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Short Communication

Multi-Stakeholder Strategies for Rabies Elimination: Insights From a Panel of Experts on World Rabies Day 2025

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A B S T R A C T

Background: Rabies remains a critical public health challenge in India, accounting for 35% of global rabies deaths despite being entirely preventable through timely intervention. A multi-stakeholder approach integrating human health, veterinary services, media, and civil society is essential for achieving the WHO's "Zero by 30" goal.

Methods: We report on a Continuing Medical Education (CME) event organised on World Rabies Day 2025 (September 27) at VMMC & Safdarjung Hospital, New Delhi, bringing together clinicians, veterinary experts, municipal health officials, media representatives, NGO leaders, and animal welfare activists to discuss prevention and control strategies for animal bites and rabies in India.

KeyFindings: The event revealed critical gaps in post-exposure prophylaxis delivery, particularly the underutilisation of rabies immunoglobulin (RIG), which is available in only 20.8% of public health facilities despite being stocked in 79.7% of facilities. Analysis of recent ICMR data shows 9.1 million annual animal bites and 5,726 rabies deaths, with poor patient compliance (only 40% completing five-dose schedules) and fragmented surveillance systems emerging as major barriers. Multi-sectoral discussions highlighted the importance of humane animal birth control programmes, strengthened veterinary-medical collaboration, evidence-based media communication, and community engagement in achieving sustainable rabies control.

Conclusions: World Rabies Day CME events serve as vital platforms for fostering intersectoral dialogue and knowledge exchange. Scaling such initiatives nationally, integrating rabies prevention into medical curricula, and strengthening One Health frameworks are essential for India's rabies elimination roadmap.

Keywords: Rabies, World Rabies Day, Animal Bites, One Health, Post-Exposure Prophylaxis, Public Health Education, India, Multi-Stakeholder Collaboration

Introduction

Rabies is a fatal neurotropic viral disease transmitted primarily through the saliva of infected animals, predominantly dogs in India. Once clinical symptoms manifest, typically including hydrophobia, aerophobia, and progressive neurological deterioration, the disease is virtually 100% fatal.[1] Globally, rabies causes an estimated 59,000 human deaths annually, with 95% of fatalities concentrated in Asia and Africa.[1,2] India bears a disproportionate burden, contributing approximately 35% of global rabies deaths and nearly 60% of all rabies-related mortalities in Asia.[1,2] According to the most recent Indian Council of Medical Research (ICMR) national survey conducted in 2022-23, approximately 9.1 million animal bites occur annually, with an estimated 5,726 human rabies deaths each year.[2]

The epidemiological profile of rabies in India is characterised by several concerning trends: increasing Category III exposures requiring both vaccination and rabies immunoglobulin (RIG); rising incidence in urban and metropolitan areas due to high stray dog populations; and persistently low awareness in rural communities regarding symptoms and preventive measures.[2,3] Children under 15 years remain disproportionately affected, often from poor rural communities, accounting for the majority of victims.[2] Despite significant progress, with an estimated 75% decline in dog-mediated human rabies deaths over the past two decades, critical gaps persist in post-exposure prophylaxis (PEP) delivery, inadequate wound management practices, and severely limited access to RIG.[4]

A landmark 2022-23 nationwide health facility survey revealed that while the anti-rabies vaccine (ARV) is available in 79.7% of public health facilities, RIG is present in only 20.8%, creating a critical gap in comprehensive PEP delivery.[4] This disparity is particularly pronounced in primary health centres and urban health facilities, where RIG availability drops to as low as 2-6% despite these being the first points of contact for many bite victims.[4] The survey further documented that only 1-2% of Category III bite victims actually receive RIG, even though 30% receive at least one vaccine dose, which is a systemic failure with potentially fatal consequences.[2,4]

Recognising these challenges, India launched the National Action Plan for Dog-Mediated Rabies Elimination (NAPRE) in 2021, aligning with the global "Zero by 30" target.[5,6] The plan emphasises a One Health approach integrating human, animal, and environmental health, with mass dog vaccination (achieving 70% coverage) identified as the most cost-effective strategy for interrupting transmission.[7,6,8] The Animal Birth Control (ABC) Rules of 2023 mandate humane "catch, neuter, vaccinate, and release" (CNVR) programmes, supported by a Supreme Court ruling in August 2025 that affirmed evidence-based, compassionate approaches to stray dog population management rather than removal.[9]

World Rabies Day, observed annually on September 28 since 2007, commemorates Louis Pasteur's pioneering work in developing the first rabies vaccine.[10] This day serves as an opportunity to raise awareness, strengthen capacity and foster multi-stakeholder dialogue on rabies prevention and control. Continuing Medical Education (CME) programmes organised around this observance provide crucial platforms for knowledge exchange among healthcare providers, veterinarians, policymakers, and communities.[1] This perspective article reports on a CME event held on September 27, 2025, at VMMC & Safdarjung Hospital, New Delhi, examining the critical insights, challenges, and recommendations that emerged from this multi-stakeholder gathering.

