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There is Something in the Air

*By: Mart Geraerts**

Tuberculosis, Aspergillus, Chicken Pox, Measles, MRSA-containing particles etc. are known to be floating around in the indoor air of most hospitals as confirmed by numerous publications on Hospital Hygiene. H5N1 might join them in the near future. Airborne infection transmission causes severe human, social and financial problems and the numbers of these infections are increasing as reported by the WHO on Tuberculosis and the H5N1 pandemic. Cleaning the indoor air is an effective solution for this problem; it is simple but requires an open mind and commitment from various departments in healthcare organizations. For starters, the hygiene department should look further than the debate and the discussion on the topic of which form of transmission is most important and rather focus on all of the parameters e.g. 'contact - droplet - airborne' that result in the transmission of infections. Linking 'contact - droplet - airborne' preventive measures, shall result in the one supporting the other. Consider for one minute; what is not in the air cannot drop and contaminate the furniture or medical devices and more importantly cannot be inhaled. The technical department should look further than the (theoretical) technical details of the HVAC system and have an open mind with respect to new, innovative solutions and options that can support their existing ventilation system, options that contribute to a safer hospital environment. The management should make a cost-benefit analysis based on all the criteria, facts and figures and consequences no different than commercial companies do on a daily basis. Consideration should be borne in mind for, 'the cost of an infection vis-a-vis the cost of a preventive measure' in light of all the potential savings in financial patient outcome and reputation.

Considerations

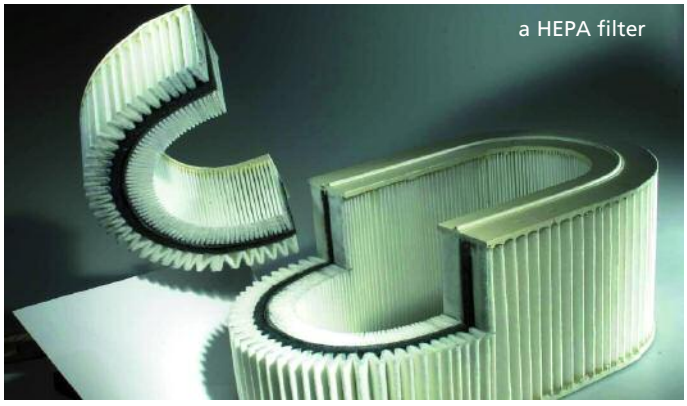
1. It was established that airborne MRSA-concentrations are always present in the patients' room (~ 6 cfu/m³) and that higher concentrations occur during bed-making (~ 116 cfu/m³). This means that high concentrations of MRSA (~ 100 cfu/m³) must have fallen on surfaces like on medical instruments, furniture and on the floor. Consequently, the result of other preventive measures like sterilization or hand-hygiene will be diminished. Additionally, part of the MRSA particles remain airborne (~ 6 cfu/m³) and will be spread by the indoor air to other hospital areas. [1]
2. The risk that HCW's are infected with Tuberculosis is higher in the general departments like First Aid, I.C.U. and Autopsy (non-isolation) than in equipped departments (isolation rooms). [2]
3. Mobile high-efficiency particulate air (HEPA) Pro Units completely eliminated Invasive Aspergillosis infections in patients undergoing (allogeinic) Bone Marrow Transplant. [3]

Technical Options

Airborne infection transmission has no limits or boundaries and the majority develops inside the hospital facility. The options available to decrease the risk of airborne infection transmission are: to renew all inadequate HVAC-installation and/or to install HVAC-systems with HEPA filters in all the potential risk areas. These options are fine when either building a new facility or when costs are not an issue, both are rather demanding as they require building activities with all the associated consequences including disturbances both to the department and patients. A workable and feasible option is to install specifically designed and developed highly efficient HEPA filter units (preferably mobile units) that filter/clean the indoor air by eliminating airborne infection transmission at the source (including MRSA and/or TB and virtually all other infectious airborne particles).

The most important questions to be asked when choosing the right HEPA filter unit are: Is the unit really effective? Does it achieve the level of filtration required? Is the information from the manufacturer correct?

The only reliable answers come from international healthcare providers faced with the dangers of airborne infection transmission, as airborne infection transmission in hospitals is an international issue. Secondly from proven scientific confirmations that are published by esteemed scientific organizations typically Hygiene Institutes from University Hospitals that have worked with and tested a specific mobile HEPA unit for a long period of time, preferably months or even years. Only a unit that has offered significant results (a high decrease or even better the total elimination of airborne infection transmission - CFU's) should be deemed to be reliable.



a HEPA filter

The technical demands for an efficient (mobile) HEPA unit are:

- double airflow (1 airflow to take in contaminated air and 1 airflow to return cleaned air);
- the air-intake should be at effective horizontal (breathing) level as from 1 meter and over 360° (air-intake at floor level is useless, this is not where people breath);
- the air-outlet should be over 360° diagonally upwards to create an airflow in the room (air-outlet at floor level is dangerous, cfu's on the floor are made airborne again);
- HEPA 14 filtration with leak test (no risk can be taken with infectious diseases);
- the casing should be shiny stainless steel (to prevent contamination to stick);
- no or limited maintenance (the unit has to function 24/24 hrs, all year through);

• the electronics have to meet maximum safety standards;
• little or no occupation of floor space (floor space is limited in the hospital rooms); and
• key remote control (only hospital staff can control the unit).

Decreasing Financial Costs

Even 1 infection that could have been prevented is too much. The costs in Europe of an infection (MRSA, non resistant Tuberculosis, Invasive Aspergillosis) range between Euro 10.000 ($13.210) and Euro 36.000 (U$47.564). Preventive medication against I.A. for all patients at risk, costs around 30 Euro/day ($39.6) per patient.

