, the Secretary of the Ministry of Livestock Development Mr Prakash Mathema and the Minister of State for Health and Population the Honourable Ms Padma Kumari Aryal. Drs Naveen Gupta (India) and Wenwu Yin (China), and Drs Amila Gunesekera (Sri Lanka) and Kinley Penjor (Bhutan) accepted their nomination as co-chairs and co-rapporteurs, respectively.

"Rabies is not a statistic: it's about people. It's about suffering, about humanity, about public service and public good… and trying to reach equity and access for all" – Dr Bernadette Abela-Ridder (WHO-NZD)

Photo: Her Royal Highness Princess Chulabhorn lights a ceremonial lamp to open the meeting. Photo: Grace Kessels

SESSION 1: WORLD CAFÉ

To begin the meeting, participants brainstormed answers to the following questions:

What are your expectations for this meeting?

- Provide an update on country progress and exchange best practices
- Network and continue dialogue after the meeting
- Review new SAGE guidelines and develop country implementation plans
- Assign countries responsibilities and create agendas with a timeline for elimination
- Establish a uniform reporting system and increase cross-border collaboration

What was the most important change in rabies control in the past 10 years in your country or region?

- Introduction of intradermal (ID) vaccination and increased access to vaccine
- Phased out use of dangerous nerve tissue vaccines (NTVs)
- Established national rabies control programmes or strategies
- Scaled up rabies awareness in communities
- Better coordination between human and animal health sectors

What could the rabies situation look like in the future, compared to the current rate of progress?

- Rabies becomes a myth!
- PEP accessible to all (low cost, short course, easy to administer)
- Robust surveillance systems resulting in better data
- Well managed dog populations (increased dog vaccination, innovation in animal health control, improved attitudes towards animals and responsible dog ownership)
- One Health concept truly working in practice, supported by strong legislative policies in all countries and One Health education integrated into school curricula
- Innovative technologies used effectively

SESSION 2: GLOBAL AND REGIONAL STRATEGIES

Objective: *country, region and partner engagement to reach Zero by 30*

We expect multisectoral and cross-border collaboration in countries to effectively combat rabies, but we also need robust collaboration at the regional and international level. The following sessions highlight the strong commitment for technical collaboration among organizations, and the regional and global mechanisms in place to support country efforts.

Global Strategic Plan to reach Zero by 30

Presented by: B. Abela-Ridder (WHO), K. De Balogh (FAO), & P. Tshering (OIE).

In 2015, the world called for action by setting a global goal of zero human deaths from dog-mediated rabies by 2030, worldwide: 'Zero by 30'. In response to this call, the United Against Rabies collaboration was formed by WHO, FAO, OIE and GARC. The collaboration leverages the unique strengths and expertise of each organisation to provide a coordinated, inclusive strategy: the Global Strategic Plan to End Human Deaths from Dog-Mediated Rabies by 2030.

"Countries are key. The role of the strategic plan is to empower, engage and enable them [countries] *to get on with their work… The United Against Rabies collaboration is there to back them up"*

The plan pursues three objectives to reach Zero by 30: (i) to effectively use vaccines, medicines, tools and technologies; (ii) to generate, innovate and measure impact; and (iii) to sustain commitment and resources. It bolsters countries to implement their own national elimination plans through evidence-based guidance on rabies best practices, fostering political will, building local capacity, and driving coordinated regional and global efforts. The plan draws on the Stepwise Approach to Rabies Elimination (SARE) tool to help countries identify their needs, steps to move ahead, and to set clear milestones and indicators. Countries were tasked to consider what steps they can implement now to eliminate rabies, and what they could do with more support as we move toward 2030. The Global Strategic Plan can be accessed here: http://www.who.int/rabies/news/RUA-Rabies-launch-plan-achieve-zero-rabies-human-deaths-2030/en/

Regional strategies to reach Zero by 30

Presented by: G. Gongal (WHO-WPRO).

"To eliminate dog-mediated rabies before 2030, we need regionally focussed, multi-sectoral collaboration among countries: if one country works a lot and another not, we won't be able to achieve our goal"

The Association of South-East Asian Nations (ASEAN) and the South Asian Association for Regional Coordination (SAARC) are actively engaged in supporting rabies elimination efforts in their respective member countries (Box 1). In 2008, ASEAN member countries called for rabies elimination in the region by 2020. ASEAN supported projects conducted in Laos, Cambodia and Vietnam helped inform the ASEAN Rabies Elimination Strategy (http://asean.org/storage/2017/02/ASEAN-Rabies-EliminationStrategy.pdf), while OIE vaccine banks assisted mass dog vaccination campaigns in many ASEAN countries. Similar initiatives undertaken by SAARC include pilot projects on rabies control in Bhutan, Bangladesh and Pakistan, and the development of a regional strategy, Prevention and Control of Rabies in SAARC Countries (http://www.searo.who.int/entity/emerging_diseases/documents/sea_cd_316.pdf)

"The SARE tool involves different steps to define where a country is, and what is needed to prevent rabies. If neighbouring countries go through the same process, we can identify gaps, risks for animal movement, and what steps to take to address that… We encourage countries to engage in this process."

Box 1. ASEAN and SAARC member countries

ASEAN: Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Viet Nam

SAARC: Afghanistan, Bhutan, India, Maldives, Pakistan, Sri Lanka

SESSION 3: NATIONAL STRATEGIES FOR RABIES ELIMINATION

Objective: *energizing effective rabies elimination strategies in countries and communities*

National strategies are the cornerstone of rabies elimination, and are emphasised in the global strategic plan to reach Zero by 30. The following presentations highlighted specific aspects of national programmes in China, Vietnam and Kenya.

Animal and human health strategies in China

Presented by: W. Yin (China CDC)

In 2017, 516 human rabies cases were reported in 27 of 34 provinces in China. This is a decline of 84% compared to the 2007 peak and reflects government support for rabies prevention and control. Initiatives include a Roadmap to Eliminate Dog-Mediated Rabies by 2025; National Medium and Long-Term Animal Epidemic Prevention Planning (2012-2020) by the Ministry of Health (MoH); and the National Plan for Rabies Prevention and Control (2017-2020) by the Ministry of Agriculture (MoA).

In 2006, a rabies post-exposure treatment regulation was implemented. This involved training of medical personnel and establishing standardized rabies clinics, to improve quality and access of PEP. In some provinces, rural residents can be reimbursed for PEP, increasing affordability. Recently strengthened animal control measures include increased dog immunization using inactivated vaccines, quarantine measures and improving public awareness.

In China, rabies surveillance is assisted by rabies being a notifiable infectious disease. Human cases are reported through a national database, with sentinel surveillance conducted for rabies cases, dog populations, PEP usage, and dog vaccination coverage. Positive rabies cases trigger an emergency response involving integrated preventative measures for humans and dogs. These measures have together resulted in a decreasing number of rabies cases in China over the past decade.

Recent changes to the national rabies strategy in Vietnam

Presented by: N. Thi Thanh Huong (National Institute of Hygiene & Epidemiology, Vietnam)

Rabies causes the highest proportion of deaths due to communicable diseases in Vietnam, with over 1000 deaths in 46 of 63 provinces during 2005-2016. PEP is expensive to provide, dog vaccination coverage low, and rabies associated with stigma and lost opportunities for affected families. In 2011, Vietnam endorsed the National Plan for Elimination I (2011-2015); in 2014 committed to leading rabies control among ASEAN countries; and in 2017 endorsed the National Plan for Elimination II (2017-2021).

The plans provide a legal foundation for evidence-based rabies elimination, and emphasise dog vaccination, access to PEP, and surveillance for human and animal cases. WHO, FAO, OIE and US CDC provided technical support for Vietnam's transition to Stage II, while a country steering committee engaged authorities from central through provincial levels. Stage II (2017-2021) aims to control rabies in domestic dogs by 2021, and achieve:

- Dog registration in >95% of communes, wards and towns
- >85% dog vaccination coverage in communes, wards and towns
- >70% of provinces nationwide observing zero human rabies cases for at least two consecutive years
- Reducing the number of high risk provinces by 60% compared to 2011-2015
- Reducing human rabies deaths by 60% compared to 2011-2015

Since 2015, great progress has been made in increasing dog vaccination coverage, improving access to PEP, conducting awareness campaigns, enhancing surveillance and diagnostic capacity, responding to rabies outbreaks, building local capacity, establishing rabies-free zones, and finalizing legal policies for rabies control.

