

Global e-health: crossing the 'digital divide'



In an essay in the February 2010 issue of *Health Affairs*, a special issue devoted to global e-health, William Tierney of Indiana University School of Medicine and the Regenstrief Institute and colleagues identify critical steps toward allowing developing countries to cross the 'digital divide' to realise the full potential of e-health to improve the quality and efficiency of their healthcare systems.

'Although business enterprises in developed nations have begun to use electronic information systems to collect, manage and communicate information, low-income nations generally lack advanced e-health tools that can help them achieve better health outcomes. In countries where per capita spending on healthcare barely reaches US\$10 per year, it is key that they get the most out of whatever they can spend,' said Dr Tierney. 'To be most efficient and effective, healthcare delivery and public health needs require timely access to high-quality secure data because healthcare is essentially an information business. The quality and efficiency of care are directly related to the availability of timely, high-quality patient information,' he added.

Key to implementing e-health tools in developing countries is developing local human capacity; but there is a chicken and egg problem. Low-income countries typically lack programmes to train individuals to develop and implement health information technology tools. Without the implementation of these tools there is no place to train people to work with them.

To address this problem Dr Tierney created and directs the East African Center of Excellence in Health Informatics. The new centre, located in Eldoret, Kenya, builds upon two decades

of collaboration between the IU School of Medicine, Regenstrief Institute, and Moi University in Eldoret. This collaboration is responsible for the Academic Model Providing Access to Healthcare (AMPATH), one of sub-Saharan Africa's largest healthcare programmes.

AMPATH has enrolled more than 100 000 HIV-infected Kenyans and 50 000 Kenyans being treated for other acute and chronic medical conditions. AMPATH operates in 23 sites in western Kenya, including rural health centers, district hospitals, and Kenya's second national referral hospital, Moi Teaching and Referral Hospital. AMPATH is served by the AMPATH Medical Record System (AMRS), the first and most successful outpatient electronic medical record system in sub-Saharan Africa.

'We have shown in Kenya that in spite of problems such as scarce resources, lack of trained personnel, ethnic tension and even lack of dependable electricity, we can capture data electronically that have been used to enhance healthcare delivery and outcomes along with community-based public health. Electronic medical records have allowed our Kenyan clinics to care for two to four times more patients than similar clinics using paper records. Hence, the investment in e-health pays for itself both financially and in terms of enhancing quality of care and accountability. But for such benefits to be sustainable, these systems must be maintained and improved by trained local technicians and developers,' Dr Tierney said.

The AMRS has spawned OpenMRS, a free open-source electronic medical record system that is now the most widely adopted electronic medical record system in the developing world. OpenMRS is used in Kenya, Rwanda, South Africa, Uganda, Tanzania, Zimbabwe, Lesotho, and Malawi. The authors conclude 'Establishing effective partnerships in e-health will take time and sustained effort. Those aiming to improve healthcare by improving information management in developing countries must have patience and take the long view... The challenge of global e-health is great.'

Change of strategy needed in the fight against malaria

Jolted by reports of poor-quality anti-malaria drugs circulating in parts of eastern Africa, Kenyan health experts are calling for a change of strategy in the fight against malaria.

They are proposing a raft of measures, ranging from the enhancement of preventive efforts and the eradication of the malaria-causing organisms to stiffer punishment for people who produce and distribute poor-quality drugs.

The call comes in response to recent World Health Organization research – conducted in 10 African countries – which revealed that up to 40% of drugs in some countries, including neighbouring Uganda, are of poor quality. Some were found to have impurities and low levels of the active ingredients.

Officials are concerned about the influx of low-quality malaria drugs, arguing that their continued use can lower the body's ability to benefit from proper treatment. Kenya is one of the countries involved in the study, but its results are yet to be released.

Health authorities fear equally negative results, arguing that the country's healthcare system is similar to those of its neighbours. But in reaction to the bad news, Kenyan health experts have proposed strategies to tackle a potential worst-case scenario.

The move is largely driven by the fact that there is no ready substitute for Artemisinin-based drugs, currently the most effective treatment.

Dr Andrew Githeko, a senior researcher at the Kenya Medical Research Institute, who is involved in malaria studies, said the WHO research focus should shift from treating malaria to controlling the mosquito population. This would reduce the incidence of the disease, hence the need for more dependable drugs to stop the development of resistance. Dr Githeko said that when poor-quality drugs are used, the malaria parasite is only suppressed and not destroyed, which gradually makes it resistant to drugs.

'We could have multiple cases of the disease in one person, which would result in ill-health and wastage of money on drugs,' he added.

