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Schistosomiasis control: experiences and lessons from China

Published Online October 20, 2008
DOI:10.1016/S0140-6736(08)61358-6

Schistosomiasis is a chronic and debilitating disease that also exacerbates poverty. The disease is endemic in the tropics and subtropics, including China.[1,2] Worldwide, almost 800 million individuals are at risk. About 200 million people are infected, over half of whom have various degrees of morbidity,[2] which leads to a disease burden that might be as high as 4·5 million disability-adjusted life-years. This estimate of burden, however, might considerably underestimate the true burden of schistosomiasis.[3]

Schistosomiasis is often neglected, because it mainly affects poor rural communities in developing countries.[4] In China, however, the public-health and socioeconomic importance of schistosomiasis was recognised already in the 1950s, as documented in Mao Zedong's poem *Farewell, God of Plague*.[5] Political will, sustained financial and technical support, and an integrated approach readily adapted to different eco-epidemiological settings and fine-tuned over time have substantially reduced the burden of schistosomiasis. For example, although there were more than 10 million individuals infected with *Schistosoma japonicum* in 12 provinces of southern China in the mid-1950s, this number was reduced to less than 1 million half a century later.[6] In parallel, transmission was interrupted in five provinces.

However, further progress has been hampered by many factors, such as climate change, profound demographic and ecological transformations, market-based reforms of the health sector, and the termination of the World Bank loan project on schistosomiasis control in 2001.[5,7,8] Re-emergence of schistosomiasis, at least in hilly environments of Sichuan province, is a growing concern.[9] At present, most schistosomiasis cases are concentrated in lake and marshland regions.[6] Since 2004, after the outbreak of severe acute respiratory syndrome[10] and fuelled by the potential re-emergence of schistosomiasis in China, the disease has moved up as one of the top public-health priorities, and is now in the same league as HIV/AIDS, tuberculosis, and hepatitis B.

Several features in the life cycle of *S japonicum* govern its epidemiology and need to be taken into account for disease control. First, *Oncomelania* spp, the intermediate host snail of *S japonicum*, is amphibious. These snails can, therefore, proliferate in an array of habitats, such as networks of water in lakes and marshlands and in different kinds of microhabitats in hilly and mountainous environments. Second, more than 40 species of mammals can act as reservoir hosts. Domestic water buffaloes in marshland regions are of particular relevance: these buffaloes can contribute up to 90% of the transmission of *S japonicum*.[5]

The Chinese authorities noted some of these issues more than 50 years ago, which guided the initial design of the national control programme. With the ultimate aim to eliminate schistosomiasis, many approaches have been used, and the overall strategy has been adapted as new approaches and evidence emerged in response to the changing epidemiology of schistosomiasis.[5,8] Early efforts focused on the control of the intermediate host snails and it was thought that schistosomiasis

Panel: Lessons from 50 years of schistosomiasis control in China

Governmental policy
- Recognition of the public-health significance of schistosomiasis
- Political will and commitment to control schistosomiasis

Control strategy
- Use of multiple interventions in integrated way
- Adapt control interventions for specific eco-epidemiological settings and over time as the challenge of control changes

Implementation, monitoring, and surveillance
- Rigorous surveillance and monitoring of human and bovine prevalence and snail-infested areas

could be eliminated by chemical molluscicides and environmental management that targeted entire snail habitats.[5] Large-scale community participation was a central feature in environmental management. Although the snail habitats were substantially reduced and the number of human infections steadily declined, the disease remained hard to eliminate.

In the 1990s, morbidity control was the backbone of disease control, helped by the administration of praziquantel, which had been introduced for large-scale use in the previous decade, coupled with health education. An important lesson learnt during the 10 years of the World Bank loan project was compliance with chemotherapy, which was dropped as the programme evolved.[11] This finding, coupled with factors such as severe flooding of the Yangtze river in the late 1990s, other ecological transformations, and forced movements of population[6] might explain the resurgence of schistosomiasis after the project was terminated.[5] Indeed, the number of acute cases of human schistosomiasis and the snail-infested areas increased at the start of 2000.

So what are the lessons from 50 years of schistosomiasis control in China? The panel gives a summary, which we hope will stimulate the scientific community and national schistosomiasis control-managers elsewhere. In view of the remaining challenges for sustainable control of schistosomiasis in China, mid-term and long-term goals have been developed: ie, reduce prevalence of infection by *S japonicum* below 5% by 2008 (infection control) and decrease infection below 1% by 2015 (transmission control) in all endemic areas. To achieve these targets,[5,12] the feasibility and cost-effectiveness of a four-pronged approach is being investigated in different settings, with the aim of interrupting environmental contamination of schistosome eggs by human beings and bovines. This strategy consists of: first, improved mechanisation of agriculture, to replace buffaloes with tractors. Second, avoidance of marshland pastures and introduction of fenced cattle-farming, as has already been done for pig-farming. Third, installation of sanitation facilities in houses. Fourth and last, provision of toilets for mobile populations (eg, fishermen).[12]

Preliminary data from pilot studies suggest that near-complete elimination of *S japonicum* contamination is possible if such a multipronged strategy is integrated with other control activities.[12] Importantly, such a strategy will not only be effective against schistosomiasis but also against a range of other helminthic diseases (eg, ascariasis, hookworm disease, and trichuriasis) that are still rampant in China. This strategy needs to be adapted in hilly and mountainous areas, although key challenges include the difficulty of mechanising agriculture in hilly terrains and fencing of cattle. Cost-effectiveness in different settings also needs to be investigated, so that schistosomiasis can eventually be eliminated as a public-health problem in mainland China.