National rabies elimination strategy in Kenya

Presented by: A. Mwatondo (Kenya MoH)

In 2014, Kenya launched its milestone National Rabies Elimination Strategic Plan (2014 -2030). The plan is informed by the SARE tool and builds on successes from other countries. It centres around mass dog vaccination; provision of pre- (PrEP) and post-exposure prophylaxis; improved education and awareness; and enhanced surveillance. The plan divides the country into three zones for sequential implementation of activities: (A) high-burden pilot counties (B) neighbouring counties; and (C) the rest of the country.

Since 2014, mass dog vaccination has been conducted in three of five pilot counties, with vaccination coverage improving from 50% to 70%. National PEP guidelines have been finalized in line with the updated WHO position and promote ID vaccination. Awareness raising involves actively engaging the media through radio, newspapers, rabies programmes in schools and World Rabies Day activities. National surveillance is currently hospital based using DHIS2 software systems. However, toll-free lines and contact tracing have been implemented in two pilot counties so far.

Challenges have included poor funding amid many disease priorities, low dog vaccination coverage, poor vaccine forecasting and PEP stock-outs in health facilities; and high costs and inadequate cold chain for vaccine delivery to remote areas. The pilot counties have shown that domestic ownership, national and regional plans are vital to catalyse funding and ensure sustainability. National One Health platforms have played a critical role in engaging multi-sector stakeholders, however better integration of rabies into other zoonotic and neglected tropical disease (NTD) programmes remains needed. Kenya is looking to innovative methods to improve outcomes, and plans to use the knowledge generated so far to scale up activities to Zone B (neighbouring counties).

Photo: A World Rabies Day run promotes rabies awareness in Kenya. Photo: Zoonotic Disease Unit, Kenya

Insights from the panel discussion

- High level political commitment in countries is critical to programme success. We need to elevate the status of rabies so that the disease gets the attention and resources required to tackle it. We can do this by communicating how easy it is to eliminate: we have the tools and the focus to follow through.

- NTDs are indicators for impact for multiple sectors. We need to engage different partners and sectors from the provincial through national level from the beginning: in planning and goal setting. If we can build relationships between sectors, they can work together towards a common goal.

- Champions are essential to bridge the gaps: we need individuals or institutions engaged to take the lead and get together other stakeholders and partners. It is easier for international organisations to support countries who have a lead, and who develop and take ownership of proposals.

- Intradermal vaccination is key to increasing access to affordable PEP

- Mass dog vaccination is the most effective strategy for rabies control and should be prioritised over dog population management if resources are limited.

- If vaccine is limited, mass dog vaccination should focus on achieving high coverage in high-burden areas: reaching 70% in a few areas will have greater impact than reaching 10% nationwide.

- Engaging the education sector is important to prevent dog bites and build awareness about rabies.

"We need vocal champions, thinking globally and acting locally"

SESSION 4: THE NEW WHO POSITION ON RABIES IMMUNIZATION

Objective: *way forward to increase uptake of immunization policy changes*

New WHO position on rabies immunization

Presented by L. Knopf and N. Salahuddin

The SAGE working group consisted of 15 members and selected experts, and had regular conference calls over the course of a year from 2016 to 2017, and a face-to- meeting to identify relevant questions, and provide suggestions for recommendations based on existing evidence. The group identified questions on use of PrEP and PEP, where new scientific evidence could potentially inform a proposed revision of the global policy of rabies biologicals. In order to develop recommendations, the group reviewed all published and grey literature on rabies vaccine and RIG. The recommendations focused on countries with resource constraints. One of the main goals of the working group, was to identify PEP schedules that are feasible, as well as being cost and dose sparing. Important issues included trying to identify a shortened schedule and reducing the number of doses need for PEP while maintaining immunogenicity and clinical protection. Previously approved intramuscular PEP regimens consisted of up to 5 clinic visits and up to 28 days, and required 4 to 5 vials (depending on the regimen), resulting in a huge financial burden. About 20 years ago, the Thai Red Cross intradermal regimen was introduced, requiring 2 doses given over 5 visits, and taking 3 months to complete. In 2005, this schedule was shortened to 4 visits, taking 28 days to complete (updated Thai Red Cross). The SAGE WG considered several regimens for potential recommendation but ultimately decided on the IPC regimen consisting of 2-2-2 doses given in the deltoid region intradermally on day 0, 3 and 7. This regimen had sufficient evidence to support its immunogenicity being equivalent to that of previous regimens. Data for this regimen was provided by the Institut Pasteur du Cambodge (IPC), which retrospectively assessed data from over 3000 patients. Moreover, the importance of ID administration was stressed by the working group, as its use is always more cost-effective, particularly in high-volume clinics.

Similarly, evidence regarding use of RIG was also reviewed to determine if the current recommendations for RIG infiltration can be made more cost-effective while remaining efficacious. Studies have shown that in some countries, only human RIG was considered acceptable (and not eRIG), but because of the high cost, was rarely used. Studies have shown that eRIG and hRIG are clinically equivalent, and that there is very little added value of injecting the remainder of RIG intramuscularly. Moreover, given the high cost and unavailability of RIG, few patients currently receive it so its use was prioritized further to highlight specific patient groups/characteristics in which RIG is necessary. In April 2017, the proposed recommendations were presented to SAGE who ultimately approved all the recommendations. In April 2018, the WHO position paper on rabies vaccines was released, describing the new recommendations.

The final recommendations are summarized in the table below:

	2010	**2018**
PEP regimen duration	3-4 weeks 4-5 visits	**1-2 weeks** **3-4 visits**
Vaccine savings PEP	ID: 0.8 ml IM: 5 ml	ID: **-20%** (0.6 ml) IM: **-20%** (4 ml)
RIG infiltration mode	Wound + distant IM	Wound only **- 40%** RIG vials **- 80%** RIG volume/ person
RIG allocation	All category III exposures	High risk cat. III exposures **- 60 to 90%** need RIG

Potential public health impact in countries and personal account of SAGE rabies working group members

Presented by N. Salahuddin and H.Wilde

The Indus Hospital (TIH) in Karachi Pakistan is a private hospital which provide care free of cost and sees more than 3000 outpatients/day. It has a rabies prevention center with a consistent supply of vaccine, where the new SAGE recommendations were implemented in January 2018. From Jan-April, 2017, the center saw nearly 1600 patients with category 2 or 3 wounds and used ~2400 vials of rabies vaccine for PEP. During the same timeframe in 2018 after the new recommendations had been implemented, the center saw nearly 1800 patients with category 2 or 3 wounds and used ~2100 vaccine vials. During the same timeframe, 709 patients required RIG, and 1030 vials of ERIG were used in 2017. By comparison, 710 patients required RIG in 2018, but only 823 vials were used, following implementation of the new recommendations.

The new recommendations have resulted in huge savings for both vaccine and RIG. Additionally, compliance increased to 90% in 2018 compared with ~70% in 2018. Other potential public health impacts include a reduction in travel costs as patients travel from far away to receive PEP, and are required to pay for accommodation in order to complete a full course. Thus, the new recommendations have been extremely beneficial at TIH.

The global burden of rabies is estimated at 60 – 70,000 deaths/year, but is likely much greater. Rabies can be difficult to diagnose, and even if it is diagnosed, cases are not always reported, leading to a gross underestimation of the global burden. There is a need to strengthen both diagnosis and reporting of rabies, particularly in rural areas where many people do not seek care for dog bites.

The incubation period for rabies can be long; similarly, immunological memory from vaccination (either PrEP or PEP) is likely lifelong, though it may be different for immunocompromised persons. To date, there has only been one documented case of a person dying from a dog bite despite having received PrEP; this person did not receive a booster. However, immunocompromised patients remain a concern, even if they have received PrEP.

RIG is too costly to use in many endemic countries and its availability is limited. As a result, few people receive it. Injecting the remainder of the calculated dosage distal to the wound, intramuscularly is wasteful and unnecessary. Studies have shown that isotope-labelled RIG injected into the wound remained at the site of infection for at least 2-3 days. Distal IM does not reach the wound efficiently and there are barely detectable levels at the wound site. Therefore, it is important to inject as much RIG as possible directly into wound. In addition, there is a window of approximately 0-10 days after a bite, where there are no antibodies in circulation so a bite patient is completely unprotected. Thus, it is important to administer as soon as possible after a bite.

