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Research Evidence for Policy

Health and veterinary workers assessing the risk status of a bite victim attending a hospital for post exposure prophylaxis i.e. emergency vaccination needed to prevent rabies after being bitten by a domestic dog.

Policy message

Rabies cases show how difficult it is for the frontline public health and animal health staff to coordinate integrated activities. Because of the limited sharing of information between the veterinary and human health sectors, rabies control and prevention efforts are always impaired. Integrated Bite Case Management (IBCM) is a rabies surveillance strategy that enables trained staff to determine the risk that an animal bite victim could have been bitten by a rabies infected animal. IBCM integrates human and animal health workers to facilitate tracing of the biting animals. Our findings show that IBCM can increase detection of rabies exposure by 50%, improve the administration and cost-effectiveness of post-exposure prophylaxis (PEP) to patients, as well as enabling intersectoral collaboration. Therefore, IBCM will be an extremely useful tool for guiding interventions aimed at preventing human deaths.

Integrated bite case management (IBCM) : The best way to strengthen collaboration between health and veterinary sectors, increase rabies case detection and save more lives

Rabies situational analysis and the implementation of IBCM

Rabies is one of the zoonotic diseases of high concern. The disease causes an estimated 59,000 human deaths annually worldwide, mostly in Africa and Asia. In Tanzania, rabies causes between 1,500 and 2,000 human deaths annually. Although it is invariably fatal once symptoms develop, death is prevented by prompt post-exposure prophylaxis (PEP). Domestic dogs cause over 99% of human rabies deaths, more than 50% of which occur in children under 16 years of age. The most effective and cost-efficient way to eliminate rabies remains the regular vaccination of domestic dogs. Unfortunately, accessing vaccines, both for humans and dogs, is both financially and logistically challenging for individuals and communities especially in rural areas. Three main global organisations, the WHO, FAO & OIE, have united under the "Tripartite" arrangement to fight against rabies with the global goal of zero human rabies deaths due to dog bites by 2030.

To support this goal, several interventions, including mass dog vaccination programmes and increasing PEP access to exposed individuals, need to be rolled out across sub-Saharan African countries. However, the surveillance systems to effectively guide these interventions are weak and few cases of rabies are recorded. Communication between the human and veterinary health sector is therefore advocated, and a pilot study carried out in the southeast and northern Tanzania using the IBCM as a potential rabies surveillance strategy, gives hope to achieve the goal by 2030 timeline. The introduction of IBCM involved 1) training public health workers to undertake risk assessments for all patients bitten by potentially rabid or healthy dogs to ensure that PEP is correctly administered to exposed individuals only and 2) training livestock field workers to find potential rabid animals (Figure 1).

