# Dog Restraining Technology Package for the Implementation of a Mass Canine Rabies Vaccination Campaign in Developing Countries

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## Abstract

Dog bites are a serious and often underestimated public health problem and associated with physical and psychological trauma, they cause wound infection by different microorganisms and the risk of rabies transmission. Tens of thousands of people in developing nations die of rabies each year, and tragically dogs are the vectors in over 98 percent of human rabies cases. Ethiopia has a high dog population and is estimated to have the second largest number of rabies deaths of all African countries. One of the strategies of rabies control and prevention is mass dog vaccination campaign. For successful implementation of vaccination campaign and to reduce the risk of dog bite, using effective dog restraint tool is crucial. For this purpose, we developed dog restraining technology package which contains three tools namely dog muzzle mask, dog catching net and dog restraining crush. These dog restraint tools are easy to use or apply on dogs, safe for vet practitioner and animal owners. They are also cost effective, very easy to maintain, can be made from easily accessible locally available materials. After developing the technology package, it was tested in different veterinary clinics and on field and it works perfectly. The stakeholders were also trained on how to prepare and use the technology. After the training, we hand over one technology package for each Gondar administrative zone that can be used as a model, and facilitate the dissemination, implementation and sustainability of the technology. The stakeholders who have taken the training and used the technology reported that situation of working with dogs was easy after the training: doing clinical examination, taking vital signs, giving interventions (drug, vaccine) and undertaking surgical procedures on dogs. They also reported that the decrement of dog bite and improvement of welfare of dogs after the technology transfer.

Keywords: Dog bite • Technology package • Rabies • Vaccination campaign

## Introduction

Dogs have shared their lives with humans for more than 12,000 years, and this coexistence has contributed substantially to humans' quality of life. However, of all the animal species, dogs display the greatest range of reactions to animal health care workers and other people working at veterinary clinics. Dog bites are occupational hazard for animal health care workers. Mainly it is also the most dangerous risk for dog owners every day and strange person. These reactions can differ from the dog's customary demeanor. Often a dog that is docile and friendly at home reacts differently in a veterinary clinic and hospital. A number of factors are involved in triggering aggression and/or escape responses in dogs at vet clinic [1]. The most common include fear, pain, feeling trapped, excessive physical contact, new environment, the personnel and equipment. Dog bites and scratches represent the most important public health concern because of the associated physical and psychological trauma, they cause wound infection by different microorganisms and the risk of rabies transmission. According to a WHO report, ten million people

are bitten by dogs around the world (WHO, 2003). Tens of thousands of people in developing nations die of rabies each year, and tragically dogs are the vectors in over 98 percent of human rabies cases Ethiopia has a high dog population and is estimated to have the second largest number of rabies deaths of all African countries Amhara region has also high dog population and the areas are well known by frequent rabies outbreak reported that a total of 924 human rabies exposure cases at Addis Alem hospital in northwest Amhara region and dogs were the principal sources of exposure (96.3%).

To control and prevent rabies disease mass vaccination of stray and owned dogs against rabies virus is paramount; and to implement vaccination campaign effective dog restraining technologies are needed to manage dogs. To minimize dog bite and scratch, optimize the welfare of the dog, safeguard animal healthcare workers and clients, and for successfully implementation of dog vaccination campaign, we developed dog restraint technology packages namely dog muzzle mask, dog catching net and dog retaining crush. These dog restraint tools are cost effective, very easy to maintain, can be made easily from locally accessible materials and don't need knowledgeable profession for construction. They are also easy to use or apply on dogs, safe for vet practitioner and animal owners [2]. In addition, they are easy to transport and use at Vet clinics, at home and on field for mass dog rabies vaccination. Moreover, the technology package give three dog restraint tools options to animal health care workers and dog owners to use them according to the behavior and aggressiveness of dogs. The dog muzzle mask can be used to handle and transport friendly dogs, the net to catch stray and aggressive dogs, the crush to manage and treat more violent dogs. The combination of two among the three restraint tools can also be applied to the most aggressive dogs [3].