From local innovation to policy change and large-scale implementation in India

Presented by *M. K. Sudarshan*

Previous studies have estimated the burden of human rabies deaths in India to be 20,000/year, accounting for approximately 1/3 of the global burden. There are an estimated 30 million dogs in India and approximately 17 million animal bites annually. Currently, seven rabies vaccines are produced in country, and 30 million doses of vaccine are produced annually, with a production capacity of 58 million doses annually. 4 types of eRIG are produced in India, with 1.5 million vials produced annually, and a production capacity of 4 million vials. In addition, a single MaB product has been licensed in India, and 0.27 million vials have been produced since its launch in November 2017.

In India, NCDC, the National Center for Disease Control, is the technical agency of the ministry of health and a WHO collaborating center for rabies. Based on precedence, in order to operationalize and implement the new SAGE recommendations in India, a national expert consultation would be required at NCDC to adopt the recommendations for the country so that national guidelines for PEP can be revised accordingly. In 2003, when ID administration was introduced, a national multi-centric study was conducted to generate local evidence using Indian vaccines. A similar study may be recommended again using locally produced vaccine and RIG to ensure that similar results are achieved with local vaccine. The process would take approximately 1 year after which the results would need to be approved at a national expert consultation in 2019 in order for new guidelines to be issued in 2020. ID use would like be off-label as revising the product insert can take 3-5 years. However, some states currently use rabies vaccines off-label (for ID administration), so this is not a new concept in India. Public health in India is state-dependent so some states may choose not to implement the national guidelines. Finally, there is a need to reassess the burden of rabies in India as the current estimates are likely outdated.

National needs and feasibility for changing rabies immunization practices in Mongolia

Presented by A. Doniddemberel

In Mongolia, a total of 36 human rabies cases have been reported in the last 40 years with a peak in 2014. 68% of cases were associated with dogs, with the remaining cases being caused by wildlife or livestock. Approximately 6,500 people receive PEP every year in Mongolia. Between 2006 and 2017, the greatest numbers of bites occurred in March, April and May, and the most bites occurred among herders. In 2017, animal bite events increased 1.6 times compared to the previous 10 years.

In 2013, nerve tissue based-vaccine was replaced with cell-culture based vaccine following recommendations of tripartite meetings. Substantial progress has been made in zoonotic disease coordination in the last 10 years. A zoonotic disease coordination mechanism was established in 2010 and expanded in 2013 to go beyond animal and human health sectors to include the environmental sector, research institutions, emergency management and food safety authorities among others. In 2016, rabies was identified as a zoonotic disease priority for both the animal and the human health sector. Formal coordination and communication mechanisms among sector have been established including event/information sharing, risk assessment, risk communication and response, and web-based reporting. This has been aligned with the national disaster management system. In addition, FETP plays a central role in both preparedness and outbreak response.

A dog population management strategy was approved by the City Governor in 2017, including administrative and regulatory procedures concerning dog certification, identification, licensing, and registration, and responsible dog ownership. Neglected zoonotic disease prevention and control was included in the National Programme on Communicable Diseases for 2017-2020. A tripartite meeting was held in Mongolia in 2017 involving FAO, WHO and other partners. Weekly updates including a risk assessment of zoonotic events and public education messages are shared online, through social media and a newsletter. A risk assessment must be conducted after every verified event involving the relevant sectors mandated by standard procedures. Future priorities include improving data availability and management, improving risk communication of neglected zoonotic diseases, developing human and animal rabies control guidelines, and implementing a dog population management strategy.

The rabies situation and the way forward in Lao PDR

Presented by S. Soutthaniraxay

Rabies is endemic in Lao PDR and is 1 of 5 priority zoonotic disease. There is an elimination goal of 0 deaths by 2020, and a draft of a national strategy for rabies prevention and control with several objectives including:

- To protect people and animals from getting rabies,
- To provide information ob rabies prevention and control to authorities at each level
- To provide information on dog vaccination and rabies to communities
- To have a good collaboration between human and animal health sectors.

There are four strategies for rabies prevention and control:

- Engagement and public participation
- Rabies prevention and control in animals
- Rabies surveillance in humans and animals
- Rabies prevention in humans

There are several mechanisms in place for multi-sectoral collaboration: rabies control activities are included in national workplans, there is information sharing between the human and animal health sector, joint response when outbreak occurs, and joint-organization of World Rabies Day between both sectors. However, there are several challenges to rabies elimination in Lao PDR. Rabies is not included into the routine reporting system making it difficult to monitor disease trends. Information sharing needs to be strengthened and the national strategy on rabies prevention and control has not yet been approved or implemented systematically. Finally, there is a lack of access to rabies vaccines and RIG.

Moving forward, the national strategy needs to be finalised and approved. Multi-sectoral collaboration between health and non-health sectors needs to be improved, and funds for rabies control need to be increased. There is a need to strengthen surveillance of rabies in humans and animals (particularly event-based surveillance in health facilities), and there are plans to develop a joint guidebook/SOPs for rabies.

BOX 2. Highlights of update to WHO position on rabies immunization

1. **Reduced duration and number of doses for PEP & PrEP schedules**
2. **ID administration is more cost-effective than IM administration**
3. **Prioritization of RIG to high risk groups within category 3 bites**
4. **No longer necessary to inject remainder of calculated RIG dosage intramuscularly**

Insights from the panel discussion

- It is important to continue encouraging the use of ID administration which is both cost and dose saving. Many countries have successfully introduced it, but there are several that still need to do so
- There are several barriers to implementing the new SAGE recommendations including:
    - A misconception that there is higher wastage with ID administration if the patient-volume is low
    - It requires additional trainings for health workers, as they may not be as familiar with ID administration as they are with IM administration, as many other vaccines are given intramuscularly. In some places health workers are very receptive to ID administration as they know that it's dose sparing; elsewhere, they are reluctant as it requires additional training
    - ID administration is off-label for most vaccines, and may then require additional approval from various regulatory bodies within individual countries.
- Possible suggestions and some ways that have worked for other countries to use a non-PQ vaccine, introduce ID administration or change regimens include:
    - Introduction in pilot areas initially, to document the benefits to the authorities
    - Collaborative efforts between animal and human health sectors
    - Support from tripartite meetings
    - Revising national guidelines to include ID administration and to specify that opened vaccine vials do not need to be discarded after 6-8 hours but can instead be used as PrEP. Revising guidelines may in some countries be conducted by national expert committees or intuitional committees
    - Ensuring that the appropriate committees meet to approve the changes, though this can be challenging
    - In some countries, because ID administration is off-label, there is a need for the label to be changed, or a phase 3 trial conducted with the permission of national regulatory authorities. Alternatively, national regulatory authorities can approve off-label use of vaccines.

SESSION 5: AWARENESS & HEALTH-SEEKING BEHAVIOUR

Objective: building rabies awareness in at-risk communities

Bite prevention education

Presented by: D. Stewart (Consultant)

Generally, dog bites are not merely caused by a rabies infected dog, but rather by multi-factors of human, environment, and dog behavioural influences. Dog and animal bites can be prevented by simply understanding why an animal may bite. There are various human behaviour aspects (human aggression, alcohol and drugs, lack of respect), dog aspects (abuse, resource guarding, aggression, breeding), and environmental factors (cleanliness, historical affects) that contribute to dog bites. Prevention of dog bites education is important and must become a key focal point of the elimination of human rabies. It is necessary to create new education concepts that will build better relationships, holistic humane dog experiences, responsible community dog ownership, and mutual respect, and to integrate these concepts into school curriculum.

Bite prevention education should target:

- Schools
- Education departments
- Adults (parents, dog owners, influential community leaders)
- Private sector (funding and community responsibility)
- Human health (government and private sectors)
- Animal health (government, private, agricultural sectors)
- Animal welfare organisations

"*Education is the most powerful weapon which you can use to change the world*" – Nelson Mandela

Sri Lanka: Community engagement, school education, a success story across the country?

Presented by: A. Gunesekera (National Hospital Sri Lanka)

Education is a strong rabies prevention tool and can be done at any level, but requires innovative solutions. Sri Lanka provided examples of education among military members and in the finance sector. Starting with influential groups in the community can have an expansive effect as the knowledge spreads throughout the community. These types of awareness programs should also be replicated among school children.

