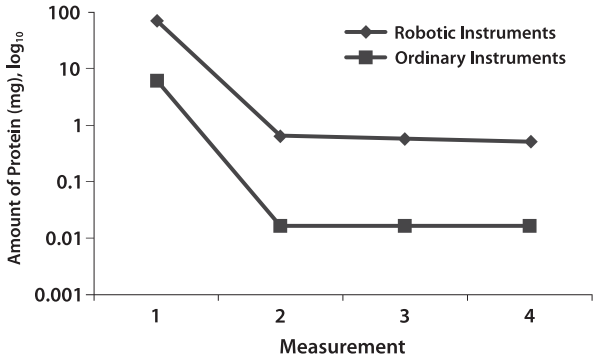

FIGURE 1. Results of Saito et al[1] redrawn with connecting lines. Measurement 1 represents residual protein on a set of instruments prior to cleaning. Measurements 2–4 represent residual protein from serial extractions on a different set of cleaned instruments. The results for robotic instruments indicate a possible high-level background signal.

DISCUSSION

Scientific best practices and controlled experimentation are not evident in the execution of the Saito et al study and published cleaning efficacy data refute the results. Additionally, the safety of robotic-assisted surgery has been extensively reported in the clinical literature; numerous multisite studies have reported statistically significant lower infection rates for robotic-assisted surgery compared to other surgical methods.[9,10] Thus, the assertions and assumptions of the article are without merit.

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Emergency Evacuation of Immunocompromised Patients From a Hematology Unit Following Flooding of High-Efficiency Particulate Air (HEPA) Filtration

To the Editor—To reduce the risk of developing nosocomial fungal infections, patients with hematological malignancies are placed in protected areas during intensive chemotherapy or during bone marrow transplant.[1,2] Patients admitted to these units often stay several weeks to be treated. Guidelines recommend placing high-risk patients in rooms with high-efficiency particulate air (HEPA) filtration systems.[3] The beds are located under laminar airflow and environmental samples (air and surface samples under laminar airflow and from the bathroom) are regularly taken from the patient rooms to detect air fungal contamination.[4]

The hematopoietic stem cell transplantation center of Brest University Hospital has been accredited for the quality management system by the Joint Accreditation Committee of the International Society for Cellular Therapy (ISCT) and the European Society for Bone Marrow Transplantation (EBMT) known as JACIE since 2008.[5,6] JACIE is equivalent to its US counterpart, the Foundation for the Accreditation of Cellular Therapy, FACT, which is an ongoing quality management system that pertains to clinical, collection, and processing activities. The configuration of the Hematology

