

July 31, 2012 10:06 pm

Infectious diseases: Innovation can still be a matter of life or death

By Andrew Jack



Needle work: a boy is vaccinated against flu in Mexico

If necessity is the mother of invention, self-interest is the father. The influenza pandemic of 2009 – which first caught the public eye in Mexico – triggered a surge in research, investment and health preparations in the west to tackle the latest manifestation of an ancient scourge.

Richer governments invested billions of dollars in purchasing vaccines and drugs, in the process stimulating fresh activity by companies into new technologies in a field long neglected by lack of interest and money.

Considerable effort also went into developing innovative approaches to regulation, public health communication and the management of surges in demand for medical care.

All such efforts need to be replicated not only for flu – which continues to kill hundreds of thousands of people a year even in its milder seasonal form – but for many other infectious

diseases. For while industrialised countries have increasingly focused on coping with the spiralling prevalence of non-communicable diseases, transmissible ones still impose a significant burden of disease and death.

Furthermore, while Ebola, Marburg and other highly lethal (but often poorly transmitted) newly discovered infections periodically emerge to trigger fear, much of the greatest underlying challenge still comes from diseases identified far longer ago.

So far, only smallpox has been eradicated, and that was a rare example of a slow-developing, quickly identifiable disease unable to survive without a human “host”. Many others, including polio and malaria, are proving far more difficult to wipe out.

Infectious diseases respect no borders. And global warming, combined with intensified cultivation and increased movement of people, animals and plants, are all contributing to a resurgence of problems long important in the “south” but until recently neglected in countries of the industrialised “north”.

The combination of resurgent demand in richer nations and lingering threats in fast-growing emerging ones helps explain fresh activity by researchers into ways to understand and tackle dengue fever, Japanese encephalitis and a series of tick-borne diseases, for example.

The good news is that many lethal infectious diseases of the past have been all but eliminated in richer countries thanks to the advent of vaccines – even if some groups of doubters in Europe and the US have slowed vaccination rates and reduced levels of protective “herd immunity”.

Many of these vaccines – including polio, measles, diphtheria, tetanus and meningitis – are now also being more rapidly disseminated into poorer nations with donors’ help, through mechanisms such as the Global Alliance on Vaccines and Immunisation, which co-ordinates distribution and helps win better prices.

Yet gaps remain, and poor underlying medical infrastructure, sanitation, clean water and nutrition can foster resurgences, as the recent outbreak of cholera in Haiti (likely to have been imported by UN peacekeepers) has demonstrated.

Enormous strides have been made in HIV therapies over the past two decades to hold the virus in step. Yet the continued spread of infection to millions of new people each year serves as a reminder of both the importance of prevention and the practical difficulties of modifying human behaviours such as unsafe sex and injecting drug use with shared needles.

In fact, human actions provide many important threats to tackling infectious disease, notably through the largely man-made problem of drug resistance. Excessive use of antibiotics in animal husbandry, for example, combined with inappropriate prescription and non-completed courses in humans, are threatening the value of essential treatments.

Rising concern over hospital-acquired infection is starting to stimulate innovation over hygiene, screening and isolation. It is also sparking efforts to find new drugs despite the considerable scientific challenges. And it is triggering discussions on new models of pricing and usage, since the traditional pharmaceutical model driven by high volume sales itself pushes to inappropriate overuse.

Instead, drug companies are seeking pooled incentives from coalitions of governments that would reward the development of a powerful new generation of antibiotics with high prices while reducing the temptation to maximise their use and undermine their long-term viability.

Drug resistance is a concern in tackling other infectious diseases too, such as HIV, malaria and tuberculosis, where medicines may be taken inappropriately or incompletely, or may be counterfeit or substandard because of poor manufacturing.

Very often, simple reformulation – such as recent efforts to identify child-friendly, soluble and better-tasting drugs for diseases including HIV and malaria – can prove as important as radically new medicines.

But the small commercial markets such products offer has also required innovation in drug development organisations, with the advent of public-private partnerships such as a new deal between Cipla, the Indian generic drug company, and the Drugs for Neglected Diseases Initiative, for paediatric anti-retroviral medicines.

Many criticised governments and public health organisations for crying wolf over the flu pandemic, pointing out that the H1N1 strain ultimately proved relatively benign. The reality was that it offered a dry run for something potentially far worse to come, and was a sobering reminder of the continued limitations of human interventions against Nature.

Infectious diseases still have tremendous power to shorten life, and the need for fresh innovation in the field – from prevention, through control to treatment – and remains as important as ever all around the world.