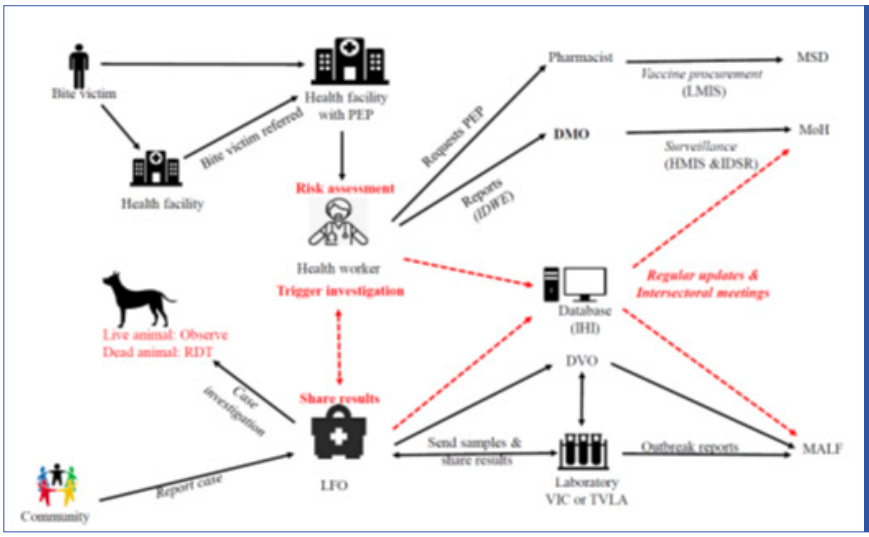

Figure 1: An IBCM framework used in the study sites (Lindi, Mtwara, Morogoro and Mara, Tanzania). Red text and arrows indicate IBCM activities. The existing health systems and reporting structures under the Ministry of Health (MoH) and Ministry of Livestock and Fisheries (MLF) are shown in black and include: the Medical Stores Department (MSD), District Medical Offices (DMO), District Veterinary Offices (DVO), Veterinary Investigation Centres (VIC), the Tanzania Veterinary Laboratories Agency (TVLA), Livestock Field Officer (LFO), the Integrated Disease Weekly Ending (IDWE) surveillance and reporting system, the Logistic Management Information System (LMIS), the Integrated Disease Surveillance and Response system (IDSR) and the Health Management Information System (HMIS). Ifakara Health Institute (IHI) hosts the server for the IBCM database. RDTs are Rapid Diagnostic Tests.

Case-studies

Evidence of intersectoral collaboration on rabies surveillance

A study piloted in Tanzania using IBCM strengthened and supported intersectoral collaboration between health and veterinary workers and increased rabies knowledge, case detection and reporting to the responsible authorities for improved rabies control (Lushasi et al., 2020)

Lack of adequate diagnostic tests in low-income countries.

A comparative study of rapid immunodiagnostic tests (RIDT) with an accredited rabies test, the fluorescent antibody test (FAT) and real-time reverse transcription polymerase chain reaction (RT-qPCR) showed that the RIDT is reliable particularly on fresh and decomposed samples under field conditions. This makes RIDTs a promising tool to support surveillance in low-income countries (Lechenne M, et al 2016).

Benefits of comprehensiveness in veterinary interventions

Lack of surveillance data and understanding of the disease burden - a major cause for the neglect of rabies in endemic countries showed the highest impact on vaccination coverage, increasing it to approximately 97% compared to the other approaches adopted (Muthiah et al., 2013).

After one year of its implementation, IBCM showed that there is a need to improve PEP access to prevent further deaths. It has also shown that there is a need for improved mass dog vaccination to stop the transmission at source. Reports of bites by suspected rabid dogs more than doubled (Figure 2) under IBCM, and a large proportion of biting animals were identified as probable rabies cases when tracked down and investigated. Over 50% (Figure 2) of the patients presenting to clinics using IBCM were identified to have been bitten by suspected rabid dogs and urgently required PEP. But shortages of PEP were frequent and unfortunately 22 human rabies deaths corresponding to 2.8/100,000 persons per year occurred in all the regions covered in this study.

Added value of IBCM

IBCM increased case detection by 50%, and generated data that is much more useful for assessing the impact of PEP than the numbers of bite cases alone. Since the introduction of IBCM in October 2018, over 2000 animal investigations have been conducted with more than 60% of the cases identified as probable animal rabies cases. The average number of monthly suspected animal rabies cases has increased from 51 to 76 after introducing IBCM. IBCM has also provided evidence of the number of people dying from rabies due to PEP shortage. This is because, of the 209 (11%) suspected rabies exposures that were reported to health facilities with no PEP available, 22 died from rabies. Around 10% of the investigated rabies cases in animals were