Event Overview

Organization and Setting

The Department of Community Medicine at Vardhman Mahavir Medical College & Safdarjung Hospital (VMMC & SJH), New Delhi, organized a continuing medical education program titled "Prevention and Control of Animal Bites and Rabies in India" on September 27, 2025.

The program was organized by the faculty of the Department of Community Medicine, with a multidisciplinary team of resident doctors ensuring the smooth execution of the scientific program and logistical arrangements.

Program Structure and Content

A defining feature of this CME was its deliberate inclusion of diverse stakeholders beyond the medical profession. This convergence of medical, veterinary, municipal, media, academic, and civil society sectors created a unique forum for holistic discussion of rabies control challenges.

The CME followed a structured agenda comprising inaugural addresses, technical sessions, and an interactive panel discussion. The inaugural session featured perspectives from municipal public health administration (Municipal Corporation of Delhi), academia (Indian Institute of Technology), and homoeopathic medicine, establishing the multi-dimensional nature of the rabies challenge. Technical presentations, delivered by faculty of the Department of Community Medicine and the hospital's emergency services, addressed recent epidemiological trends, hospital-based clinical management experiences, and innovative approaches, including a novel 3-dose subunit vaccine under development.

The centerpiece was a moderated panel discussion titled "Are We Really Prepared for Managing Rising Cases of Animal Bites and the Threat of Rabies in India?" This session featured representatives from municipal veterinary

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services, academic community medicine, the print media, a national rabies-control professional body (the Association for Prevention and Control of Rabies in India, APCRI), and animal-welfare advocacy, each addressing their respective sector's roles and challenges. The interactive format encouraged audience participation and cross-sector dialogue, moving beyond the fragmented approaches to embrace collaborative problem-solving.

Key Insights & Critical Analysis

Epidemiological Shifts and Persistent Surveillance Gaps

The event highlighted epidemiological trends that demand urgent attention. The session on recent epidemiological changes revealed that India's rabies burden has evolved from predominantly rural to increasingly urban, driven by high population density, increased human-animal interaction, and larger stray dog populations in metropolitan areas.[11] Recent geospatial analysis confirms that urban and peri-urban areas now account for the majority of dog bite incidents, with Delhi alone reporting a 277% increase from 6,691 cases in 2022 to 25,210 cases in 2024.[11] The shift toward more Category III exposures, defined as transdermal bites, scratches, or contamination of mucous membranes requiring both vaccine and RIG, reflects either actual increases in severity or improved case classification through enhanced surveillance.[2,3]

However, critical gaps persist in the surveillance architecture. As emphasized in the inaugural academic address, millions of dog bites occur annually, but hospitalizations and rabies deaths remain significantly underreported due to administrative concerns and legal implications.[3] The IDSP, while valuable, captures only a fraction of actual exposures, and only 20 states have declared human rabies a notifiable disease, compromising evidence-based planning.[12] Research into the determinants of underreporting and strategies to strengthen databases should be prioritized. Without accurate denominators, it becomes impossible to calculate true incidence rates, monitor trends reliably, or evaluate intervention impact effectively.[3]

Post-Exposure Prophylaxis: The RIG Accessibility Crisis

The most alarming finding is the underutilization of rabies immunoglobulin. The 2022-23 nationwide health facility survey documented that while ARV is available in 79.7% of public health facilities, RIG is available in only 20.8%—ranging from as low as 2.1% in community health centres to 5.9% in urban primary health centres.[4] The APCRI representative noted that while nearly 30% of bite victims receive anti-rabies vaccine, only 1-2% are administered RIG, which is a critical component of post-exposure prophylaxis for Category III exposures.[4] The municipal public health administration representative corroborated this, highlighting accessibility barriers, cost disparities between human RIG (HRIG) and equine RIG (ERIG), and stockout issues at public health facilities.