Poverty muddies response to West African drug trade

West African drug trafficking is having a 'very significant' impact on the region's economies but local responses have been contradictory as the flow of money is seen as 'better than nothing' by some, the United Nations says.

The world body estimates that US\$1 billion worth of cocaine, destined to Europe from Latin America, passed through West Africa in 2008. The figure is higher than or comparable with the gross domestic product of a handful of nations in the region.

The trade has spooked European nations trying to stem drugs flowing onto their markets. But concerns are also rising over the impact a drugs trade of this value is having in West Africa as analysts say it is leading to a spike in money laundering, crime, and corruption in a region in need of stability and investment.

'There is a contradictory message coming from these countries,' said Antonio Maria Costa, executive director of the U.N.'s Office for Drugs and Crime (UNODC).

'On the one hand you cannot build the societies using illegal money. On

the other hand, these are countries not greatly appreciated by foreign investors, with mass unemployment, mass poverty. Therefore these resources coming in are better than nothing,' he added.

Costa was speaking on the sidelines of a meeting of seven nations seeking to map out a response to the drug trade, which is increasingly seen as having a direct impact on, rather than just passing through, a patchwork of poor and unstable nations.

Real estate, tourism, and, casinos in the region are being used to launder vast sums of money, experts say. Few figures are available, though a boom in construction in Senegal and a sudden jump in the number of banks in Gambia are cited as evidence.

Recently, experts warned that West Africans are consuming more of the drugs flowing through their countries, raising the spectre of rising crime and health problems in already unstable states.

Instability in Guinea-Bissau and Guinea over the last year has also been linked, in parts, to the trade.

85 million African children to be immunised against polio

A campaign to immunise over 85 million children under 5 against polio began in early March in west and central Africa in a bid to halt a year-long epidemic, health bodies said in a joint communique.

According to a statement issued by the Joint Global Polio Eradication Initiative and International Federation of the Red Cross, nine countries in the region had active outbreaks of polio, a virus eliminated in most of the world.

'With better coverage that leaves no child unvaccinated, these campaigns can succeed in making west and central Africa polio-free,' said the United Nations Children's Fund's regional director, Gianfranco Rotigliano.

Over 400,000 volunteers and health workers will participate in the immu-

nisation campaign in 19 countries – a US\$30 million operation funded by Rotary International.

UNICEF regional spokeswoman Gaelle Bausson said there had been 1469 cases in the 19 countries since February 2008.

Nigeria, one of only four polio-endemic hotspots left in the world, was the origin of the outbreak in 2008 which spread to neighbouring countries that had been declared polio-free and lacked the necessary skills to respond.

'A dedicated army of volunteers and health workers will work up to 12 hours per day, travelling on foot or bicycles, in cars and boats and on motorcycles, in often trying conditions,' read the statement.

Children will receive two drops of oral polio vaccine (OPV) to immunise them against the highly infectious virus which has no cure and can result in total paralysis.

Kenyan raps African health chiefs

THE appalling health systems in African countries is a result of mismanagement and failed leadership, a senior Kenyan official has said.

The director of medical services in the Kenya Ministry of Health, Dr Francis Kimani, said most managers of health institutions across Africa lack leadership and management qualities, leading to under-performance. 'The success of every institution depends on management. We need cleanliness in our hospitals and this does not need money. It is simply a problem of failed management,' Kimani said. He was speaking recently at the 50th East, Central, and Southern African Health Ministers Conference at the Serena Conference Centre in Kampala. The theme of the 5-day conference was 'Improving access to quality health-care to achieve the Millennium Development Goals.'

In a paper, Kimani urged other African countries to borrow a leaf from Kenya. He said Kenya had embarked on a campaign to compel managers of health institutions to meet the expected standards. African countries should stop lamenting, he said, and use the available resources to make the situation better.

Men 'need better fitting condoms'

Badly fitted condoms may raise the risks of infection and pregnancy, say researchers, after a poll of 436 men published in the journal *Sexually Transmitted Infections*.

Gill Gordon, from the International HIV/AIDS Alliance, has spent time talking to men in Africa about condom use, and says the size and fit issue must be addressed if condoms are to be used effectively to reduce the number of new HI infections.

Unlike in Europe and the US, the variety of sizes and shapes of condoms is not available to most men in Africa. 'I think that the unwillingness of African men to use condoms has been overstated, and that many more would be willing to wear one if they were more comfortable,' said Gill Gordon. 'If we are serious about people being able to use condoms consistently, then we need to listen to their needs.'