"[The] military are part of our society... and schoolkids why can't we talk to schoolkids? Awareness is the number one thing... Rabies is not like influenza or cancer… this education will save lives, it will save on PEP and on RIG" – A. Gunesekera

Photo: Human rabies prevention training with military personnel in Sri Lanka. Photo: Amila Gunesekera

Vietnam: PEP health seeking behaviour in pregnant women, role of traditional healers in rabies exposures

Presented by: N. Thi Thanh Huong (National Institute of Hygiene and Epidemiology)

Pregnant and breastfeeding women

Rabies deaths from rabies vary greatly in different regions of Vietnam, with the north bearing the largest burden of rabies deaths. Rabies PEP health-seeking behaviour also varies with 54% of all bite victims not vaccinating following a potential exposure because they did not believe that vaccination was necessary. Vietnam conducted an assessment looking at rabies vaccine hesitancy and deaths among pregnant and breastfeeding women. Of the women included in this study, six patients died (two breastfeeding mothers and four pregnant women). Of these women, none sought rabies PEP after being bitten. The primary reason for not seeking PEP included patient's fear of risk to foetus or breastfeeding child.

Nguyen HT, Tran CH, Dang AD, et al. Rabies Vaccine Hesitancy and Deaths Among Pregnant and Breastfeeding Women — Vietnam, 2015–2016. MMWR Morb Mortal Wkly Rep 2018;67:250–252. DOI: http://dx.doi.org/10.15585/mmwr.mm6708a4

Traditional healers

Among children 6-15 years old, 27% seek care through a traditional healer after being bitten. In 2015-2016, there were trainings for traditional healers as an initiative from the rabies control programme in order to learn about rabies prevention and control in animals and humans. This was an initiative from the National Rabies Control Programme 2011-2021. There were 20 training courses in two provinces in Vietnam. Additionally, in 2017, the Prime Minister of Vietnam banned the use of traditional medicines, traditional remedies, and family inherited medicinal recipes for use in rabies prevention.

Pakistan: Toward a rabies free Karachi

Presented by: N. Salahuddin (The Indus Hospital Karachi)

The Indus Hospital (TIH) is a tertiary hospital, funded by grants, in Karachi that is free-of-cost to patients. The catchment population of TIH comprises of a multi-ethnic population of approximately 2.5 million people. From 2009-2017, there were almost 100 cases of human rabies at TIH and Jinnah Postgraduate Medical Centre (JPMC) alone.

In order to control rabies in Pakistan, there is a need to both reduce the population of dogs, in addition to mass vaccination. Current efforts include training on mass dog vaccination, sterilization surgeries, and rehabilitation, and community engagement sessions. These community engagement sessions have occurred weekly in 2018 from March until May and are ongoing. They have also vaccinated around 2000 dogs since January.

Moving forward, Karachi hope to scale up to mass dog vaccinations and animal birth control, initiate work in the remaining union councils, and reach out to other communities for possible collaboration.

https://indushospital.org.pk/

BOX 3. Integrated Bite Case Management (IBCM)

Presented by: R. Wallace (US Centers for Disease Control and Prevention)

A risk assessment should always be conducted to determine if a rabies exposure has occurred. These risk assessments must take into consideration the epidemiology of rabies in the area, severity of exposure, and clinical features of the animal. Integrated bite case management (IBCM) is the collaborative investigation of rabies suspect animals by veterinary and human health professionals to achieve the following:

- Prevent additional exposures to the suspected rabid animal
- Identify all exposed people and animals
- Provide accurate and timely assessment of risk for medical decision-making
- Reduce unnecessary provision of rabies PEP

There are many success stories of the implementation of IBCM in various countries include the US, Vietnam, and Haiti. Vietnam and Haiti have both developed pilot projects and have plans to scale-up. Furthermore, IBCM provides a cost-effective solution to reducing the use of rabies PEP with an average cost of US$0.05 per person on average for the cost of the program and rabies PEP.

Insights from the panel discussion

Traditional healers

- Traditional medicine is an issue worldwide but traditional healers need to be incorporated into rabies prevention
- In examples in other countries, when PEP was given for free, the problem around traditional healers decreased; it was the cost that was driving patients to use traditional healers

Dog prevention education

- There is a dog prevention toolkit from FAO and GARC for use in schools
- Educational videos on dog vaccination are available online form WHO and FAO
- Various online platforms include an app in Mexico to prevent responsible dog ownership

Education works

- From a study done in Vietnam, there was a 70% reduction in dog bites between case groups that participated in an education program and control groups that did not
- While typically target children, there is also the opportunity to target non-traditional groups: men, teachers, parents
- Education gives empowerment to the community and gives them ownership over the decisions about rabies in their community

SESSION 6: ONE HEALTH COLLABORATION

Objective: *implementing effective One Health strategies in communities, countries, regions*

One Health (OH) is the collaborative effort of multiple disciplines working locally, nationally, and globally to attain sustainable optimal health for the ecosystem. An OH approach is necessary for the control and elimination of rabies worldwide. The following sessions detail country approaches from which to learn best practices.

Thailand: How did the implementation of OH change with progress of rabies control and elimination, how does OH work a decentralized level

Presented by: K. Thiangtum (Kasetsart University)

One Health (OH) practice in control of zoonotic diseases in Thailand has come through the close collaboration between the Department of Disease Control (DDC) and the Department of Livestock Development (DLD), academic institutions, local administration, and multi-sectoral organizations. The OH approach for rabies control in Thailand aims for

- Vaccination and population control in animals (>80% vaccination of dogs and cats)
- Community engagement (triangulated through public awareness, regulation, and responsibility)
- Post-exposure prophylaxis (PEP) in humans (accessible to all public)

In Thailand, at the national level, the government has placed rabies control on the national agenda with multi-sectoral collaboration throughout the various levels of government. At the very local level, the Ministry of Public Health, Ministry of Interior, and Ministry of Agriculture work together with village health volunteers and animal health volunteers on risk communication, animal registration, and animal vaccination. An OH approach results in more efficiency of surveillance, response and control of rabies at the local level through communication, and appropriate data collection and sharing. The implementation of this project at the local level has also resulted in rising community awareness on rabies and the threat of rabies vaccine.

There are still areas of improvement in Thailand. Thailand aims to increase the capacity of animal health staff through collaboration and coordination with other sectors such as NGOs and Buddhist temples. Thailand also wants to further increase community participation by using villagers to create ownership and engagement in their own communities.

Introduction Chad and Cote d'Ivoire

Presented by: M. Lechenne (Swiss Tropical and Public Health Institute)

There are many different stakeholders involved in rabies control:

- Ministries
- Local authorities
- Health workers
- Veterinarians
- Dog owners
- Bite victims
- Media

There are also many different tools to keep the OH collaboration going:

- Joint training sessions
- Diagnostic tools
- Media releases, leaflets, posters
- Hotlines and SMS awareness messages
- Dissemination workshops
- World Rabies Day activities

Chad and Cote d'Ivoire provide examples of areas in which the stakeholders have worked together to create and implement the various tools that enable an OH collaboration.

Chad: Setting up and scaling up OH collaboration

Presented by: R. Mindekem (Centre de Support en Sante International)

Chad has established five peripheral diagnostic facilities as a reinforcement of surveillance through the building of logistical and personnel capacity in Chad. They have also held joint training sessions for human and animal health sectors. During these trainings, they trained animal health workers on animal observation and human health workers on intradermal injection. They also created a leaflet on information on what to do in case of a bite with a hotline number. Chad plans to hold dissemination workshops at the end of the project to discuss the results and evaluate the pilot system. A national elimination plan will be presented to stakeholders as well.

Cote d'Ivoire: Setting up and scaling up OH collaboration

Presented by: M. Tetchi (Institut National d'Hygiene Publique Ministere de la Sante)

Cote d'Ivoire reinforced surveillance through the building of logistical and personnel capacity (provided motorbikes to animal workers and built shelters to observe dogs). Cote d'Ivoire also developed sensitization materials (targeting children) and has held school education materials. Trainings on intradermal administration has resulted in moving from intramuscular to intradermal administration in some locations. Finally, Cote d'Ivoire has conducted some dissemination workshops with local authorities, and plans to hold more in the near future.

