



Contribution ID: 284

Type: Oral presentation

A rapid response mobile laboratory for (waste)water monitoring in emergency settings

Tuesday, October 14, 2025 9:30 AM (15 minutes)

Water monitoring represents a critical nexus in One Health frameworks, serving as the intersection where human, animal, and environmental health systems converge. Natural disasters frequently compromise water distribution networks and disrupt the laboratory infrastructure essential for water quality assessment. Here we present a portable laboratory utilizing commercially available testing platforms to deliver point-of-care water analysis capabilities. The system was deployed with the World Health Organization to a remote island near Madagascar, addressing critical water quality monitoring gaps following a post-cyclone emergency declaration.

The mobile laboratory incorporates a handheld device for comprehensive water analytics. The testing suite includes contamination indicator assays for alkalinity, free and total chlorine, phosphate, nitrate/nitrite, and ammonia, alongside rapid detection methods for manganese and arsenic. Microbiological assessment of *E. coli* and coliform bacteria is conducted through count plates and presence/absence tests. All analytical parameters operate within WHO standards. A rapid water concentration protocol enables efficient processing of surface water samples without requiring heavy laboratory equipment. The system features a mobile PCR component for detection of gastroenteric viruses and bacteria.

The demonstrable outcomes of this mobile laboratory deployment encompass enhanced emergency preparedness, inter-organizational collaboration, and operational adaptability. This integrated approach supports the maintenance of continuous water system surveillance, which is fundamental for preventing disease outbreaks, ensuring food security, and protecting vulnerable populations.

Keywords

water monitoring, rapid response, pandemic preparedness, water quality

Registration ID

OHS25-125

Professional Status of the Speaker

Postdoc

Junior Scientist Status

Yes, I am a Junior Scientist.

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Session Classification: Session 5: Environmental Pollution & Agriculture & Health

Track Classification: Environmental Pollution & Health