Artificial pancreas diabetes hope

Scientists in Cambridge, UK, have shown that an 'artificial pancreas' can be used to regulate blood sugar in children with type 1 diabetes.

A trial found that combining a 'real time' sensor measuring glucose levels with a pump that delivers insulin can boost overnight blood sugar control.

The *Lancet* study showed the device significantly cut the risk of blood sugar levels dropping dangerously low. Experts said the results were an important 'step forward'.

In total, 17 children and teenagers with type 1 diabetes took part in the study over 54 nights in hospital.

Individually, the glucose monitoring system and the insulin pump used in the study are both already widely used and commercially available. But in order to turn them into a 'closed loop' system which monitors the patient's condition and delivers treatment accordingly, the researchers developed a sophisticated algorithm to calculate the appropriate amount of insulin to deliver based on the real-time glucose readings.

They then measured how well the artificial pancreas system controlled glucose levels compared with the children's regular continuous pump, which delivers insulin at preselected rates.

Testing was done in different circumstances – for example on nights when the children went to bed after eating a

large evening meal, which can lead to 'insulin stacking', or having done early evening exercise – both of which can increase the risk of low blood sugar episodes known as hypoglycaemic attacks or 'hypos'.

Overall, the results showed the artificial pancreas kept blood glucose levels in the normal range for 60% of the time, compared with 40% for the continuous pump.

And the artificial pancreas halved the time that blood glucose levels fell below 3.9mmol/l – the level considered as mild hypoglycaemia. It also prevented blood glucose falling below 3.0mmol/l, which is defined as significant hypoglycaemia, compared with nine hypoglycaemia events in the control groups.

Study leader Dr Roman Hovorka said, 'This is the first randomised study showing the potential benefit of the artificial pancreas system overnight using commercially-available sensors and pumps. 'Our study provides a stepping stone for testing the system at home.'

Karen Addington, chief executive of Juvenile Diabetes Research Foundation, who funded the research said the study provided 'proof of principle' of an artificial pancreas. 'We need to redouble our efforts to move the artificial pancreas from a concept in the clinic to a reality in the home of children and adults with type 1 diabetes,' she said.

Action urged on pregnancy deaths

Pregnant women in developing countries face the same risk of death as women in the UK did 100 years ago, according to a coalition of campaign groups.

They are using International Women's Day to call for more action to reduce deaths among women during pregnancy. They say improving mothers' health is 'the most off-target' of the UN's eight Millennium Development Goals.

For every 100 000 live births in developing countries, 450 women die during pregnancy or labour.

The coalition, which includes White Ribbon Alliance, Amnesty International, and Oxfam, says that in 1910, 355 women died per 100 000 live

births in England and Wales. In Ghana today the rate of pregnancy-related deaths is 560, while in Chad it is 1500. The rate in the UK is now 14 deaths per 100 000.

The comparison has been drawn because it was 100 years ago that International Women's Day was established.

The UN says although it is difficult to get accurate figures on maternal mortality, very little progress has been made in sub-Saharan Africa. Many of the medical problems are easily preventable if, for example, women have access to skilled health workers who can treat infections and use drugs to prevent haemorrhage.

Some countries have made progress in improving women's health - most notably Nepal and Rwanda.

Tutankhamun 'killed by malaria'



The Egyptian 'boy king' Tutankhamun may well have died of malaria after the disease ravaged a body crippled by a rare bone disorder, experts say. The findings could lay to rest

conspiracy theories of murder.

Scientists in Egypt spent the last 2 years scrutinising the mummified remains of the 19-year old pharaoh to extract his blood and DNA. This revealed traces of the malaria parasite in his blood, the *Journal of the American Medical Association* says.

New blood pressure approach urged

People with occasionally high blood pressure are more at risk of stroke than those with consistently high readings, research suggests.

Current guidelines focus on measuring average blood pressure levels to spot and prevent the chance of a stroke. But research suggests doctors should no longer ignore variation in test results and give drugs that produce the most steady blood pressure levels.

In the first of the series of studies published in the *Lancet*, UK and Swedish researchers looked at the variability in blood pressure readings at doctors' checks. They found those with fluctuating readings at different visits to their doctor had the greatest risk of future stroke regardless of their average blood pressure reading.

A review of previous trials also found that the differences in effectiveness of several blood pressure drugs could be explained by how well they kept blood pressure on an even keel.

Some drugs, in particular beta blockers, were shown in a separate study in the *Lancet Neurology*, to increase variation in a patient's blood pressure.

Lead researcher, Professor Peter Rothwell of the University of Oxford, who led the research, said the findings have major implications for how doctors spot and treat people at high risk of stroke.