How do we guard against the potential of infection as a result of airborne infectious particles and the crippling associated costs?.. the answer is simple as the costs to implement an effective (mobile) HEPA concept pales into significance when compared to the cost of an airborne infection outbreak. An efficient mobile HEPA unit that protects healthcare workers, patients and visitors all year through, costs substantially less than Euro 10.000 and is a one time investment. The initial budget estimate to create an isolation or patient safe room with air-cleaning and pressure difference (positive or negative) is approximately Euro 10.000. Apart from that, a professional isolation room with negative pressure (for Tuberculosis /H5N1) or positive pressure (for immuno-compromised) is installed in less than a day.

Finally, when an organization decides to implement an effective and efficient (mobile) HEPA filter device/unit, it should make sure that the unit has been double checked, and confirmed by medical, clinical and laboratory studies that were published by esteemed medical organizations. Then and only then, one can be sure that there is nothing "bad" in the air. ■

References:
[1] MRSA - Journal of Hospital Infection (2002) 50; 30-35. "Evaluation of bed-making related airborne and surface MRSA contamination".
[2] "Hospital Ventilation and Risk for Tuberculosis Infection in Canadian Health Care Workers".
[3] Aspergillus - European Bone Marrow Transplant 29 (2) 2002 P850 - 853.

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كثيراً ما تنتشر الأجسام المعدية داخل المستشفيات، وإنّ إنتقال العدوى بين البشر جراء إنتشار هذه الأجسام تؤدي إلى الإصابة بأمراض تزداد حدّة يوماً بعد يوم. يتعيّن على المستشفيات الإحاطة علماً بهذه المشكلة، بل ينبغي لها بذل جهد ما في معالجتها، وعليها المقارنة بين كلفة المعالجة من هذه الإلتهابات وكلفة إتخاذ التدابير الإحترازية الضرورية لتفاديها. تفيد الإحصاءات في أوروبا أنّ كلفة المعالجة من هذه الإلتهابات تساوي بالمعدل ٣٠ ألف دولار أميركي، أمّا سعر منقّي الهواء الدقائقي الفائق الفعاليّة HEPA فهو يزيد عن ١٣٢١٠ دولاراً أميركياً لذا يجب على المكلفين بتوفير النظافة في المستشفيات تحديث نظام التدفئة والتهوئة HVAC غير المجدي و/أو تزويد هذا النظام بمنقّي الهواء الدقائقي الفائق الفعاليّة.

عليهم أيضاً أخذ المعايير التالية في الإعتبار: إنتشار الملوّثات عبر الإتصال مع الآخرين أو عبر قطارات السوائل الصغيرة الحجم أو عبر تنشّق الملوّثات المنتشرة في الهواء كما ينبغي التأكد مما إذا كانت هذه الأداة تؤدي وظيفتها على النحو الأمثل، كذلك ينبغي التدقيق في المعلومات الموفّرة من قبل مصنّعي هذا المنقّي. لذا لا يجب الوثوق إلا بخبراء الصحة الدوليين وبالدراسات العلمية الصادرة عن مراجع موثوقة. يتمتّع منقّي الهواء الملوّث الفائق الفاعلية بمنفذين للهواء، ولا يوضع عند سطح الأرض بل قريباً من مستوى رؤوس البشر.

REFER TO **RIN28** ON PAGE 90

Schaerer Mayfield
Operating Tables

Schaerer Mayfield has over 90 years of experience in the development and manufacture of operating room tables. Its broad range of modern operating tables covers all surgical disciplines and applications, and represents the current state-of-the-art as well as the trends of tomorrow. Along with outstanding functionality and highest technology, top design is now also finding its way into the operating room.

The new Schaerer arcus 500-700 is a universal middle-range operating table for universal use for general surgery and all other disciplines. Its features are: exceptional height range from 595 mm to 1200 mm; in standard version for 260 kg and in heavy version for 360 kg patient weight; and motor powered adjustment. With interchangeable table top head and leg plate and multi-functional motor driven joints the arcus can be adapted individually of each human being. The models arcus 500 and 700 can be equipped with orthopaedic/traumatological accessories without any floor support.

The Schaerer axis 400-700, a mobile universal operating table, is fully made of stainless steel, for any application, it features an eccentrically arranged table top which allows an unlimited C-arm access. High stability guarantees the greatest comfort for both neurosurgical and cardiovascular procedures. An extension device without the need for floor support can easily be attached for orthopaedic and traumatological surgery. In combination with an extensive range of accessories, the Schaerer operating tables are products which meet the requirements of all medical disciplines.

Schaerer axis 200-303E is an ideal OP-table for universal use, for surgical practice, outpatient surgery, and hospital surgery. It features a modular design with a favorable price-performance ratio. Unlimited mobility and manual override functions on the electrohydraulic models allow for flexible, reliable and independent utilization. ■

أطلقت شركة Schaerer Mayfield طاولة العمليات Schaerer arcus 500-700 المخصّصة للجراحة العامّة، وهي متوفّرة بنموذجين الأول يتحمّل وزن ٢٦٠ كلغ والثاني وزن ٣٦٠ كلغ. كما أطلقت axis 400-700 وهي طاولة نقالة للعمليات من الفولاذ الذي لا يصدأ بالإضافة إلى axis 200-303E طاولة العمليات المثالية للممارسات الجراحيّة بتصميمها المعياري ومرونة إستعمالها.

REFER TO **RIN29** ON PAGE 90