A new discovery in the fight against cholera

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Few can have been unaffected by the disturbing scenes following the devastating earthquake in Haiti in January. More than one million displaced survivors are now housed in camps around the capital, Port-au-Prince, with squalid sanitation facilities and little access to clean drinking water. Poor sanitation is known to give rise to disease and so it is unsurprising that, at the time of writing, there are more than 2,600 known cases of cholera in Haiti, with more than 250 people having lost their lives. Cholera causes diarrhoea, vomiting and subsequent severe dehydration and will kill in the absence of rehydration and antibiotics. Health officials say the number of new cases is now falling, but the question remains as to whether more could have been done to avert this new crisis.

Microbiological waterborne disease remains a significant concern for the global water community. Pathogens from human and animal wastes in drinking water sources (such as streams and wells) cause ill health, hindering sustainable settlement. Globally, 884 million people do not have access to safe drinking water supplies and 2.6 billion are without access to improved sanitation services. The UN Millennium Development Goals aim to halve the number of people without access to safe drinking water and sanitation by 2015, as the global disease burden of water, sanitation and hygiene-related diseases is approximately 82 million disability-adjusted life years.

This critical public health issue would benefit from innovation to improve the efficiency of contaminant detection methods in drinking water. Obtaining standard counts of faecal coliforms takes in excess of 30 hours and needs skilled training and laboratory conditions for the preparation of samples. Consequently, their use in community water management and disaster relief scenarios, such as refugee and displaced peoples camps, like those found in Haiti, is problematic and infrequent. Situations like these demonstrate that rapid engineering-based indicators of safe drinking water are relevant and necessary for alleviation of suffering and for the development of sustainable livelihoods.

Research-council funded work is underway at the University of Birmingham to address this public health issue by measuring drinking water fluorescence. All water fluoresces (although this is invisible to the human eye) and a large body of research has demonstrated that water fluorescence is particularly good at identifying faecal contamination. The rapid analysis time of fluorescence screening is something urgently needed in disaster relief. Results are available in less than one minute, significantly improving on existing coliform count technology. The innovative LED-based technique being employed uses cheap, off-the-shelf equipment that is portable and so can be used from the back of a 4x4 vehicle or temporary field laboratory. Furthermore, there is the ability to have both expert interpretation of results as well as simplified pictorial interpretation by non-experts in individual communities. Thus, the innovative approach to improving efficiency of analysis has the additional but important benefit of involving poor water users themselves in the application of the technology.

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