Elimination of Canine Transmitted Rabies in Asia and Africa

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Rabies is one of the world’s oldest preventable diseases that still cause death to 55,000 people each year (Haider, 2008).

The mortality rate falls disproportionately in the developing world in countries such as India and China, as well as, in some areas of Africa, and Latin America (Schneider et al., 2009).

Re-emerging global health threat due to the virus evolving faster than it may be realized. Recently, the International Committee on Virus Taxonomy ratified 4 new virus species from Eurasian bats.

Rabies elimination is possible by stressing the need for recognition of new reservoirs of the virus, vaccination, and education.

Most of all rabies deaths (30-50%) occur in children under the age of 15 years (World Rabies Day, 2011).
Much has been accomplished since 2007 by the establishment of the World Rabies Day for international prevention, control, and education awareness (Krisberg, 2009); but there is so much more that can be accomplished.

Bringing major stakeholders together to raise awareness of this “neglected disease”.

Focus on the development of novel affordable vaccines and post-exposure treatment that are widely available to high risk populations worldwide.

Education campaigns may finally reduce and hopefully eliminate the global burden of rabies.
Rabies Facts

- Caused by RNA viruses in the family *Rhabdoviridae*, genus *Lyssavirus* (*CDC, 2011*).
- Maintained in nature in domestic and wild animal reservoirs.
- Infected dogs maintain the cycle of infection.
- Virus is contained in the saliva of an infected animal (*CDC, 2011*).
- Transmitted through bites, scratches, or licks on broken skin and mucosal membranes (*Meslin, 2005*).
- If not timely treated, medical prognosis is always unfavorable and fatal once the symptoms begin.
- No human to human transmission has been documented.
Historical Development of Rabies

Rabies is an ancient disease known for more than four thousand years.

- **2300 BC**: Dog owners in Babylon fined heavily for deaths caused by their dogs biting people (Steele, 1991).
- **1271**: 1st large rabies outbreak reported in Germany (Steele, 1991).
- **1703**: 1st case of rabies reported in the Americas by a priest in Mexico (Steele, 1991).
Clinical Synopsis

- Transmission primarily via bite by rabid dog or infected animal.
- The rabies virus enters the body and attacks the central nervous system (CNS), it is highly neurotropic.
- Replicates in CNS and travels to salivary glands for viral excretion in saliva.
- Incubation period range: 6 days to >2 years, average: 4–6 weeks (WHO, 2001)
- Headache, fever, sore throat, nervousness, confusion, pain or tingling at the site of the bite, progressing to hallucinations, hydrophobia, paralysis, coma, and death (CDPH, 2011).
Social and Behavioral Theory Based Antecedents

- *Healthy People 2020* “achieve health equity, eliminate disparities, and improve the health for all groups” through immunization and elimination of infectious diseases as part of the projected goals (McKenzie, et.al 2012).

- According to Cohen, (2000) emerging infectious diseases (EID’s) are evident in many parts of the world.

- EID due to migration from rural to urban areas, war, changes in personal behavior, forest clearance, and global changes induced by humans (Weis & Michael, 2004).

- Social inequality.
The ecological theory: individual beliefs and behaviors occur in a social context and health promotion may be more effectively achieved through changing the social environment (Schneider, 2006).

The social environment, community, and public policy can benefit infection disease control initiatives.

The spillover of pathogens and wild animal host to human populations is responsible for many EID, including the rising epidemics of rabies worldwide (Smith et al., 2005).
Social and Behavioral Theory Based Antecedents (continuation)

- Pet vaccination successfully reduce rabies cases in pets and humans.
- Strategies to control rabies in wildlife are limited.
- Effective strategies: oral rabies vaccines, extensive GIS mapping of rabies occurrence, and mathematical spatial models (Smith et al., 2005)
- Availability of affordable post-exposure immunization to victims in poor counties (Krisberg, 2009) is an initiative that would prevent people dying from wildlife related rabies.
Epidemiological Relevance

- Epidemiology’s goal is to limit disease, injury, and death in a community by intervening to prevent or limit outbreaks of epidemics of disease and injury (McKenzie, Pinger, and Kotechi, 2012).

- More than 99% of human deaths caused by rabies occur in Asia and Africa as a result of bites from rabid dogs (WHO, 2011).

- Unvaccinated dogs constitute the main reservoir worldwide.

- The prevalence of rabies varies depending on animal control effectiveness and immunization programs (Gompf, 2011).
Rabies in humans can be prevented by appropriate post-exposure prophylaxis (PEP) (Zinsstag, et al., 2008).

PEP is $40 dollars in Africa and $49 in Asia, where the average daily income is about $1 - $2 dollars per person. (WHO, 2011).

Rabies can also be prevented through sustained mass dog vaccination programs (Zinsstag, et al., 2008).

Continuing education of health and veterinarian professionals in rabies prevention and control (WHO, 2011).

September 28th as “World Rabies Day” since 2007. World Rabies Day is celebrated throughout the world, including the U.S. (CDC, 2011).
Assessment of Current Interventions

- As stated by Deshaies, Pilon, and Carsley (2004) on the study of a public health intervention at the time of a case of rabies in Quebec, the rapid and coordinated action with all stakeholders (regional ministries focused on animal and human health, education, animal welfare, communications, and finance) is essential to the success of rabies intervention.

- Raising awareness of rabies to help reduce rabies through education, outreach, support for research, and with targeted medical intervention; rabies can be prevented (Rabies Free World, 2011).