This gap has potentially fatal consequences. RIG provides immediate passive immunity, while vaccine-induced active immunity develops over 7-14 days, bridging the critical window during which the virus may reach the central nervous system.[13,14] Without RIG, patients with high-viral-load exposures (severe bites, head/neck wounds) face substantially elevated risk despite vaccination. The cost differential with HRIG costs ₹30,000 compared to ₹1,200 for ERIG in the private market, creating a two-tier system where economically advantaged patients access complete PEP while vulnerable populations receive incomplete protection.[4] The recent introduction of rabies monoclonal antibodies (RmAb) such as Rabishield offers promise, demonstrating non-inferior efficacy to ERIG with better tolerability, but procurement and distribution at scale remain challenges.[14] Addressing RIG/RmAb supply chain issues, negotiating affordable pricing, and exploring domestic manufacturing capacity should be national priorities.[4,15]

Compliance Challenges and Health System Fragmentation

Clinical insights from the hospital's emergency services revealed suboptimal compliance patterns. While first-dose vaccine uptake approaches 100%, subsequent doses see progressive dropout: 85% for dose two, 65% for dose three, and 40% for dose four, with the fifth dose often missed entirely.[2] This phenomenon reflects multiple factors: inadequate patient counseling, logistical barriers (travel costs, time off work), perceived resolution after initial treatment, and confusion created by switching between healthcare facilities using different regimens or vaccine brands.

The health system's fragmentation exacerbates these challenges. No standardized Health Management Information System (HMIS) format exists for classifying bite types or tracking follow-up visits. Approximately 70-80% of patients seek care in the private sector due to perceived better availability, but this results in higher out-of-pocket expenditure (₹300-600 per vaccine dose and ₹3,000-6,000 for RIG) and potential for regimen inconsistency.[4,12] The session on innovations noted that many healthcare professionals lack adequate training in intradermal vaccination techniques despite their cost-effectiveness and superior immune response due to lymphatic-rich skin. Consequently, intramuscular administration persists, increasing costs and potentially reducing overall population coverage.[4]

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Strengths of Multi-Stakeholder Engagement

The CME's greatest value lay in demonstrating the power of intersectoral collaboration aligned with One Health principles. The presentation from municipal veterinary services illuminated veterinary perspectives often absent from medical forums: Delhi's 12 administrative zones conduct 70,000-80,000 annual dog sterilizations across 20 animal control centers yet struggle to keep pace with a stray population of 6-7 lakh and biannual breeding cycles.[11,12] The emphasis that "the enemy is the virus, not the dog" reframes the challenge from dog removal to viral elimination through vaccination, a perspective reinforced by the Supreme Court's 2025 ruling supporting humane ABC approaches over removal.[9]

Insights from the media sector were equally illuminating. The senior journalist drew parallels with Mexico, which achieved substantial reductions in rabies through strong intersectoral collaboration and sustained public education campaigns, suggesting that India can replicate this success with appropriate political will and coordinated effort.[1] The representative from academic community medicine emphasized the pivotal role of medical colleges in strengthening rabies prevention and animal bite management through education, research, and community engagement, challenging the misconception that reducing dog populations alone can eliminate rabies, stressing that "dog-free does not mean rabies-free," and advocating for a One Health approach that integrates human, animal, and environmental health systems. The untapped potential of India's more than 800 medical colleges was highlighted, noting that together they could function as a nationwide network of rabies prevention hubs through their hospitals and outreach programs. Drawing on community-based studies from Delhi, the speaker pointed out that hospital data significantly underestimates the true burden of animal bites and their psychological impact and called for stronger interdepartmental collaboration, research-based advocacy, and institutional initiatives, such as the "Rabies-Free Medical College Campus," to position academic institutions as drivers of both clinical excellence and public health leadership. The APCRI representative outlined the association's national efforts, including school-based education reaching nearly 80 lakh children and training programs for intradermal vaccination, demonstrating the scalability of community engagement when properly resourced.[12]

The animal-welfare advocate added a vital ethical and behavioral dimension by challenging the "mad dog" myth and explaining how fear, pain, and human provocation drive aggression, demonstrating how humane animal birth control, stable feeding, and respectful human–dog interactions reduce bites and facilitate vaccination.[7,16] The ABC program's success depends on public acceptance, which requires empathy cultivation and behavioral education about safe human-animal interaction.

Innovations and Forward-Looking Approaches

The presentation on the 3-dose subunit vaccine under development represents promising innovation. Modeled on COVID-19 vaccine platforms, this approach could simplify regimens, improve compliance, and reduce costs.[1,17] However, innovation must extend beyond biologicals to encompass delivery systems. The emphasis on digital tools like mobile apps, SMS reminders in local languages, and telemedicine for follow-up consultations reflects recognition that technology can address compliance barriers in resource-constrained settings.