## Materials and Methods

### Methods for development and materials used

**Dog muzzle mask:** A muzzle mask is a restraint device applied around a dog's nose and mouth to prevent the dog from biting. Any dog that may become aggressive during examination, treatment or vaccination should wear a muzzle mask, applied before the animal shows signs of fear or aggression. Muzzle mask can be prepared from locally available materials such as nylon cloth, plastic, leather, or wire with variety of sizes (Figure 1).

Procedure to prepare dog muzzle mask from nylon or leather:

- Measure the length and circumference of a dog muzzle.
- Cut the nylon cloth, or leather by scissors according to length and circumference of a dog muzzle.
- Sew the cut piece of nylon or leather by sewing needle manually or tailor machine.
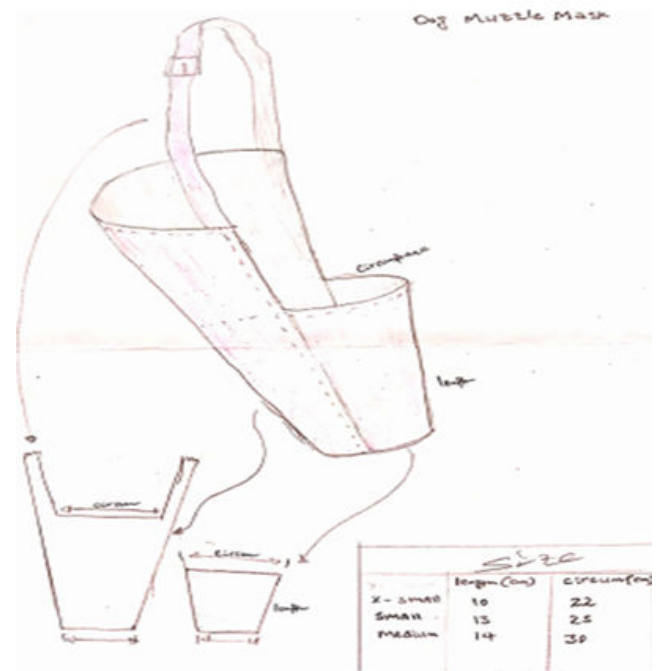


**Figure 1.** Design of dog muzzle mask. The length and circumference of dog muzzle mask with different sizes (medium, small and x-small).

**Dog catching nets:** The can be a very humane and effective way of catching and restraining fearful and street dogs for medical procedure and vaccination. They are a versatile tool for animal control officers, disaster responders, those rescuing hoarding cases, and spay or neuter or Animal Birth Control (ABC) programs [4]. The medium dog catching nets have a circumference of about 240 cm, diameter of 74 cm, handle length of 127cm and the netting should be 100 cm deep to twist the net after catching the dog (Figure 2). The dog catching net is prepared from iron rod and rope.

Procedure to construct the dog net:

- Prepare a loop with 240 cm circumference and 74 cm diameter.
- Prepare 127 cm handle and fix with the loop by blending at garage house.
- Prepare a 100 cm depth net with the same circumference and diameter to the loop and attach on the loop by tying.
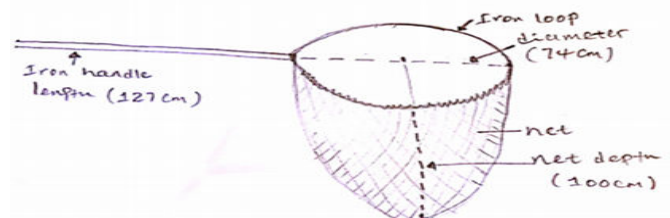