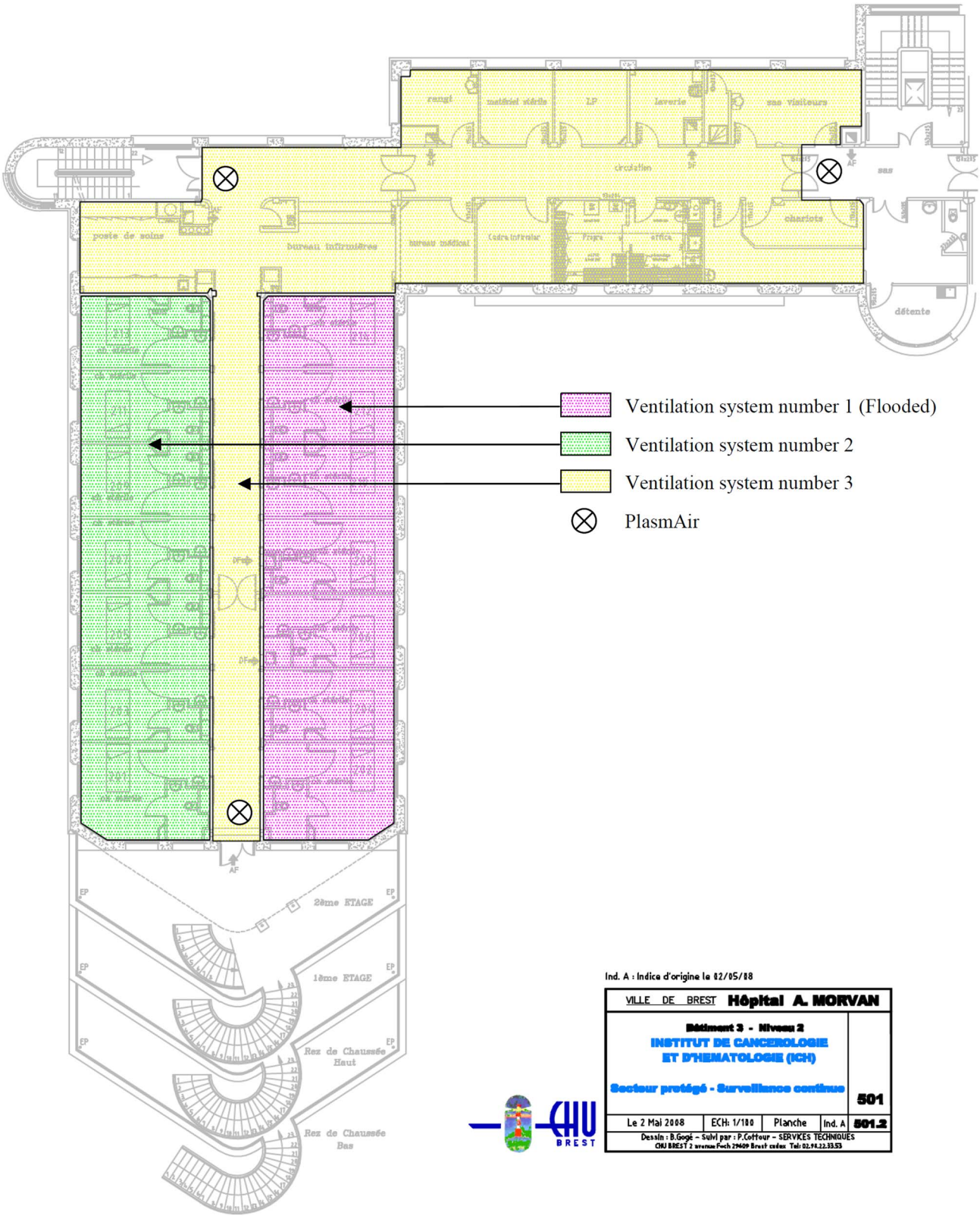

FIGURE 1. Ventilation system of the Hematology Department of Brest University Hospital.

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Department of Brest University Hospital follows these guidelines and national recommendations: it is organized in 2 units of 7 rooms with independent air handlings.[3] The 2 units are separated by a corridor and equipped with 2 independent HEPA filtration systems. A third HEPA filtration system treats the air of the common parts of the service (Figure 1).

In July 2016, a water pipe in the technical room located above the hematology unit broke, causing the HEPA filtration system number 1 to flood. The water flowed through the filters located in the ceiling and along the walls of the rooms. This incident caused the emergent evacuation of 7 patients.

We applied the JACIE evacuation disaster plan that first recommends triaging patients according to their level of risk of fungal infection. Patients treated by allogeneic hematopoietic stem cell transplantation are at high-risk for developing fungal infections and they must be relocated emergently to a protected area.[7] In this situation, 2 of these patients were relocated to available rooms in sector number 2, where the HEPA filtration system had not been flooded. Patients of sector number 2 who no longer needed to be located in a protected area were moved to standard hospital rooms in another department. However, there were not enough available rooms to harbor all patients from the flooded sector; we had to create a new protective environment using a mobile unit that recycled and distributed treated air through a plenum over an isolated zone. We used 2 Immunair Systems (AirInSpace, Montigny Le Bretonneux, France) to quickly convert 2 standard hospital rooms into areas that could be used to host immune-compromised patients.[8–10]

The flooded rooms were closed, and a slight negative pressure was created to extract humidity from the rooms and to prevent air fungal contamination of the corridors. These rooms had to be closed for 6 weeks, the time required to order and install 7 new custom HEPA filters and to monitor the effectiveness of the HEPA filtration system by collecting air and surface samples to detect an increase of air fungal contamination. During that time, the Hematology Department could care for only 9 patients instead of 14.

The HEPA filtration systems of sectors 1, 2, and 3 are located on the same ceiling. The broken water pipe seemed to have affected only the HEPA filtration system of sector 1, but we had to make sure that the HEPA filtration of sector 2 was still efficient. Therefore, we decided to sample the environments of all the patient rooms of sector number 2. A laboratory technician collected air samples from each room and its bathroom with a Microbiology Air Sampler-100 Bio Collector (Merck, Darmstadt, Germany) using Sabouraud chloramphenicol plates under the laminar airflow. We also collected air samples in the corridor of the department to assess fungal contamination where there was no HEPA filtration.

