Minimizing the risk of disease transmission in emergency settings: novel *in situ* physico-chemical disinfection of pathogen-laden hospital wastewaters

Emanuele Sozzi  
Postdoctoral Research Associate, ESE  
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Abstract:
The operation of a health care facility, such as a cholera or Ebola treatment center in an emergency setting, results in the production of pathogen-laden fecal waste that may potentially lead to onward transmission of the disease. The presented work outlines the results of field and laboratory studies devised to inform the design and operation of a novel full-scale treatment protocol to disinfect pathogen-laden hospital wastewaters *in situ*, thereby eliminating the need for potentially hazardous road haulage and disposal of human excreta or wastewater to poorly-managed waste facilities. The approach investigated has the potential to provide an effective barrier to disease transmission by means of a novel but simple sanitary intervention. During Phase I of this research, a fieldwork study in Haiti focused on the design and operation, at short notice and within a disaster setting, of a new fecal waste treatment technology. The results of this fieldwork period were validated and further optimized during Phase II: a detailed laboratory-based study in the United Kingdom that assessed the performance of the novel treatment technology in order to improve its efficacy. This study represented the first known successful attempt to disinfect wastewater in a disease outbreak setting without resorting to the alternative, untested, approach of 'super-chlorination' which, it has been suggested, may not consistently achieve adequate disinfection. The approach to sanitation for cholera treatment centers and other disease outbreak settings presented here offers a timely response to a United Nations call for *in situ* disinfection of wastewaters generated in such emergencies. Further applications of the method to other emergency settings have been actively explored in discussion with the World Health Organization in response to the last Ebola outbreak in West Africa, and with Oxfam.