Recognising the substantial burden of neglected pandemics cystic and alveolar echinococcosis

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Cystic echinococcosis and alveolar echinococcosis belong to the diverse group of mainly parasitic, but also bacterial, viral, and fungal diseases currently listed among the neglected tropical diseases (NTDs) for which WHO advocates control.[1] As with most NTDs, cystic and alveolar echinococcosis affect rural and marginalised communities without voice, often distant from health-care settings. However, and in contrast to most NTDs, the prevalence of cystic and alveolar echinococcosis extends beyond tropical and subtropical regions to include worldwide pastoral and rural communities of medium-high income countries, including Europe, where they should be managed as orphan diseases.[2,3]

In 2014, the Food and Agriculture Organization of the UN and WHO, based on a multicriteria ranking system, highlighted alveolar and cystic echinococcosis as the second and third most important food-borne parasitic diseases at the global level, respectively.[4] Cystic and alveolar echinococcosis combined infect more than 1 million people worldwide at any given time, with an estimate of 200 000 new cases per year.[5]

Cystic and alveolar echinococcosis are very different parasitic diseases caused by infection with the larval stages (metacestodes) of *Echinococcus granulosus* sensu lato and *Echinococcus multilocularis*, respectively. Human cystic echinococcosis is a chronic, disabling disease, mainly affecting the liver and lungs, although infection can spread to any organ or tissue such as the kidney, bones, heart, spleen, and CNS. Cystic echinococcosis is characterised by anatomically isolated, fluid-filled parasitic cyst formations (up to 30 cm) that grow concentrically, mainly causing compression on neighbouring organs. By contrast, alveolar echinococcosis primarily affects the liver and is a chronic, devastating clinical condition with a high fatality rate if untreated. Human alveolar echinococcosis is characterised by the progressing infiltrative proliferation of the metacestode into adjacent organs and tissues, mimicking a metastasising tumour. Moreover, cystic and alveolar echinococcosis not only differ in terms of parasite development and prognostic outcome, but also in their epidemiology. Indeed, cystic echinococcosis is a pastoral zoonotic disease transmitted by canid definitive hosts (mainly dogs) to livestock intermediate hosts (mainly sheep). On the contrary, alveolar echinococcosis is a wildlife zoonotic disease that, depending on the epidemiological setting, involves wild or domestic canid definitive hosts (mainly foxes) and small rodents as intermediate hosts. Humans act as intermediate dead-end hosts for both cystic and alveolar echinococcosis. Under-reporting and misreporting of patients receiving medical attention are among the factors that contribute to neglect of these parasitic infections at the global level.

In central Asia, 270 million people are at risk of cystic or alveolar echinococcosis, which, after the collapse of the Soviet Union and the consequent profound socioeconomic changes, are considered to be re-emerging in some countries, such as Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan.[6] In Kyrgyzstan, changes in animal husbandry practices, decline in veterinary public health services, and the increase in dog populations seem to have had an impact on transmission of these parasites to humans, resulting in serious cystic and alveolar echinococcosis epidemics. During the period between 1995 and 2011, human alveolar echinococcosis in Kyrgyzstan increased at least 20-fold, from 0–3 cases to more than 60 cases per year.[7] The disease burden of selected zoonotic infections in Kyrgyzstan (alveolar echinococcosis, brucellosis, campylobacteriosis, cystic echinococcosis, congenital toxoplasmosis, rabies, and non-typhoidal salmonellosis) is substantial and similar to that of HIV (35 209 *vs* 38 870 disability-adjusted life-years [DALYs] in 2013).[8] Among these zoonotic agents, the second highest burden was caused by *E multilocularis* (11 915 DALYs [95% uncertainty interval 4705–27 114] per year).[8]

In this context, the study in *The Lancet Global Health* by Giulia Paternoster and colleagues[9] provides new insights into the epidemiology of cystic and alveolar echinococcosis in Kyrgyzstan. This retrospective study aimed to identify cystic and alveolar echinococcosis surgical cases reported by the national surveillance system to estimate crude and standardised hospital incidence, and to identify disease hotspots at high spatial resolution. Even though hospitalised cases represent

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the tip of the iceberg, 2359 primary surgical cases of cystic echinococcosis and 546 primary surgical cases of alveolar echinococcosis were detected in Kyrgyzstan during 2014–16, accounting for a surgical incidence of around 13·1 per 100 000 population per year for cystic echinococcosis and 3·02 per 100 000 population per year for alveolar echinococcosis. This study also revealed remarkable within-country variations, with surgical incidence reaching up to 176 per 100 000 population for cystic echinococcosis and 246 per 100 000 population for alveolar echinococcosis primary surgical cases. Finally, Paternoster and colleagues identified precise geographical locations where epidemiological and clinical research should be implemented to reduce the burden of cystic and alveolar echinococcosis, and to support the planning of cost-effective control interventions in Kyrgyzstan. In the 21st century, global health challenges for the surveillance and control of cystic and alveolar echinococcosis in central Asia and in other hyperendemic regions include development of new, improved, and standardised molecular or serological assays for the detection and follow-up of the parasite in humans and animal hosts; a stage-specific approach for human clinical management; a better understanding of environmental contamination by the parasite eggs and their pathways of transmission to humans by food or water sources and hand-to-mouth contacts; and generation of epidemiological data on burden of diseases, as demonstrated by Paternoster and colleagues.[9,10]

The time has come for scientists, stakeholders, and policy makers to work together to make a difference and bring an end to these ancient pandemics.

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