- Education interventions provide relief for thousands of people and communities in developing countries afflicted by fear, pain, and suffering from anti-rabies treatment following animal bite injuries (Rabies Free World, 2011).
Assessment of Current Interventions (continuation)

- Focusing in dogs mass vaccination campaigns (CDC, 2011).
- Worldwide >90% of rabies exposures are from dogs (CDC, 2011).
- Bite wounds, stress, and trauma from dogs transmitted rabies.
- Rabies control and elimination is possible in dogs.
- Feral and roaming infected dogs is a challenge.
- Oral Rabies Vaccination (ORV) and contraception hold promise to enhance rabies control (CDC, 2011).
Rabies eradication requires necessary resources for large scale, long term vaccination programs (Gordejo, 2006) for both wild and domestic susceptible animals and post-exposure treatment for humans.

- Post-exposure rabies shots are 100% effective against the virus (Wildlife Crisis, Inc., 2011)
- Education campaigns are needed.
Potential Partnerships

- In order to eradicate rabies globally, building and maintaining effective relationships with stakeholders and organizations is critical in achieving the desired outcome (Siegel & Doner, 2004).

Examples:
1. Centers for Disease Control and Prevention
2. Bill & Melinda Gates Foundation
3. The World Veterinary Association
4. Global Alliance for Rabies Control
5. Vaccines’ producing companies, such as Novartis
6. Forming community and international level coalitions, such as World Rabies Day and E-global communications.
1. Identifying the needs, wants and core values:

- Canine rabies is a serious global health concern with major public health impact in terms of mortality, morbidity, and disability adjusted years (Lembo, T. et al., 2011).
- Mass vaccination has been successful in Western Europe and North America. Japan successfully eliminated rabies in 1956 by mass vaccination of dogs (Karee, M. et al., 2007).
- Challenges include inadequate resources, lack of political support, lack of consensus on strategy, weak intersectoral coordination, inadequate management structure, lack of public cooperation, prevalence of myths, and religious factors (WHO, 2005).
2. Defining the Product

- Final product reduced morbidity and mortality.
- Intermediate products bringing together of disparate forces to work for a common goal and change ((Kaufer, 2000).
- Intersectoral cooperation of: animal control and welfare, diagnostics, ecology, economy, education, epidemiology, health communication, anthropology, human and animal health services, virology, and wildlife biology (Lembo, t. et al., 2011).

3. Marketing Public Health – Packaging and Positioning the Program

- Public Health advocacy (Siegel & Doner, 2004).
- Massive canine rabies vaccination campaigns.
- Changing public health perception through education, and eliciting political support (WHO, 2001).
- Sustainable and economic solutions.
- Funding educational programs.
According to the WHO (2011), promotion and partnership are the three strategic elements, and the main focus is to introduce cost-effective public health interventions to improve the accessibility, affordability and availability of post-exposure prophylaxis, mass vaccination of dogs, and dog population management.
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Other Factors

- Shorter (PEP) vaccination regimens
- Effective intersectoral collaboration between health, agriculture, environment, education, and local government (Gongal & Wright, 2011).
- Intersectoral approach and pilot programs.

Innovative Programs for Global Rabies Prevention and Control

- World Rabies Day
Communication and Media Plan

- Mass canine vaccination campaigns with educational resources targeted to the age group below 15 on how to prevent being bitten by a dog.

- Information to school teachers, parents, and health care workers on how to proceed in dog bites’ cases.

- Media channels with cultural sensitive information.

- Entertainment educational approach (Siegel & Doner, 2004) using television, radio, magazines, newspapers, and school and church pamphlets.
The rabies vaccination campaigns will be conducted annually or more frequently in areas where population birth and death rates are high (WHO, 2005). All dogs and cats, when presented either at vaccination posts in the community or house to house visits, will be immunized, regardless of their age, weight, or state of health and the animal identified with colored tags or collars.
Evaluation Plan

- Evaluation of the intervention to eliminate rabies transmitted by rabid dogs in Asia and Africa determines whether the program or parts of the program are sufficient, appropriate, effective and efficient (World Rabies Day, 2011).

- The evaluation plan begins while the program is being created, and would continue through the duration of the program, ending once the final assessment has taken place and the program has achieved its intended goals.

- The activities in the process evaluation to be effective would consist of setting evaluation objectives and designing evaluation plans, determining data collection instruments, and implementing and reporting on evaluation activities (Siegel & Doner, 2004) to stakeholders.
Evaluation Plan (continuation)

According to Crosby (2006) the evaluation would provide information on:

- Whether the materials used to motivate people to vaccinate pets are culturally suitable for the target population.
- If the plans to offer free animal vaccination are feasible before they are put into effect.
- Ensures that the program is conducted as it was designed.
- Provides ways to improve service.
- Provides an early warning for developing problems, such as places where vaccines or prophylaxis are offered.
- Monitors program activities for reduction of reported cases of rabies.
- Demonstrates if any unexpected benefits or problems exist.
- Provides both qualitative and quantitative data to base similar future programs.
Logic model with detailed inputs, activities, outcomes, and impact (goals) would provide graphic representation of the resources, the activities, and the results (W.K. Kellogg Foundation, 2006).

The qualitative: observations, in depth-interviews, official documents on vaccination records, photographs, recordings, and informal conversations (Crosby, 2006).

Coding of interview results provides data to analyze along with other quantitative data gathered from the program participants and official rabies incidence reports.

- The evaluation framework used in this process evaluation provides utility, feasibility, propriety, and accuracy (CDC, 2001).
Rabies elimination in Asia and Africa is Possible...


Centers for Disease Control and Prevention Division of High Consequence Pathogens and Pathology National (2011) Center for Emerging and Zoonotic Infectious Diseases Rabies: a neglected, re-emerging zoonosis.


References


References


References


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