Take home messages from Chad and Cote d'Ivoire

Presented by: M. Lechenne (Swiss Tropical and Public Health Institute)

Final take home messages from the Chad and Cote d'Ivoire examples

- Encourage positive feedback and positive completion
- Use existing networks and structures where possible
- Give input on all stakeholder levels

Insights from the panel discussion

Funding

- In Chad, mass dog vaccination funding falls between a gap in government funding; NGOs have come in to fill the gap
- However, small amounts of funding from NGOs have allowed Chad to conduct some activities, which, in turn, have been successful in building awareness and now municipality governments are also providing funds to support
- Typically the animal sector has less funding than the human sector; if relationships are built, this provides an occasion to leverage opportunities in the human sector to also advocate for funding in the animal sector

OH can be integrated into other mechanisms

- Rabies work should not be siloed; can use the same mechanisms and platforms that are used for other conditions

It is necessary to have an OH collaboration at all levels (from national to local)

- OH involves more than the veterinary and health sector

SESSION 7: SURVEILLANCE AND DATA REPORTING

Objective: *efficient reporting systems, programme monitoring and linking to the global level*

Linking national rabies data to the global level

Presented by: L. Knopf

Data is a powerful tool to inform programmes, measure progress, target interventions and build advocacy. WHO have identified key human and animal rabies indicators for national reporting to inform global data (see also Annex 2):

- Number of human rabies cases reported
- Number of animal bite cases reported
- Number of people who receive PEP
- Number of dog rabies cases reported
- Number of rabies cases reported in animals other than dogs
- Estimated dog population
- Estimated dog vaccination coverage

Shared data (Box 4) would be made available on the Global Health Observatory (http://apps.who.int/gho/data/node.main.NTDRABIESHUMANDEATHS?lang=en). The above indicators are harmonised to avoid duplication with other bodies, such as OIE and regional databases such as the Pan-African (PARACON) and Asian (ARACON) Rabies Control Networks, and the Regional Rabies Surveillance System in the Americas (SIRVERA). WHO aims to launch a rabies module of the WHO integrated data platform in the coming months, and is working on mechanisms to allow automatic interfacing with other reporting platforms.

BOX 4. Four steps to link country data reporting to the global level

1. **Identify** national focal point responsible for rabies data collection
2. **Collate** national annual data on key indicators (Annex 2)
3. **Validate** rabies data through rabies focal point at MoH
4. **Submit** data to WHO-HQ (via excel template or integration with DHIS2)

Frequency of reporting: annual (end March)

What we need:

- ✓ Countries to share their national rabies focal point with WHO
- ✓ Countries to commit to reporting data on an annual basis
- ✓ WHO to provide an interface for data collection

The following presentations assess systems, challenges and solutions for rabies surveillance and data reporting in Nepal, India and Thailand.

Overcoming limited programme data in Nepal

Presented by: K. B. Shresta

Rabies is endemic in Nepal. More than 100 people are estimated to die of rabies each year, and 94% of reported human cases are due to dog bites. With regard to rabies, districts in Nepal are categorized as high risk (20 districts), moderate risk (39 districts), and low risk (16 districts). Currently, rabies surveillance is passive: monthly recording formats exist for hydrophobia cases, animal bites, and PEP usage, however reporting is irregular. Rabies cases are diagnosed at a central rabies laboratory, with plans to extend these facilities to the regional level.

Challenges include significant underreporting of rabies cases; non-notifiability of human rabies; lack of an approved national rabies control strategy; lack of a federal structure for reporting cases; and limited coordination between private hospitals, veterinary and human health authorities. These could be overcome by (i) making rabies a notifiable disease in Nepal; (ii) developing a national rabies control strategy using a One Health approach; (iii) increasing visits to reporting sites; (iv) establishing a federal system for rabies surveillance and reporting; and (v) assessing the potential for innovative strategies e.g. a mobile phone app to improve reporting.

Programmatic data variability across settings in India

Presented by: A. Narayana

India is diverse, populous, and can be difficult to manage due to its size and complexity. From 2017-2018 a study was conducted across seven states and two islands to investigate (i) reporting mechanisms for dog and human rabies surveillance and (ii) logistics of rabies biologicals in the government and private sector.

Dog bites are included as one of 18 disease/ conditions monitored across all states/ union territories by the Integrated Disease Surveillance Programme (IDSP). From 2012-2017, IDSP dog bite data from the seven states showed concordance with IDSP data from the National Centre for Disease Control (NCDC) in only 46% of instances (13 of 28). Based on this data and the 2011 census, dog bite incidence was calculated to be between 0.31% and 0.41% during this period. This may not reflect the true incidence, as the data obtained from government hospitals is related to availability of vaccine in the hospital, and does not include dog bites treated at home or in private clinics.

The study also showed variability in use of rabies biologicals. Three of the seven states used mostly ID vaccination in the government sector, while other states and the private sector used mostly IM vaccination. Equine RIG (eRIG) was used occasionally in the government sector. Human RIG (hRIG) was used by the government in only one state, and for high income groups in the private sector. Human rabies surveillance was passive and poor, with human cases grossly underreported by states. A new initiative aims under the National Rabies Control Programme aims to improve human surveillance by establishing linkages with infectious diseases in hospitals.

How national reporting systems support the rabies programme in Thailand

Presented by: P. Panlar

Overall, human and animal rabies cases in Thailand have been decreasing since the 1990s. However, since 2015, misinformation (lack of awareness) and issues with dog vaccination have led to increases in both animal and human cases. In 2010 and 2013, websites were established for reporting of animal and human cases, respectively. Human vaccination and health data have since been integrated, with collaborative mechanisms in place between the Department of Livestock Development, the Department of Local Administration, the Health Data Center, the Health Information System, and the Ministry of Public Health.

Human and animal rabies surveillance data are integrated to give an interactive map that shows high-risk areas in Thailand. It identifies where human and animal cases (including species) have been reported, as well as human and animal population data. The map also shows dog vaccination coverage, with an association seen between areas with incomplete rabies vaccination and numbers of infected animals. This extensive and

precise surveillance allows for effective planning, and targeting of interventions such as mass dog vaccination and rabies awareness campaigns to high risk areas.

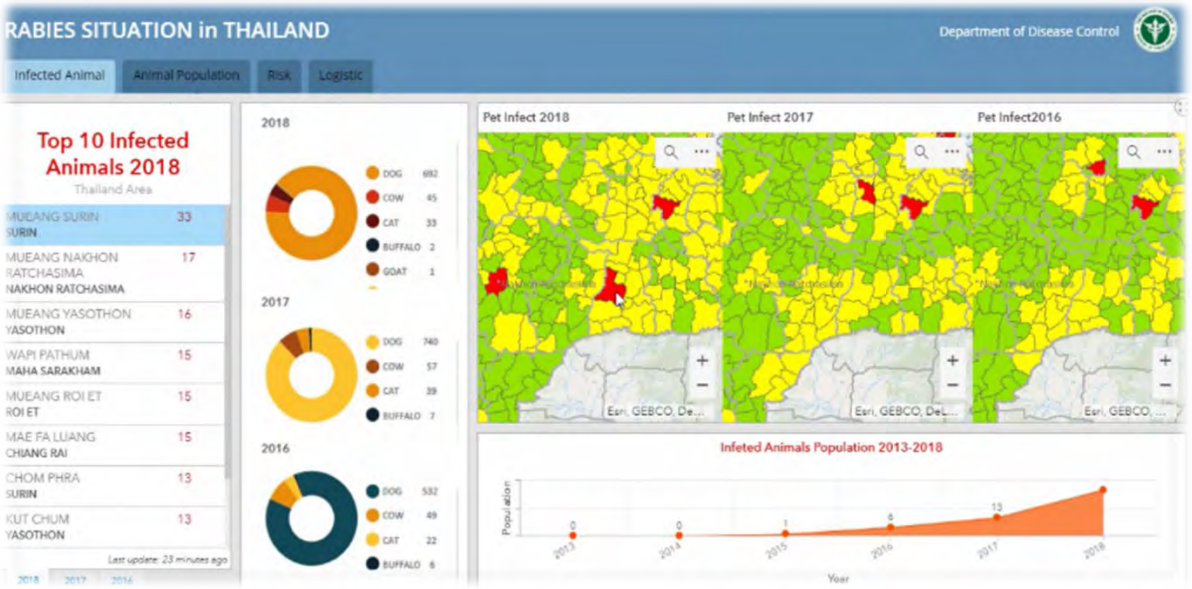

Photo: screenshot of interactive map showing rabies-infected animals by location, number and species throughout Thailand.

Insights from the panel discussion

- Notifiability is essential to make rabies part of formal disease reporting systems. It is associated with investment and budgeting for programme activities, motivates better reporting, and helps our understanding of disease through better data.

- One Health training can connect human and animal health ministries so that when rabies cases occur, they can contact the relevant focal point in either sector.

- Cross-border committees or human and animal health can exchange data for early warning systems.