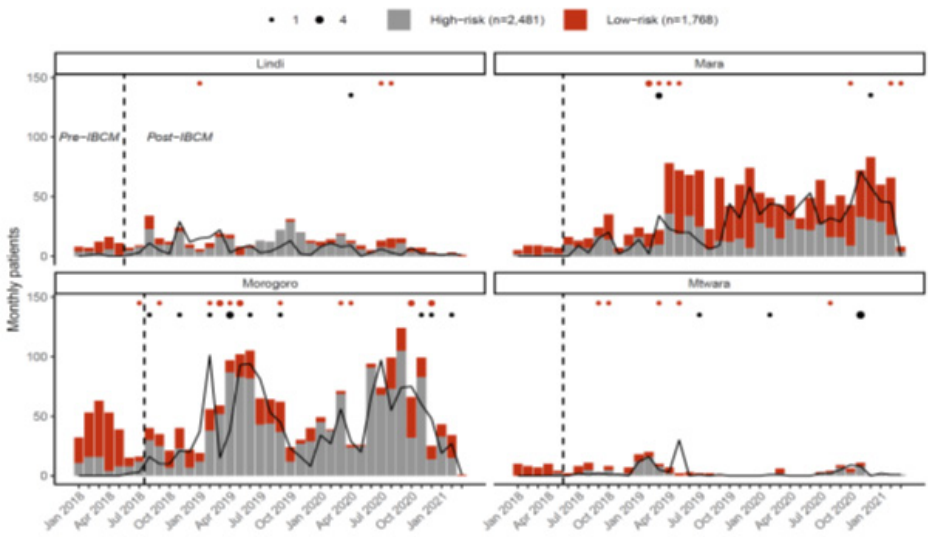

Figure 2: Regional reporting of bites assessed as high risk (red) vs. low risk (gray) and investigations of biting animals (lines) in the study regions. The dotted line indicates when IBCM was implemented in each region; red dots indicate the number of human deaths (n = 22) attributable to rabies; black dots indicate the number of positive animal rabies cases (n = 20) confirmed through rapid diagnostic tests.

confirmed through the rapid diagnostic tests performed by the LFOs (Figure 3).
Domestic dog bites contributed to over 95% of the reported suspected animal bite cases. This data provides a more accurate insight into rabies dynamics and is useful in guiding policy decisions and public health measures.

Figure 3: Livestock field officers collecting brain samples while investigating a suspected animal. Rapid diagnostic test results indicated that the animal was rabies positive. (Photos by Kennedy Lushasi, June 2019)

Figure 4: A research scientist from Ifakara Health Institute (IHI) conducting an on-the-job training to health workers at Endulen Hospital, Ngorongoro, Tanzania. This was to increase rabies awareness and capacity to undertake risk assessments of animal bite victims and follow updated WHO protocols for PEP (Photo by Anna Czupryna, August 2019).

Policy options/recommendations

Regular mass dog vaccinations can eliminate rabies at source: We recommend free mass dog vaccination campaigns be conducted annually in collaboration with all relevant authorities to ensure rabies is eliminated at the source.

Increasing PEP availability and accessibility for bite patients: All government-based facilities need to be able to provide PEP to exposed individuals. PEP should always be recommended if there is any doubt concerning the risk of rabies. Our findings suggest that increasing PEP access should be a priority. The use of IBCM in highly endemic settings could better sensitize practitioners to the risks of rabies and given limited diagnostic capacity and PEP availability.

Further reading

1. M. Muthiah et al., "Assessing extension methods for improving livestock health care in the Indian himalayas," Mt. Res. Dev., vol. 33, no. 2, pp. 132-141, 2013, doi: 10.1659/MRD-JOURNAL-D-12-00036.1.

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i. Lushasi, K., Steenson, R., Brunker, K., Changalucha, J., Haydon, D., Hoffu, H., Magoti, F., Mchau, G., Mpolya, E., Mtema, Z., & Hampson. One Health in Practice: Using Integrated Bite Case Management to Increase Detection of Rabid Animals in Tanzania. February 2020 Frontiers in Public Health doi:10.3389/fpubh.2020.00013

ii. Abela-Ridder B., Knopf L., Martin S., Taylor L., Torres G., De Balogh K. 2016: the Beginning of the End of Rabies? Lancet Glob Heal. 2016;4(11):e780-e781. doi:10.1016/s2214-109x(16)30245-5

iii. Wallace RM., Reses H., Franka R., et al. Establishment of a Canine Rabies Burden in Haiti through the Implementation of a Novel Surveillance Program. PLoS Negl Trop Dis.2015. doi: 10.1371/journal.pntd.000424

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Policy recommendation (continued)

Strengthening rabies surveillance also improves the collaboration between health and veterinary sectors (One Health):
There is a need for improving and strengthening the capacity for One Health. Integrated Bite Case Management (IBCM) is a way to do this and at the same time improve rabies surveillance, enhancing capacity to detect and respond to rabies outbreaks.

Engage with stakeholders regularly to improve and sustain rabies elimination:
Joint discussions about surveillance findings amongst stakeholders and practitioners, including engagement with the regional and council health management teams is highly encouraged. This could promote better implementation of One Health and rabies control and prevention activities.

Rapid Diagnostic Tests are empowering and easy to use: Recent studies demonstrate the value of rapid diagnostic tests for detecting rabies in suspect animals. Surveillance systems can feasibly be set up for effective reporting, safe sampling, and rapid diagnosis of animal rabies cases.

Regular training of practitioners i.e livestock field workers and health workers on how to control rabies and prevent human rabies deaths:
Health workers should be trained to conduct risk assessments and LFOs to undertake investigations to improve rabies case detection (Figure 4).

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Evidence for policy

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This issue

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