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We received support from the Ministry of Health, China. X-NZ receives a grant from the National Natural Science Foundation of the People's Republic of China (grant no 30590373), and the UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (grant no A30298). JU receives financial support from the Swiss National Science Foundation (project no PPOOB-102883, PPOOB-119129). LDW declares that he has no conflict of interest.

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Medical regulation in the telemedicine era

In May, 2008, the Portoroz Declaration committed the European Union (EU) to a "paradigm shift towards clear support for eHealth".[1] However, the declaration did not include a specific commitment on medical regulation. A report from the EU's Information Society Directorate-General stated that European patients do not have the legal certainty and medical regulation they need as they increasingly access ehealth-care.[2] For many to learn that health-care regulators across the EU do not universally inform each other when they restrict a practitioner's licence to practise will be a surprise.[3] In the UK, the principles for the implementation of revalidation do not even mention telemedicine.[4]

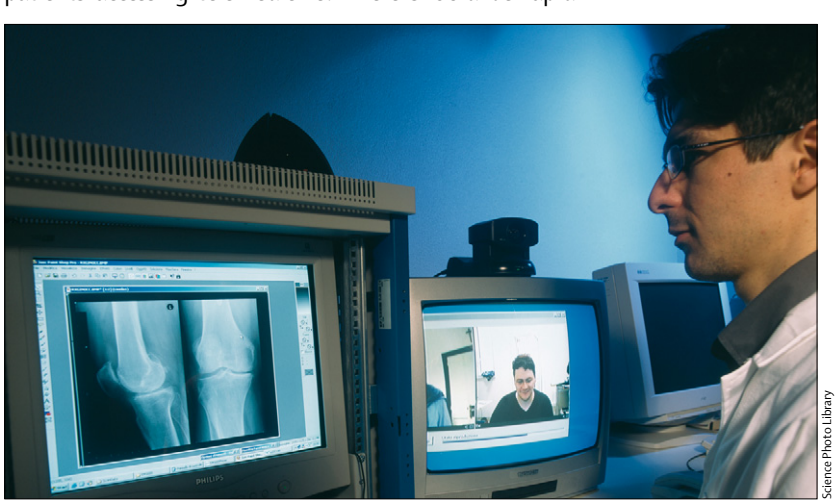
The scale of existing delivery of ehealth-care is under-recognised. In December, 2007, the EU's Information Society's Directorate-General conference on telemedicine gave presentations about 2 million prescriptions made via the internet in Sweden, telemonitoring of patients with cardiac problems that led to a 44% reduction in admissions to hospitals, teleophthalmology, tele-dermatology, telepathology, teleneurophysiology, and other topics.[5] In England, waiting times for elective MRI scans have considerably shortened because many patients have had their scans reported through teleradiology. In the USA, 240 000 teleconsultations are done every year by the Department of Veterans Affairs and one provider of remote services for intensive care units has 150 client hospitals.[6]

All health care poses risks to patients, whether traditional or through telemedicine. The UK's General Medical Council imposed a limitation of practice for 9 months on a British doctor last year who prescribed via the internet because of patients' safety issues. The sanction was only possible because the doctor practised within the UK.

Telemedicine brings substantial benefits to many patients by improved access, timeliness, specialisation, cost-effectiveness, quality, and choice. Power is shifting to patients, whose decisions on caregivers will not necessarily be well informed and whose health-care providers might not be regulated. Microsoft's HealthVault and GoogleHealth are personally controlled products of health records that are already available.[7] Patients, or their chosen caregiver at a specific time, will be able to access virtual repositories of medical records. However, a potential loophole exists for surrogate interpretation of teleradiology images on a network by unlicensed individuals under the supervision of someone who does hold a licence. A licensed radiologist could theoretically sign off reports seen by others.[8]

Malaysia passed a Telemedicine Act in 1997. 19 of the US states require doctors who practise telemedicine to have a special licence.[9] European regulation of telemedicine has focused on data protection, patients' confidentiality, and consent.[2] No EU legislation exists to require licensing of doctors who provide ehealth-care to EU patients from outside their state. At present, the ease with which a doctor can register and practise on patients in another EU member state takes precedence over ensuring adequate medical regulatory safeguards for patients' safety.

What needs to be done to assure the safety of European patients accessing telemedicine? There should be rapid



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