**Figure 2.** Design of dog catching net. Different parts (net, iron loop and hand) and its size of dog catching net.

### Dog restraining crush:

Movable dog restraining crush is a strongly built stall for holding dogs safely while they are examined, vaccinated, marked, or given veterinary treatment. The great advantage of this restraint tool is that a dog in the crush cannot see the procedures performed on it and stays calm. In addition, having the dogs calmly held will have a positive impact on the outcome of clinical examination, vaccination or parameter measurement as it avoids physiological changes that result from stressed dogs trying to escape or adjust their positions. Dog restraining crush is made from wood, Medium Density Fiberboard (MDF), cola, nail and a piece of sponge wrapped with leather or cloth. The front end has head gate between two MDF boards to catch. A circumference of head gate is rimed with sponge wrapped by leather or cloth to avoid dog neck injury. The crush has a manual operating mechanism from the side to widen head gate by raising the top MDF board up for a dog to enter its neck through head gate, and then let down the top MDF board. Both the head gate and the height of crush are also adjustable at 3 cm interval to accommodate dogs of different sizes (Figure 3). Moreover, it is portable for field use as well as potentially designed to be fixed and stay in one place [5].
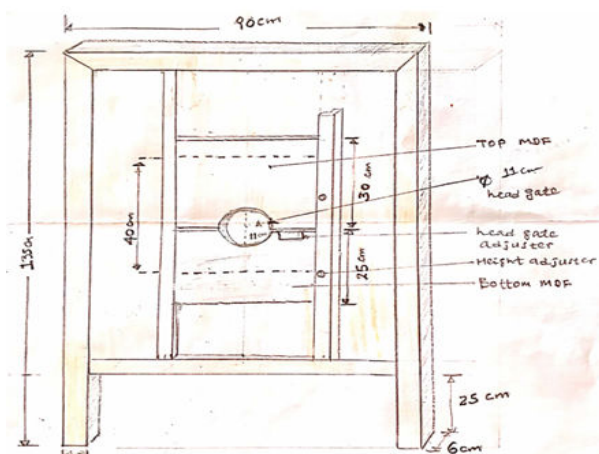


**Figure 3.** Design of the dog restraining crush. Different component and its dimensions of dog restraining crush.

## Results and Discussion

### Methods to test and transfer the dog restraint technology package

To check efficiency and easiness of dog restraining technology package, it was tested at selected veterinary hospitals and clinics and on field in the presence of the University-Industry linkage and technology transfer directorate director and coordinator; and in front of selected animal health care workers and dog owners (Figure 4D, 5C, 6D). During testing of the technology, we received feedbacks from different stakeholders and incorporated them into the final product of technology package (Figure 4) [6].



**Figure 4.** a) Practical training and demonstration to the stakeholders about dog restraining crush. Explaining materials used to prepare; b) how to construct dog restraining crush; c) Training on how to use/apply the tool; d) administer rabies vaccine after effective restraining.

Once the technology was tested, we transferred it to end users by practical training and demonstration in different training centers [7]. During the training, the trainees were informed about the type of the materials used; trained on how to prepare and apply/use the dog retaining tool and finally on how to vaccinate already properly restrained dogs (Figure 4-6) [8]. To sustain and implement the technology the university provided one technology package as a model for each administrative zones of Gondar (Figures 5 and 6) [9].



**Figure 5.** a) Practical training and demonstration to stakeholders about dog catching net. Explaining materials used to prepare and on how to construct dog catching net; b) training on how to use/apply the tool; c) administer rabies vaccine after effective restraining.

(A)                                                          (B)

(C)                                                          (D)

**Figure 6.** a) Practical training to stakeholders about dog muzzle mask; b,c) Training on how to use/apply the dog muzzle mask; d) administer rabies vaccine after effective restraining.

## Conclusion

Dog restraining crush was successfully developed and dog catching and muzzle mask were prepared from locally available cheap materials. These dog restraining tools were tested both in veterinary clinics and on field, and work efficiently. The technology package is used in canine rabies vaccination campaign, effective medical procedures and treatments. The other use of the technology is to catch stray dogs and to transport dogs to veterinary clinics. The overall impact of the technology is keeping the safety of animal healthcare workers and dog owners, and to improve the welfare of the dog.

## Acknowledgements

## Conflict of Interests

The authors declare that they have no conflict of interests.

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