Countries urged to review progress made in achieving national AIDS targets

Ahead of the UN high-level meeting on Millennium Development Goals in September, UNAIDS is calling for an international effort to renew commitment for countries to achieve universal access to HIV prevention, treatment, care, and support. Countries are urged to undertake an open and inclusive consultation process – bringing together governments, development partners, civil society organisations, networks of people living with HIV, and community groups to review the progress made in reaching country targets for universal access. UNAIDS will support countries and regional bodies in convening these reviews.

The call to action was made by UNAIDS Executive Director Mr Michel Sidibé while on an official visit to Botswana. 'Universal access to HIV prevention, treatment, care, and support is about achieving equity. This is a groundbreaking global movement that is saving millions of lives,' he said. 'However progress has been uneven so now we need to take stock of what's working and what is not and to link future national progress in AIDS to the Millennium Development Goals.'

UNAIDS has lauded Botswana in its progress towards achieving its universal access targets. Despite having one of the highest HIV prevalence rates in the world, the country has been able to provide antiretroviral treatment to more than 80% of people. It has also made significant strides in preventing mother-to-child transmission of HIV, achieving over 93% coverage in 2009. Botswana was one of the first countries in Africa to adopt universal access targets.

The universal access movement was launched in 2006 when UN member states signed a political declaration to achieve universal access to HIV prevention, treatment, care, and support. Its aim is to ensure that people everywhere have this access by 2010. Countries affirmed their commitments by setting ambitious national targets. However progress towards these targets has varied – with some countries

exceeding some of their targets but not reaching others.

The country and regional level reviews, which will take place in all regions of the world, will utilise the data collected for the 2010 country progress reports as the basis to identify barriers and strategies to meet their targets in 2010 and beyond. UNAIDS will convene an international advisory team to analyse the review reports and make recommendations on how to redouble progress towards universal access.

UNAIDS is committed to ensure that regional bodies for political, social, and economic cooperation are engaged in supporting this process, which will take place over the course of 2010. 'In Africa, this process will enable countries across the continent to measure their progress against the commitments made at the African Union in Brazzaville in 1996 to reach universal access by 2010,' said Mr Sidibé.

The 2010 reviews will provide a forum to hold partners accountable as well as celebrate achievements. In addition, implementers and policy makers can jointly chart out new strategies to remove programme implementation barriers. These consultations will provide an opportunity to analyse existing approaches to HIV prevention, identifying gaps and priorities. The process should catalyse a prevention revolution that aims for zero new HIV infections including the elimination of mother-to-child HIV transmission. It will also help countries readjust their plans on access to HIV treatment based on the new treatment guidelines and begin thinking about a new generation of treatment options that are sustainable.

The ongoing economic crisis and the ensuing cuts in national budgets and international aid investments have exposed the vulnerabilities of national AIDS programmes. The reviews will include an assessment of current AIDS spending patterns and propose new investment options that are aligned to local epidemic trends, and increase efficiencies.



Mosquitoes 'smell' humans

Researchers have identified some of the tools that mosquitoes use to smell their human prey and said that their findings might help find better repellents or ways to trap and kill the pests.

They found 50 different genes that the mosquito *Anopheles gambiae* uses to sniff out tasty humans, and characterised how each one responded to different uniquely human odours, including those known to attract mosquitoes. Their analysis, published in the journal *Nature*, might greatly improve ways to repel mosquitoes – a field dominated by just a few compounds such as DEET. Each gene controls a receptor – a molecular doorway that in this case attaches to a molecule of human aroma.

John Carlson and colleagues of Yale University transferred the 50 genes into the nerve cell of a type of fruit fly called *Drosophila*. Fruit flies are well understood and don't try to smell out humans, so any mosquito gene that lights up in response to a human smell is likely to be one used by mosquitoes to guide them to their blood meals. 'The results may have implications for the control of malaria, one of the world's most devastating diseases,' Carlson's team wrote. 'Screens for activators and inhibitors of selected receptors may identify compounds that attract mosquitoes into traps, interfere with their navigation, or repel them.'

Mosquitoes also carry a range of other human ills, including dengue fever, West Nile virus, yellow fever and several viruses that cause encephalitis, an often deadly inflammation of the brain. In two other studies in the same journal, researchers said they found a special protein called plasmepsin V that the malaria parasite uses to get into human red blood cells, and said blocking this protein could lead to better malaria drugs.

Drugs 'could stop spread of AIDS'

Health officials are considering a radical shift in the war against HIV and AIDS that would see everyone tested for the virus and put on a lifetime course of drugs if they are found to be positive.

