

A Cluster Randomised Controlled Trial Investigating the Impact of Integrating Mass Drug Administration Treating Soil Transmitted Helminths with Mass Dog Rabies Vaccination in Remote Communities in Tanzania

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Abstract : Achieving the London Declaration goal of a 90% reduction in neglected tropical diseases (NTDs) by 2030 requires cost-effective strategies that attain high and comprehensive coverage. The first objective of this trial was to assess the impact on cost and coverage of employing a novel integrative One Health approach linking two NTD control programs: mass drug administration (MDA) for soil-transmitted helminths in humans (STH) and mass dog rabies vaccination (MDRV). The second objective was to compare the coverage achieved by the MDA, a community-wide deworming intervention, with that of the existing national primary school-based deworming program (NSDP), with particular focus on the proportion of primary school-age children reached and their school enrolment status. Our approach was unconventional because, in line with the One Health approach to disease control, it coupled the responsibilities and resources of the Ministries responsible for human and animal health into one program with the shared aim of preventing multiple NTDs. The trial was carried out in hard-to-reach pastoral communities comprising 24 villages of the Ngorongoro District, Tanzania, randomly allocated to either Arm A (MDA and MDRV), Arm B (MDA only) or Arm C (MDRV only). Objective one: The percentage of people in each target village that received treatment through MDA in Arms A and B was 63% and 65%, respectively ($\chi^2 = 1$, $p = 0.32$). The percentage of dogs vaccinated in Arm A and C was 70% and 81%, respectively ($\chi^2 = 9$, $p = 0.003$). It took 33% less time for a single person and a dog to attend the integrated delivery than two separate events. Cost per dose (including delivery) was lower under the integrated strategy, with delivery of deworming and rabies vaccination reduced by \$0.13 (54%) and \$0.85 (19%) per dose, respectively. Despite a slight reduction in the proportion of village dogs vaccinated in the integrated event, both the integrated and non-integrated strategies achieved the target threshold of 70% required to eliminate rabies. Objective two: The percentages of primary school age children enrolled in school that was reached by this trial (73%) and the existing NSDP (80%) were not significantly different ($F = 0.9$, $p = 0.36$). However, of the primary school age children treated in this trial, 46% were not enrolled in school. Furthermore, 86% of the people treated would have been outside the reach of the NSDP because they were not primary school age or were primary school age children not enrolled in school. The comparable reach, the substantial reductions in cost per dose delivered and the decrease in participants' time support this integrated One Health approach to control multiple NTDs. Further, the recorded level of non-enrolment at primary school suggests that, in remote areas, school-based delivery strategies could miss a large fraction of school-age children and that programs that focus delivery solely at the level of the primary school will miss a substantial proportion of both primary school age children as well as other individuals from the community. We have shown that these populations can be effectively reached through extramural programs.

Keywords : canine mediated human rabies, integrated health interventions, mass drug administration, neglected tropical disease, One Health, soil-transmitted helminths

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