participatory innovation to improve global health. Nearly all equipment available at participating hospitals required electricity to function; however, 56% of clinical staff reported experiencing power outages two or more times per week, rendering electricity-dependent technology useless. Many clinical staff expressed frustration regarding inability to prevent mortality attributed to equipment failure. Over 56% of clinical staff reported average time to repair a single piece of medical equipment as longer than six months. Reported barriers to repairing medical equipment included shortage of maintenance personnel (77.8%), lack of replacement parts (64.7%), lack of proper tools (61.1%), and lack of user's manuals for equipment (53%).

Interpretation: Health and technical education efforts should be intensively explored to increase working knowledge of medical device maintenance in LMIC. This study demonstrates that medical device donations fail to sustainably improve health outcomes, and technology innovation in global health should incorporate community expertise and local resources.

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Abstract #: *2.036_TEC*

Improving access to safe surgical care by collaboratively developing a low-cost, ultraportable device platform: pilot trial results

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Background: We organized a tri-institutional, interdisciplinary collaboration to develop, evaluate, and deploy a new technology to help increase access to safe surgery. We reduced to practice a novel paradigm of surgical sterility in austere settings: that the space that determines patient outcomes-and thus warrants regulation-is not the operating theater, but the incision site.

Methods: We engaged in iterative and parallel prototyping with multi-stakeholder input to produce a low-cost, ultraportable, modular system. This comprises sterile, disposable clear drapes covering the incision, with arm and material ports. The drapes attach to a reusable frame with a battery-powered system supplying filtered air to control enclosure conditions. The entire system collapses to fit into small spaces such as duffels or unmanned aerial vehicles. We used an optical particle counter on a test mannequin torso to benchmark the device's ability to maintain the sterile field in a passively contaminated environment and when stressed with talcum puffs outside each wall. Particle counts were tested with active airflow and different port configurations (no port, materials port, materials and arm port) over 10 minutes at points along a simulated laparotomy incision and at the flanks.

Findings: Without airflow, the system reduced particle counts by 22.8% (20.0-25.6%) between the outside and inside five minutes after nonsterile setup. Talcum puffs increased external particle concentration by 28.3% but did not significantly change the internal particle count. Active airflow produced 0 particle count in 83.8 seconds (73.4-94.1 seconds). Low airflow was required to maintain 0 particle count.

Interpretation: Analysis of results recognizes limitations of using particle counts for dynamic approximation of microbiological burden. Successive ergonomic, optical, and mechanical testing generated an easy-to-use, ultraportable system capable of being customized via modules for different procedures. The system provides an effective passive barrier to active external contamination. In all port configurations, initially-contaminated enclosed air was fully purged of detectable particles within two minutes. Ongoing work includes reducing airflow requirement, obtaining microbiological data, reducing system cost, and assessing in vivo outcomes such as surgical site infection rates.

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From global to local: Virtual environments for global-public health education

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Project Purpose: Recent events such as the devastating earthquakes in Nepal, outbreaks of deadly infections like MERS and Ebola, and ongoing violent unrest around the world, are reminders that while even the most experienced travelers must prepare for the unexpected, the same dangers can also occur at home. Globalization has increased the overlap between global and local public health. However, it may be difficult to show learners who have never travelled internationally how similar the social, environmental, and economic determinants of health are for U.S. and international populations.

Virtual environments are online computer-generated simulations, in which users can be in different locations, but have real-time interaction in the same 3D space. These environments are accessed through a computer using a 3D viewer application. They can be used to present educational material in context and bring together learners in geographically separated locations.

The Aims of the Project Were: 1) To improve preparation for international global health (GH) electives through virtual experiences; and 2) To increase knowledge of the social determinants of health in both local and global settings in both GH and non-GH learners.

Design: Africa Traveler, with environments representing African settings, developed in 2013; and SPH Places, an urban and suburban U.S. neighborhood, developed in 2014; were piloted with health professional students and individuals without a healthcare background. Using Kolb's theory of experiential learning as