SESSION 8: OPERATIONAL PROGRAMME DELIVERY

Objective: *strengthening vaccine delivery mechanisms at community, country, regional levels*

Global overview: Rabies vaccine and immunoglobulin use monitoring, reporting and forecasting

Presented by A. Li and N. Sreenivasan

In 2013, Gavi, the Vaccine Alliance, assessed a potential investment in rabies vaccine but ultimately decided instead to invest in research to fill knowledge gaps. These gaps included a lack of information on rabies burden and surveillance data, cost-effectiveness, health-seeking behaviour, vaccine demand, and PEP distribution, monitoring, and forecasting systems. In order to fill some of these gaps, an assessment was conducted to:

- describe delivery, distribution, and monitoring systems for rabies PEP
- identify areas that need to be strengthened, and
- understand the feasibility and logistical requirements of increasing access to rabies PEP.

An assessment tool was developed with questions grouped into 10 main categories including program delivery, vaccine procurement, demand, requests and distribution, cold-chain and vaccine storage, vaccine forecasting, vaccine monitoring and utilization. The tool was distributed to 25 countries and interviews were conducted with key informants at every level.

Key findings from the assessments indicate that access to rabies vaccine and RIG continues to be restricted to countries that can afford it; RIG continues to be largely unavailable in most countries in the public sector. Approximately 2/3 of countries assessed do not have subsidized/affordable vaccine widely accessible to patients in the public sector, with the primary reason for this being a lack of funding. Moreover, vaccine procurement is often based on available budget rather than vaccine forecasting and demand resulting in a cycle of continuous poor forecasting as there is not enough vaccine available to meet the demand. There is limited information on vaccine utilization in part due to a lack of standardization of monitoring tools and lack of mandatory reporting. Over half the countries assessed use non pre-qualified vaccines due to high cost and low availability of pre-qualified vaccines. Only 1/3 of countries exclusively use ID administration in the public sector. Almost half of all countries assessed have a regular system of distribution or collection for rabies vaccines, separate from routine vaccines.

Recommendations from the assessment indicate that there is a need to develop standardized global guidelines for rabies PEP, including examples of reporting tools. In order to improve reporting, it is important that reporting on PEP utilization is mandatory. Manufacturers should be encourage to apply for pre-qualification, and advocacy and training for ID administration should be strengthened to increase uptake in countries.

Rabies post-exposure vaccine and immunoglobulin supply chain in Kenya

Presented by A. Mwatondo

In Kenya, a survey was conducted to assess the logistics flow, demand, supply and forecasting for PEP vaccines and immunoglobulins in order to identify challenges and opportunities for improving PEP provision, accessibility, and affordability in the country. The survey was conducted in May-June 2017, in 5 counties (both pilot and non-pilot counties) and a combination of qualitative and quantitative data was collected. Selection of respondents was based on a purposive sampling procedure at four levels (national, county, sub-county, health facility) and included pharmacists, surveillance officers, public health officers, and EPI logisticians. Questions were grouped into 8 major categories and included vaccine forecasting, monitoring and reporting, procurement, cold chain and storage, among others.

Key findings from the survey included:

- procurement of rabies at the county level is inconsistent and dependent on funds

- the process for quantification and forecasting of vaccines is not standard at the county level for non-routine vaccines including rabies vaccines
- there is low awareness on use of RIG within the health sector. In one health facility, RIG was being used in place of vaccine.
- stock outs have been experienced in all counties ranging in duration from 4 weeks to 36 weeks.
- There are no clear and standardized reporting systems for usage of rabies vaccines, and follow-up mechanisms to determine access and completion of rabies doses for bite victims.
- EPI vaccines have sufficient cold chain at the county level but this is not the case for non-routine vaccines.

Survey results will be widely disseminated. There is a need to transition to ID administration. It was attempted to do this in the pilot areas; however, despite documentation to regulatory authorities that ID administration confers sufficient protection, it was not approved for use. It is necessary to identify mechanisms by which the off-label use can be accepted. Once approved, there is a need to train health workers on ID use.

The EPI infrastructure should be leveraged so that their experiences can be used to improve vaccine forecasting (taking into account bite data) and cold chain storage. Finally, there is a need to improve monitoring and reporting of rabies vaccine use and rabies, both in outpatient and inpatient settings.

Scaling up the network of PEP providing clinics in Vietnam

Presented by N. Thi Than Huong

In Vietnam, there are 63 provincial preventive medicine centers, which support 697 district medical centers, and ~11,000 commune health facilities. In 1996, there was a commitment from the prime minister to eliminate rabies. In 2007, the country switched from NTBV to CCBV. An elimination plan was established with phase 1 rolled out from 2011-2016, and phase 2 from 2017-2021.

In 2017, there were 430 vaccination points providing rabies vaccine, whereas in 2014 there were 656 vaccination points (distributed among 697 districts). The reduction in vaccination points has resulted in 39% of districts not having a vaccination point. RIG is provided at 132 vaccination points; 47 at the provincial level and 85 at the district level. Eight provinces do not have any vaccination points providing RIG. There are several challenges to provision of PEP in Vietnam. A full course costs approximately 30-80 USD which is paid entirely by patients. The demand for vaccine is not stable and there is no agency/group responsible for predicting the demand annually. Moreover, the vaccine is not produced in Vietnam so they are dependent on imported vaccine. There was a shortage of vaccine in 2017 due to increased demand and a lack of vaccine availability from one manufacturer (Verorab). Because of the stockout, a number of vaccination points had to send patients to the main hospitals for PEP. There is a need for improved mechanisms to predict vaccine demand. This responsibility should lie within a specific agency or programme, and demand should be predicted for 3 years at a time. In the event of a stockout or variation in supply, it should be reported in a timely manner. There is a need to maintain existing vaccination points and expand to increase the number. In addition, vaccination points should be piloted at the commune level, in areas of high rabies burden. Finally, the goal should be to produce vaccine locally.

BOX 6. Ways to improve vaccine forecasting

- Develop standardized tools for monitoring and utilization of bite patients and vaccine use
- Improve monitoring of vaccine use
- Institute mandatory reporting on vaccine utilization
- Ensure that there are sufficient funds to base vaccine procurement on forecasting and demand rather than on budget availability, to improve forecasting moving forward

Insights from the panel discussion

- Without proper monitoring of number of bite patients, number of patients requiring and receiving PEP, and monitoring of vaccine use, it is challenging to forecast vaccine quantities properly. A lack of funds results in vaccine procurement being based on budgets rather than forecasting. As a result, there is a lack of data on actual vaccine demand from health facilities, and as a result, poor vaccine forecasting. Moreover, because monitoring and reporting tools are not standardized or not always strictly enforced, vaccine forecasting is done insufficiently.
- There is need for strong collaboration between national, regional and local health authorities to address a disease like rabies which transcends provincial boundaries. In Vietnam, a clear chain of command and guidelines on how provinces and districts should implement MoH recommendations have resulted in a high level of national coordination for rabies.
- There are opportunities to integrate reporting for rabies with reporting for other diseases e.g. in Kenya, and app for reporting livestock diseases is used to collect data on dog bites.
- Innovative technologies and projects could be used to address gaps in communication, delivery and reporting. E.g. in Kenya, snake bite projects involve motorbikes for delivery of snake antivenom; these projects work in the same areas as rabies and could be joined to use the same mechanisms for both diseases.
- Strong need for data to prevent stock outs i.e. data on how many dog bites occur and how many people are vaccinated to forecast how much vaccine will be needed.

