

Case Study “Managment of Urban Cysticercosis”

“Portuguese Observatory of taeniasis and cysticercosis”. A "One Health" approach for epidemiological surveillance of one specific neglected disease in a European country.

Context	<p>Cysticercosis results from the ingestion <i>Taenia solium</i> eggs directly by faecal-oral route or contaminated food or water. Human tapeworm carriers who have become infected after ingesting pork meat contaminated with cysticerci release these eggs. Cysticercosis occurs after tapeworm eggs are ingested by an intermediate host (pig or human) and then hatch, migrate, and lodge in the host's tissues, where they develop onto larval cysticerci. When they lodged in the central nervous system of humans, results in the disease condition called Neurocysticercosis (NCC), with a heterogeneous manifestations depending of the locations of cysts, number, size and their stage of evolution (1). Consequently the prognostic ranges from asymptomatic to situations leading to death in 2% to 9.8%. of cases (7) In swine’s there are few studies, but recent works have proved that animals, for the same reasons, also have neurological abnormalities, expressed by seizures, stereotypic walk in circles, chewing motions with foamy salivation included tonic muscle contractions followed by a sudden diminution in all muscle tone leading to collapse (2).</p> <p>Conventional domestic wastewater treatment processes may not be totally effective in inactivating parasites eggs from <i>Taenia solium</i>, allowing some contamination of soils and agricultural products (11).</p> <p>In Portugal there are some evidence of aggregation of human cysticercosis cases in specific regions, bases in ecological design studies (6). There are few information about human tapeworm carriers and social and economic factors associated with them.</p>
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<p>Rationale of the One Health initiative</p>	<p>Success in knowledge and consequently in lowering transmission is limited by the complex network of biological and social factors that maintain the spread.</p> <p>Effective control of mostly zoonosis require One Health approach, after a real knowledge and transparency in the information provided by the institutions responsible for both animal and human health, allowing sustained interventions targeted at the transmission cycle's crucial nodes.</p> <p>In general, the model used to control, reflects a rural reality, where pigs are raised freely, poor sanitation conditions and incipient sanitary inspection. In cysticercosis, pigs are obligate intermediate hosts and so considered as first targets for control and used as sentinels to monitor environmental <i>T. solium</i> contamination (3).</p> <p>Usually environmental contamination with <i>Taenia</i> spp. eggs is a key issue in most of studies with landscape factors influencing presence of <i>Taenia</i> spp. antigens in both pigs and humans (5).</p> <p>Soil-related factors as well as socio-economic and behavioural factors are associated with the emergence of significant clustering human cysticercosis (4,5).</p> <p>However scarce studies has been produced in urban environmental and in developed countries with the finality to characterize the spatial pattern. There are still few data available regarding its prevalence and spatial distribution; Transmission patterns are likely to exhibit correlations as housing conditions, water supply, basic sanitation, schooling and birthplace of the individual or relatives, more than pigs rearing free, soil conditions (9).</p> <p>As a matter of fact, tapeworm carriers from endemic zones can auto-infect or transmit infection to other people or arrive already suffering NCC (as a result of travelling to or being a citizen from an endemic cysticercosis country) to a free cysticercosis country. Transmission is fecal-oral; this includes transmission through person-to-person contact, through autoinfection, or through contaminated food</p> <p>This has been happening in different continents as North America (5.4–18% been autochthonous), Europe and Australia (7). Recently, case reports of NCC have also emerged from Muslim countries. (10). Actually, different papers relate an</p>
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	<p>epidemic situation in Spain and Portugal (7, 8). However the kind of study done does not authorize such conclusion. There are no evidence that infections were acquired in Portugal and there are not characterized the mode of transmission. Papers with these kind of information will be allow to have economic consequences resulted from artificial trade barriers with serious consequences for pig producers and pig meat trade. We need transparency in information's that allow provide the basis to support the development and targeting of future effective control programmes (and prove we need that).</p> <p>So, to have a real picture of the disease, it is necessary integrate data from human, animal and environmental factors surrounding human and pig cases to characterize the pattern of the transmission. The design needs to be able to capture unexpected, and not common outcomes (routine data). We need to think "One Health" to get a genuine image of the situation.</p>
<p>Objectives</p>	<p>A. Assessment of the performance of The National Observatory of Cysticercosis and Taeniasis (NOCT)</p> <p>B. To characterize the epidemiological situation of human cysticercosis in Portugal:</p> <ul style="list-style-type: none"> • Transmission • Risk factors • Geographic distribution • Socioeconomic and demographic conditions of patients <p>C. To characterize the epidemiological situation of pig cysticercosis in Portugal:</p> <ul style="list-style-type: none"> • Transmission • Risk factors • Geographic distribution • Socioeconomic and demographic conditions of owners

DRIVERS

- A. Human routine data
 - 1. Cysticercosis is not a mandatory disease.
 - 2. There are not routine information about human cysticercosis.
- B. Pig cysticercosis data
 - 1. Slaughterhouse information. The data posted in the official website does not distinguish between different forms of metacestodes found during official inspection in slaughterhouses.
 - 2. OIE. It is a mandatory data to OIE. OIE indicates a single case of pig cysticercosis infection by *Taenia solium* in 2002 (no region indicated). It was not possible to get more information. Portugal is considered eradicated for pig cysticercosis.
 - 3. Personal information refer two single cases in North region (2006 e 200?)
 - 4. Pig distribution units with less than 100 animals (non-industrial)
- C. Other National Information Available
 - 1. International Information on animal cases report (OIE)
 - 2. National information about human distribution population including foreign people living in Portugal
 - 3. Pig distribution units, excluding those with less than 100 animals (non-industrial)
- D. Social Drivers
 - 1. The reasons behind the sub notification by doctors and veterinarians are based on a complex network of reasons, one of legal character, others of relations and working conditions and still others of jurisprudence. In this system thinking it will be necessary discern, identify and define the whole pattern of reasons behind underreporting, in an attempt to supplant them.
 - 2. Accessibility to health services of individuals with symptoms suggestive of cysticercosis
 - 3. Socio-economic level of individuals with symptoms suggestive of cysticercosis
 - 4.