The event also highlighted the need for innovation in training methodologies. Workshops on intradermal vaccination techniques for nurses, advocated by APCRI, address a critical capacity gap.[4] Simulation-based training, video-assisted learning modules, and competency-based certification could ensure healthcare workers master these skills. Similarly, integrating rabies prevention comprehensively into medical, veterinary, and nursing curricula, rather than cursory coverage, would create a professionally prepared workforce aligned with elimination goals.[7]

Challenges, Limitations & Recommendations

Event Limitations

While the CME successfully convened diverse sectors, the two-hour duration limited the depth of integration of community-level perspectives. No formal pre-post assessment evaluated knowledge gain or attitude change among participants. The absence of community members or bite victims' perspectives represented a gap, as effective prevention requires understanding ground-level realities and patient experiences. Follow-up mechanisms to translate discussions into actionable institutional changes were not explicitly articulated. Additionally, while the event successfully convened diverse stakeholders, achieving sustained collaboration beyond episodic meetings remains challenging without formalized coordination structures.

Broader Systemic Challenges

The discussions revealed persistent barriers beyond any single event's capacity to address. Urban stray dog populations continue growing faster than sterilization and vaccination programs can control, reflecting resource constraints and ecological complexities.[11,12] Delhi's achievement of 70-80% sterilization coverage in only half its wards demonstrates the magnitude of the challenge. Vaccine supply chain issues, RIG stockouts, and inadequate wound-washing facilities at primary health centres

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compromise PEP quality.[4] The private sector's dominance in providing rabies care suggests public facilities have not met population needs, raising equity concerns.

Legal and social dimensions further complicate control efforts. The Supreme Court's August 2025 order, initially mandating street dog removal before revision to align with ABC Rules, reflects public pressure for aggressive action against perceived threats.[9] Balancing legitimate safety concerns with evidence-based, humane approaches requires continuous stakeholder education. The stigmatization of rabies patients, fears of job loss or social ostracization following bites, and cultural beliefs about animal bites all influence care-seeking behavior and must be addressed through sensitive, context-appropriate communication.[16,12]

Actionable Recommendations

Based on event insights and recent evidence, we propose several recommendations:

- **Scale CME Programs Nationally**: Replicate this multi-stakeholder model across districts, leveraging World Rabies Day and other public health observances. Regional centers should host quarterly forums maintaining intersectoral dialogue beyond annual events.
- **Strengthen Medical Education**: Integrate comprehensive rabies prevention modules into MBBS, BDS, nursing, and veterinary curricula. Include practical training in intradermal vaccination, wound management, bite categorization, and patient counseling. Develop "Rabies-Free Campus" initiatives as proposed during the panel discussion.[7]
- **Address RIG/RmAb Supply Crisis**: Conduct needs assessment for RIG/RmAb requirements, strengthen procurement and distribution systems, accelerate adoption of WHO-prequalified monoclonal antibodies, and subsidize or provide free RIG/RmAb for economically vulnerable populations at public facilities.[4,14,15]
- **Enhance Surveillance Architecture**: Standardize HMIS formats for animal bite reporting; establish real-time linkages between human and veterinary surveillance systems (Integrated Bite Case Management); mandate rabies as notifiable across all states; and conduct periodic community-based surveys to capture true incidence beyond facility-based data.[3,18]
- **Leverage Technology for Compliance**: Deploy mobile apps for appointment reminders, SMS-based patient education in local languages, telemedicine platforms for follow-up consultations, and digital systems for tracking vaccine administration across facilities to prevent regimen confusion.[1]
- **Fund Veterinary-Public Health Collaborations**: Increase budgetary allocations for ABC programs targeting 70% dog vaccination coverage; support joint veterinary-medical outreach camps; establish formal coordination mechanisms between municipal corporations and health departments; and invest in research on optimal dog population management strategies.[6,8,12]

Conclusion

The World Rabies Day CME at VMMC & Safdarjung Hospital demonstrated the essential value of multi-stakeholder dialogue in addressing complex public health challenges. By bringing together clinicians, veterinarians, administrators, media, NGOs, and animal welfare advocates, the event transcended disciplinary silos to forge a shared understanding of the imperatives for rabies elimination. Critical gaps in RIG/RmAb availability (only 20.8% of facilities), patient compliance (40% completion rate), healthcare worker training in intradermal techniques, and surveillance systems were candidly discussed alongside promising innovations in vaccines, monoclonal antibodies, digital health tools, and community engagement strategies. Achieving the 'Zero by 30' goal necessitates transitioning from episodic awareness to sustained intersectoral institutionalization, evidence-based policy, and humane approaches that recognize the integrated nature of human, animal, and environmental health. The lessons from this CME emphasizing one health principles, strengthening capacity at all system levels, ensuring equitable access to life-saving biologicals like RIG, and viewing dogs as partners rather than problems in rabies elimination offer a roadmap for progress toward a rabies-free India.

Ethical Statement

This is a descriptive event report; no human subjects research or animal experimentation was conducted. Ethical approval was not required.

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