SESSION 9: SETTING CONDITIONS FOR SUCCESS

Objective: *country networking to share expertise and reach common goals*

Bhutan: Dealing with cross-border rabies transmission and outbreaks in dog populations

Presented by: T. Tenzin (National Centre for Animal Health)

Rabies is a cross-border problem that requires cross-border collaboration. In Bhutan, the rabies burden lies at the southern part of the country, which shares a porous border with India. Bhutan has implemented several activities to manage cross-border transmission:

- National policy and political commitment (one health approach)
    - Cross-border consultation meeting among the Gangetic Plain countries (Bangladesh, Bhutan, India, Nepal)
    - Cross border harmonization meetings on dog population management/rabies
- Strong collaboration among sectors (MoH, animal, forestry, etc)
- Creation of an immune belt along the border
    - Annual mass dog vaccination campaign with temporary vaccination points and mobile vaccination teams
- Advocacy and education program (risk-communication)
- Cross border rabies surveillance in animals and animal exposed victims with contact tracing of bite victims to ensure they visit for PEP
    - Introduction of ID administration (since 2013)
- Implement control activities during rabies outbreaks by activating Rapid Response Team
    - Ring vaccination
    - Removal of suspected/in-contact dogs
    - Enhance surveillance and reporting system
    - Awareness education
    - Provision of PEP to exposed victims

The way forward for managing cross-border rabies transmission:

- Regionally coordinated rabies control programme to promote inter-country collaboration and international partnership
- Need for a strategic guidelines for cross-border rabies control
- Memorandum of Understanding (MOU) for cross-border rabies control between relevant authorities of bordering countries
- Designate responsible and dedicated focal persons at national and local levels
- Create a platform for real time rabies outbreak information sharing between countries
- International partners should play an active role in cross border control programmes

Breakout session: ASEAN+

- "2020 elimination goal"- ASEAN/regional opportunities to discuss and revise goals and targets?
    - September/October 2018, ASEAN rabies focal point meeting in Vietnam as an opportunity to discuss and revise elimination goal in line with the global 2030 elimination goal
    - WHO, FAO, and OIE to be involved to share global/regional updates on strategies and tools
- Countries should update strategic plan with new 2030 goal
    - Implementation of SARE
    - Don't need to wait for these plans to strengthen active surveillance system with prompt data sharing between public health and animal health sides at all levels
- Continued public awareness campaigns to mobilize people for dog and human vaccination
- One health training at all levels involving different stakeholders including
    - Dog and human vaccination
    - Surveillance and response
    - Clinical case management
    - Dog bite management and prevention

- Organize regional venues to gather rabies programme managers for progress and challenge sharing regularly

Breakout session: SAARC

- Tripartite (WHO, OIE, FAO) meeting in Colombo, Sri Lanka in 2018
- All countries have introduced ID
    - Now all NTBV has been phased out (Pakistan last country to phase out)
- Bhutan and Sri Lanka slated to reach elimination goal ahead of 2030
- OIE training and veterinary laboratory training in Bangalore (WHO CC NIMHANS)
- Burden of rabies needs to be discussed
    - Requesting common methodology for the estimation of the burden of rabies
    - Especially needed in India (updated from multi-centric study from 2003/2004)
- Cross-border transmission
    - Need to use SAARC platform for regional collaboration
    - In many countries, rabies is not a notifiable disease
    - Need of unified rabies data reporting system
    - Regarding human rabies, member states will report through WHO and for animal sector, through OIE
    - SAARC has developed animal reporting, which includes rabies
    - Pilot testing done in Bhutan
- Human vaccine
    - Accessibility and availability important
    - Requesting Gavi to consider human vaccine in their VIS
    - Many vaccine producers in South Asia, and should be encouraged to go through WHO PQ
    - Nepal and Sri Lanka facing issues because there are only two WHO PQ vaccines
- Focal points for animal and human rabies should be explored
- Examine suing SAARC platform o share best practices
- WHO SEARO working with SAARC secretariat on IHR
    - Should be SAARC platform to track rabies elimination progress
- Nepal is requesting exchange of information with countries that have gone through federalism

Breakout session: AFRO

- Stop rabies at the source (dogs)
- Vaccine forecasting to improve delivery
- Collaboration among countries
- Collaboration with manufacturers to change from IM to ID
- Good surveillance and improve reporting of surveillance
- Donor-based funding is not sustainable, countries need to make their own budgets
- Education, create a sustainable school-toward program on one health, bite prevention, disease elimination
- World rabies DAY → WEEK
    - Have specific events on what happens in the country
    - Radio events
    - Public messages that include schools to commit to rabies elimination and bite prevention

SUMMARY OF MEETING OUTCOMES

What we have learned

- Outlined global and regional strategies to reach Zero by 30
- New WHO position is cost and dose saving for rabies vaccine and RIG
- Examples of innovative, low-cost strategies implemented to improve reach (e.g. involving military, traditional healers, villagers)
- Data is powerful for prevention, awareness raising, targeting vaccination campaigns, vaccine forecasting to prevent stock-outs
- NTVs phased out in Asia region and many countries using ID administration; PEP often provided free of charge

What works

- Intradermal vaccination
- Rabies awareness in schools, among traditional healers, military
- Mass dog vaccination
- Involving communities in surveillance
- One Health collaboration; examples of improved coordination between different sectors
- SARE as a told of assessment and planning
- Better data supports targeted interventions and resource prioritization

What is needed

- Country ownership and investment in rabies programmes
    - Building evidence through project base/other organizations/pilot programmes
    - Engagement governments and catalysing investments
- Standardize data collection and consistent reporting
    - Rabies as notifiable disease
    - Link animal and human surveillance data
    - Unified reporting systems and cross-border collaboration
    - Standardize monitoring tools
- Integrate rabies prevention with mechanisms and platforms used for other diseases
- Involve education sector to improve awareness for children, teachers, parents
- Engaging manufacturers to transition from IM to ID vaccination, and apply for pre-qualifications, supported by international organizations
- One Health collaboration at the national scale; multisectoral political commitment across all levels

Next steps

- Each country to identify and share a national rabies focal point with WHO
- Each country commits to reporting data on an annual basis (March)
- WHO commits to providing an interface for data collection
- Support for countries to implement new WHO recommendations
- Refinement of national strategies according to updated guidance
- ASEAN+ countries to revise target and strategy in line with WHO 2030 target
- START: improving surveillance, communication between sectors

ANNEX 1. LIST OF PARTICIPANTS

OPENING CEREMONY

Prof Dr Her Royal Highness Princess Chulabhorn Mahidol
Bangkok, Thailand

Padma Kumari Aryal
State Minister
Ministry of Health and Population Kathmandu, Nepal

Pushpa Chaudhary
Secretary
Ministry of Health and Population Kathmandu, Nepal

Prakash Mathema
Secretary
Ministry of Agriculture, Land Management and Cooperative (Livestock Development)
Kathmandu, Nepal

PARTICIPANTS

Bol Raj Acharya
Veterinary Complex
Kathmandu, Nepal
E-mail: bolraj_acharya@yahoo.com

Hanumanthaiah Ashwath Narayana Doddabele
Association for Prevention and Control of Rabies in India (APCRI)
Bengaluru, India
E-mail: dhashwathnarayana@gmail.com

Anup Bastola
Sukraraj Tropical and Infectious Disease Hospital
Kathmandu, Nepal
E-mail: docanup11@gmail.com

Kedar Prasad Ceintury
Ministry of Health and Population
Kathmandu, Nepal
E-mail: centurykp@yahoo.com

Altantogtokh Doniddemberel
National Center of Zoonotic Diseases
Ministry of Health
Ulaanbaatar, Mongolia
E-mail: altantogtokh@nczd.gov.mn

Hossein Erfani
Minstry of Health and Medical Education
Tehran, Iran
E-mail: h_erfanimd@yahoo.com

Amila Gunesekera
Antirabies campaign, PHVS office
Ministry of Health
Colombo, Sri Lanka
E-mail: amiladarshana@gmail.com

Rohani Binti Jahis
Ministry of Health Malaysia
Putrajaya, Malaysia
E-mail: rohbj@moh.gov.my

Rinzin Kinga Jamtsho
Ministry of Health
Thimphu, Bhutan
E-mail: rkjamtsho@health.gov.bt

Samjhana Kafle
Ministry of Agriculture
Kathmandu, Nepal

Irine Kalandadze
National Center for Disease Control and Public Health (Georgia)
Tbilisi, Georgia
E-mail: i.kalandadze@ncdc.ge

Omesh Kumar
State Institute of Health and Family Welfare
Shimla, India
E-mail: bhartiomesh@yahoo.com

Monique Lechenne
Swiss Tropical and Public Health Institute
Basel, Switzerland
E-mail: monique.lechenne@swisstph.ch

Anyie Li
Centers for Disease Control and Prevention (CDC)
Atlanta, USA
E-mail: yrw5@cdc.gov

Rolande Mindekem
Centre de Support en Santé International
N'Djaména, Chad
E-mail: mrola2002@yahoo.fr

Samuel Thumbi Mwangi
Center for Global Health Research
Kenya Medical Research Institute
Kisumu, Kenya
E-mail: thumbi.mwangi@wsu.edu

Athman Mwatondo
Zoonotic Disease Unit, Ministry Of Health
Nairobi, Kenya
E-mail: amwatondo@yahoo.com

Susilakanthi Nanayakkara
Medical Research Institute
Colombo, Sri Lanka
E-mail: kanthinana@yahoo.com

Thi Thanh Huong Nguyen
National Institute of Hygiene and Epidemiology
Hanoi, Viet Nam
E-mail: huongdichte83@gmail.com