<p style="text-align: center;">EXPECTED OUTCOMES</p>	<p>A. Disciplinary outcomes</p> <ol style="list-style-type: none"> 1. To get from the official Human Health sector of Portugal the possible information on human cysticercosis diagnosed in Portugal using any data routinely collected. 2. To get from the official Animal Health sector of Portugal the possible information on slaughterhouses on pig cysticercosis. 5. To get from the official Animal Health sector of Portugal the possible information on pig distribution units with less than 100 animals (non-industrial) 6. To get from the official Statistical sector of Portugal (INE and PORDATA) the possible information on resident human distribution population. 7. To get from the official Statistical sector of Portugal (INE and PORDATA) the possible information on foreign resident distribution population. <p>B. Interdisciplinary outcomes</p> <p>All information will be analyse cooperating with scientists coming from veterinary area and medical area.</p> <ol style="list-style-type: none"> 1. Analyse all data together to try determine the principal residential geographic hot spots for human cysticercosis. 2. Analyse the probabilities of the live cycle of the parasite and the respective geographic area. 3. Planning the strategy to follow in both situations in the different sectors (Agriculture and Human Health) <p>C. One Health outcomes</p> <ol style="list-style-type: none"> 1. Information and identification of the Hot spots for human Health 2. Information and identification of the Hot spots for animal Health 3. Strategies defined and implemented in Agriculture sector, with a spatial analysis of rural porcine cysticercosis if relevant. 4. Strategies defined and implemented in Human sector 5. Results on identification of human clusters of the disease. Clustering of cases in specific households would indicate tapeworm carriers in the vicinity, whereas their dispersal would suggest other hypotheses that it is necessary to study.
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	<ol style="list-style-type: none">6. Identification of tape worms carriers. Household location of tapeworm carriers play a crucial role, in increasing the risk of human cysticercosis (auto-infection, neighbors and friends) and transmission to pigs.7. Use of new diagnostics techniques, especially regarding the identification of ape worms carriers.8. Actions taken to prevent the dissemination of the disease9. Assess the influence of socio-economic, behavioural and environmental variables on pig cysticercosis.10. Better knowledge and interest on the part of physicians involved in the process11. Others information and Prevention actions, contributing for changing population knowledge, attitudes and practices (KAP).12. Characterization of the environment surrounding the human cases and definition of the variables that contribute for the transmission13. Assessment of living conditions, equity and well-being associated with tape worms carriers and cysticercosis patients14. Assess the influence of socio-economic, behavioural and environmental variables on human cysticercosis patients.15. Establishment of better channels of communication between the different responsible official sectors, translate into better governance actions.16. Planning the strategy to follow in both situations in the different sectors (human and agriculture sectors)17. Identification of cases followed in an outpatient clinic18. Prevalence of neurocysticercosis in Portuguese patients.19. Evaluation of burden associated with hospitalizations by NCC.20. Evaluation of burden associated with outpatients21. Calculate the global burden of the disease in Portugal22. Contribute to create a group of thinking system, based on the governance organisations, educational organizations and local cultural organizations that act as a whole, thinking in common health strategies, interacting in a constructive collaboration to identify wrong practices and promote behaviour changes, able to capture changes, analyse information and find results for unanswered questions.
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	<p>23. Better sharing of information on diagnostic criteria between clinicians, treatment and prevention measures that will contribute to an effective epidemiological surveillance of patients with <i>Taenia solium</i>.</p> <p>24. Better information of new cases of pig cysticercosis followed by prevention measures that will contribute to an effective eradication of the life cycle of <i>Taenia solium</i>.</p> <p>25. Evaluation of results over time (years)</p>
Stakeholders	<ol style="list-style-type: none"> 1. Human Health Directorate (Direção Geral de Saúde) 2. Animal and Food Directorate (Direção Geral de Alimentação e Veterinária) 3. Faculdade de Ciências Médicas. Universidade Nova de Lisboa 4. Departamento de Medicina Veterinária. Universidade de Évora 5. UTAD
Boundaries	<p>The limitations identified can affect the results, need to be considered in the structuration of the thinking system and need to be evaluated.</p> <ol style="list-style-type: none"> 1. Habits rooted in public institutions regarding data sharing (Human Health Directorate) (Direção Geral de Saúde) 2. Gaps in the recording data (Human Health Directorate) (Direção Geral de Saúde) 3. Habits rooted in public institutions regarding data sharing (Animal and Food Directorate) (Direção Geral de Alimentação e Veterinária) 4. Gaps in the recording data (Animal and Food Directorate) (Direção Geral de Alimentação e Veterinária) 5. Lack of support for different reasons for reporting new cases and monitoring them by clinicians 6. Lack of real network implementation, because it is not considered an essential objective 7.

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