The strategy, which would involve testing most of the world's population for HIV, aims to reduce the transmission of the virus that causes AIDS to a level at which it dies out completely over the next 40 years.

Brian Williams, professor of epidemiology at the South African Centre for Epidemiological Modelling and Analysis in Stellenbosch, said that transmission of HIV could effectively be halted within 5 years with the use of antiretroviral drugs (ARVs).

'The epidemic of HIV is really one of the worst plagues of human history,' Williams told the American Association for the Advancement of Science meeting in San Diego.

'I hope we can get to the starting line in 1 to 2 years and get complete coverage of patients in 5 years. Maybe that's being optimistic, but we're facing Armageddon.'

Major trials of the strategy are planned in Africa and the US and will feed into a final decision on whether to adopt the measure as public health policy in the next 2 years.

The move follows research that shows blanket prescribing of ARVs could stop HIV transmission and halve cases of AIDS-related tuberculosis within 10 years.

In general epidemics, a person with HIV infects between five to ten others before succumbing to complications of AIDS. Treating patients with ARVs within a year of becoming infected can reduce transmission tenfold, enough to cause the epidemic to die out.

In the trials, people will be offered HIV tests once a year, either as routine when they visit their GP, or through mobile clinics in more remote regions. Those testing positive will be put on a lifetime course of ARVs.

'Over the past 25 years we have saved the lives of probably 2 to 3 million people using antiretroviral drugs, but almost nothing we have done has

had any impact on transmission of the disease,' Williams said. 'We have stopped people dying but we haven't stopped the epidemic.'

If patients take ARVs when they should, the amount of virus in their bodies can fall by 10000 times, to a level at which they are extremely unlikely to pass the virus on.

'The question is, can we use these drugs not only to keep people alive, but also to stop transmission and I believe that we can. We could effectively stop transmission of HIV in five years.' Scientists estimate that the cost of implementing the strategy in South Africa alone will be US\$3-4bn a year. The world currently spends US\$30bn a year on AIDS research and treatment, a figure that some experts believe will double over the next decade.

Sub-Saharan Africa has seen a dramatic rise in cases of tuberculosis among HIV patients, who are also susceptible to other infections because their immune systems are weakened.

'If you factor in all of the costs, in my opinion, doing this would be cost saving from day one, because the cost of the drugs would be more than balanced by the cost of treating people for all of these other diseases and then letting them die,' Williams said.

'We're killing probably half a million young adults every year in the prime of their life just at the point where they should be contributing to society and the cost of that to society is enormous,' he added. 'The only thing that's more expensive than doing this is not doing this.'

HIV patients in southern Africa are more likely to take ARVs when they should than people living in developed countries, according to health officials. The finding gives doctors hope that the blanket administering of drugs might suppress the virus enough that it dies out naturally.

Last year, scientists reported marginal success of a HIV vaccine following a large scale trial in Thailand. The vaccine benefited only 31% of those who received it. A vaccine is generally regarded as worthwhile if it protects more than 70% of those treated.

Global Fund and Dow Jones Indexes sign memorandum to explore creation of co-branded indexes

The Global Fund to Fight AIDS, Tuberculosis and Malaria and Dow Jones Indexes have signed a Memorandum of Understanding to explore the creation of a series of indexes that could be licensed as the basis for investible products. It is envisioned that the flagship of this index series would be a blue-chip index to be called the Dow Jones Global Fund 50 Index. The announcement was made at the international conference on Innovative Financial Solutions for Development organised by the Bill & Melinda Gates Foundation, the World Bank and the French development agency in Paris.

Both, The Global Fund and Dow Jones Indexes, hope to benefit from this collaboration. The Global Fund wants to further strengthen its engagement with the private sector and bring to bear the power of financial markets to help save lives. The Global Fund is a leading multilateral financing organization in global health with commitments with more than US\$19 billion to date. The collaboration with Dow Jones Indexes as well as product providers to license the index is the latest in a series of innovative finance initiatives undertaken by the Global Fund. Dow Jones Indexes intends to add to its range of socially-conscious indexes that will complement its increasingly diverse range of products.

'Global Fund and Dow Jones Indexes are leaders and innovators in their respective fields. This collaboration will lead to the creation of investible indexes that will be representative of the Global Fund's goals and missions,' said Michael A Petronella, president, Dow Jones Indexes.

'This collaboration with Dow Jones Indexes will provide the financial community with incentives and vehicles to participate in innovative financing of health and development,' said Robert Filipp, head of innovative financing at the Global Fund. 'We are excited that the feedback from market participants has been very positive.'