Hemant Chandra Ojha
Ministry of Health and Population
Kathmandu, Nepal

Krishna Kumar Oli
TU Teaching Hospital
Kathmandu, Nepal
E-mail: olirit@hotmail.com

Pornpitak Panlar
Ministry of Public Health
Nonthaburi, Thailand
E-mail: ppanlar@yahoo.com

Kinley Penjor
Dewathang Hospital
Department of Medical Services
Samdrup Jongkhar, Bhutan
E-mail: kinleypal@gmail.com

Manisha Rawal
Sukraraj Tropical and Infectious Disease Hospital
Kathmandu, Nepal
E-mail: rawaldrmanisha1976@gmail.com

Naseem Salahuddin
The Indus Hospital Karachi
Karachi, Pakistan
E-mail: Naseems101@gmail.com

Chakkarin Satthathum
Faculty of Veterinary Medicine
Kasetsart University
Bangkok, Thailand

Krishna Bahadur Shrestha
Himalayan College of Agricultural Sciences and Technology
Kathmandu, Nepal
E-mail: krishna_shrest@hotmail.com

Sisavath Soutthaniraxay
Department of Communicable Diseases Control, Ministry of Health
Vientiane, Lao DPR
E-mail: vniraxay@gmail.com

Nandini Sreenivasan
Centers for Disease Control and Prevention (CDC)
Atlanta, USA
E-mail: vii2@cdc.gov

Daniel Stewart
KwaZulu Natal, South Africa
E-mail: daniel4stewart@gmail.com

Mysore Kalappa Sudarshan
Association for Prevention and Control of Rabies in India (APCRI)
Bengaluru, India
E-mail: mksudarshan@gmail.com

Tenzin Tenzin
National Centre for Animal Health
Thimphu, Bhutan
E-mail: tenzinvp@gmail.com

Mathilde Tetchi
Institut National d'Hygiène Publique Ministère de la Santé
Abidjan, Côte d'Ivoire
E-mail: mathilde.tetchi@yahoo.fr

Suman Thapa
Communicable disease Center
Purano-Baneshwor
Kathmandu, Nepal
E-mail: thapaloud@gmail.com

Khongsak Thiangtum
Faculty of Veterinary Medicine
Kasetsart University
Bangkok, Thailand
E-mail: fvetkot@yahoo.com

Chaiyakorn Thitiyanaporn
Faculty of Veterinary Medicine
Kasetsart University
Bangkok, Thailand

Romadona Triada
Directorate of Vector borne diseases and Zoonoses Control, Ministry of Health
Jakarta, Indonesia
E-mail: rtriada@yahoo.com

Ketkaew Wasanasuk
Faculty of Veterinary Medicine
Kasetsart University
Bangkok, Thailand

Sengdoeun Yi
Ministry of Health
Phnom Penh, Cambodia
E-mail: doeurn.cdc@gmail.com

Wenwu Yin
Chinese Center for Disease Control and Prevention (China CDC)
Beijing, China
E-mail: yinww@chinacdc.cn

Ei Ei Zar Nyi
Department of Public Health
Nay Pyi Taw
Myanmar
E-mail: eieiznyi@gmail.com

WHO Collaborating Centres

Naveen Gupta
National Centre for Disease Control
WHO CC for Rabies epidemiology
Delhi, India
E-mail: nicdnaveen@gmail.com

Reeta S. Mani
National Institute of Mental Health and Neurosciences (NIMHANS)
WHO Collaborating Centre for Reference and Research in Rabies
Department of Neurovirology
Bengaluru, India
E-mail: drreeta@gmail.com

Henry Wilde
Chulalongkorn University
Bangkok, Thailand
E-mail: henrywilde27@gmail.com

INTERNATIONAL ORGANIZATIONS

Food and Agriculture Organization of the United Nations (FAO)
Katinka De Balogh
Bangkok, Thailand
E-mail: Katinka.DeBalogh@fao.org

Society for the Protection of Animal Rights (SPAR)
Zain Mustafa
Karachi, Pakistan
E-mail: zain.mustafa@gmail.com

UNICEF Regional Office for South Asia (ROSA)
Andreas Hasman
Kathmandu, Nepal
E-mail: ahasman@unicef.org

World Animal Protection
Pankaj KC
London, UK
E-mail: pankajkc@worldanimalprotection.org

World Organisation for Animal Health (OIE)
Pasang Tshering
Tokyo, Japan
E-mail: p.tshering@oie.int

WHO SECRETARIAT
HQ (Geneva, Switzerland)
Ren Minghui
Assistant Director-General for Communicable Diseases
E-mail: renm@who.int

Gautam Biswas
E-mail: biswasg@who.int

Bernadette Abela-Ridder
E-mail: abelab@who.int

Jocelyn Kessels
E-mail: jocelyn.kessels@uq.net.au

Lea Knopf
E-mail: knopfl@who.int

Naoko Obara
E-mail: obaran@who.int

Nepal Country Office (Kathmandu, Nepal)
Jos Vandelaer
WHO Representative
E-mail: vandelaerjo@who.int

Subhash Lakhe
E-mail: lakhes@who.int

Khurshid Hyder
E-mail: hyderk@who.int

Rahul Pradhan
E-mail: pradhanr@who.int

Murray Singer
E-mail: singerm@who.int

Poojan Shrestha
E-mail: shresthap@who.int

SEARO (**New Delhi, India)**
Sarkar Swarup Kumar
E-mail: sarkarswa@who.int

Gyanendra Gongal
E-mail: gongalg@who.int

EMRO (Islamabad, Pakistan)
Qutbuddin Kakar
E-mail: kakarqut@who.int

WPRO (Manila, Philippines)
Aya Yajima
E-mail: yajimaa@who.int

Cambodia Country Office (Phnom Penh, Cambodia)
Vannda Kab
E-mail: kabv@who.int

Laos Country Office (Vientiane, Laos)
Thipphavanh Chanthapaseuth
E-mail: chanthapaseutht@who.int

Mongolia Country Office (Ulanbaatar, Mongolia)
Ariuntuya Ochirpurev
E-mail: ochirpureva@who.int

ANNEX 2. KEY RABIES DATA INDICATORS TO BE REPORTED TO WHO

Human-related data elements

Human rabies cases	
Full indicator name:	Number of human rabies cases reported
Data type:	Count
Definition:	Total number, clinical or lab diagnosed
Disaggregation:	- Male; female; unknown - Age groups (<5y; 5-14y; 15-over); age unknown/other age distribution - Dog-transmitted; bat-transmitted; transmitted by other animal; unknown - (clinical diagnosis; laboratory diagnosis; unknown)

Animal bites in humans	
Full indicator name:	Number of reported animal bite cases in humans
Data type:	Count
Definition:	Bites by warm blooded animals (excluding snake bites)
Disaggregation:	- Bite by Dog; Bite by cat; Bite by bat; bite by wildlife; bite by livestock; bite by unknown animal - Male; female; unknown - Wound categories: Cat I; Cat II; Cat III; unknown - Age groups (<5y; 5-14y; 15-over); age unknown/other age distribution

People receiving PEP	
Full indicator name:	Number of people receiving post-exposure prophylaxis (PEP)
Data type:	Count
Definition:	PEP is defined for this variable as wound care and at least 1 dose of rabies vaccine
Limitation	Patients may attend different health facilities (double counts).
Disaggregation:	- Male; female; unknown - Age groups (<5y; 5-14y; 15-over); age unknown/other age distribution - (Wound categories: Cat I; Cat II; Cat III; unknown)

Animal-related data elements

Dog population	
Full indicator name:	Estimated dog population
Data type:	Count
Definition:	The best evidence based estimation of (national) dog population; a proxy is the human:dog ratio if known
Disaggregation:	- (owned; unowned)

Dog rabies cases	
Full indicator name:	Number of dog rabies cases reported
Data type:	Count
Definition:	Total number, clinical or lab diagnosed
Disaggregation:	- (clinically diagnosed; lab diagnosed; unknown)

Rabies cases other animals	
Full indicator name:	Number of rabies cases reported in other species than dogs
Data type:	Count
Definition:	Total number, clinical or lab diagnosed
Disaggregation:	- Cat; Bat; Livestock; Wildlife - (clinically diagnosed; lab diagnosed; unknown)

Dog vaccination coverage	
Full indicator name:	Percentage of dogs that received rabies vaccine
Data type:	Percentage
Definition:	The best evidence-based estimation of dog rabies vaccination coverage in the country as percentage
Disaggregation:	- (owned; unowned; unknown)