We collected 29 air samples during the period. Air samples from the flooded rooms showed a high level of air fungal contamination (27 colony forming units/m^3). No fungal contamination was detected in air samples collected under laminar airflow of the rooms of sector 2. These rooms were controlled once a week to make sure HEPA filtration system was still efficient. Air samples collected in the corridors did not reveal any fungal contamination either. Negative pressures in the flooded sector seemed to have protected sector 2 and the corridors from fungal contamination.

The flooding of the unit was mainly due to the lack of waterproofing of the floor of the technical room; water flowed along the ventilation ducts that passed through the ceiling of the patients' rooms. This incident revealed that this type of room should be isolated from both air and water. Therefore, the technical services of our hospital decided to seal the floor of the technical room above the rooms to avoid any further incidents of this kind.

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Attire as a Fomite: Proposal for a New Index Concerning Change of Attire

To the Editor—Haun et al[1] wrote a review of the literature regarding 2 fomites found in hospitals: devices and attire. This article raises the importance of hygiene in inpatient units to prevent increasingly multidrug-resistant bacteria in hospitals all over the world, and this issue is particularly relevant to our practice. We would like to contribute our experience in a French military hospital to their findings.

In France, we have seen an increase of patients infected or colonized with MRB. For example, Arnaud et al[2] showed that the incidence of extended β-lactamase–positive *Enterobacteriaceae* infections in French hospitals increased by 73% from 0.35 to 0.60 per 1,000 patient days ($P < .001$) from 2009 to 2013. Consequently, the risk of cross infection increases.[3] In this context, we wanted to improve infection prevention in our hospital this past year. Because the indicator of consumption of hydro-alcoholic solution, ICSHA-2 (indicateur de consommation de solutions hydro-alcooliques number 2) is at its highest in our hospital, we focused our attention on 2 other fomites (ie, like Haun et al): devices and attire.[4]

We first studied the bacterial contamination of mobile phones. We obtained 80 samples from 40 phones from 40 people of all healthcare occupations: nurses, doctors, nursing aides and hospital service agents. Overall, 16 mobile phones (40%) were contaminated (ie, >50 colony forming units/25 cm^2). Indicator bacteria were found on 3 phones: *Staphylococcus aureus* (n = 2) and *Escherichia coli* (n = 1). Mobile phones of doctors and nurses were contaminated more often than those of other healthcare workers: 65% versus 35%, respectively ($P = .01$).

In a second investigation, we controlled the implementation of standard precautions[5] when a patient was hospitalized for pneumonia because of *K. pneumoniae* OXA48. We recognized that doctors did not change professional attire every day. Thus, we created a new hospital hygiene indicator: index of change of attire (ICA).

The goal is that each caregiver changes attire every day. This ICA is calculated using 2 variables. The first, referred to as X, is the number of outfits washed each month in the hospital. We were able to measure this variable with the assistance of the laundry service. The second variable, referred to as Y, is the number of monthly working days contributed by all hospital healthcare workers at our institution. We were able to measure this variable with the help of the office of human resources. We then calculated the ICA as ICA = X/Y. According to our stated goal, the ICA should be ≥1.

In our hospital, ICA was <1; it was 0.57 for pants and 0.60 for white gowns. Thus, we sought to determine why all healthcare workers did not change attire daily. In some inpatient units, the reasons were material. For example, the number of outfits worn by doctors was insufficient. An outfit is worn for 1 day then put into the dirty laundry circuit. The dirty outfits are sent to the laundry service at an outside company. The clean garments are returned to the hospital and are distributed to the units. The entire procedure takes 2 weeks. Consequently, each doctor needs at least 12 complete outfits.

To improve the ICA, we changed the contract with the laundry company so that each healthcare worker and doctor were provided the exact number of garments according to his/her scheduled work days. We launched an information campaign regarding wearing and changing attire. The management of our hospital took part in this information campaign to emphasize its importance to all healthcare workers. Hygiene training was provided regarding awareness of the problems of changing attire and mobile phone contamination. In 6 months, we will complete a "before-and-after" study to determine the impact of these measures on our ICA and the number of cross infections in our hospital.

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