VIROX™ TECHNOLOGIES INC.

Autumn 2005 Issue

Solutions®

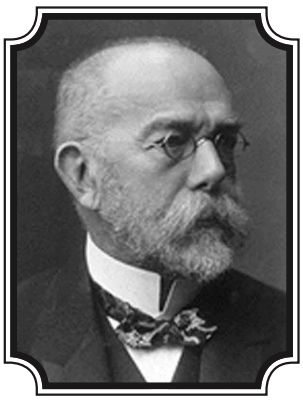
Robert Koch – Beyond Postulates

By Prof. Uwe Frank

Inside This Issue:

"The secret of success is constancy of purpose"

Benjamin Disraeli



From a poor mining family of 13 children Robert Koch (b.1844) emerged to become a father of bacteriology, developer of microbial test methodology, and discoverer of some of the most pathogenic microorganisms of his day. At the age of 5, little Robert announced to his parents that, with the aid of the daily newspaper, he had taught himself to read. This feat would foreshadow the intelligence and methodical persistence which were to be so characteristic of his life.

It took substantial determination for Koch to reach university, let alone graduate. He enrolled at the University of Göttingen in Germany in 1862 intending to study mathematics, switched to natural sciences, and finally settled on medicine. It is reported that Koch's focus and drive, and the fact that he didn't tolerate dissent of his ideas, made him less than popular among fellow students and faculty, but he successfully emerging as a medical doctor in 1866.

Wrath of God

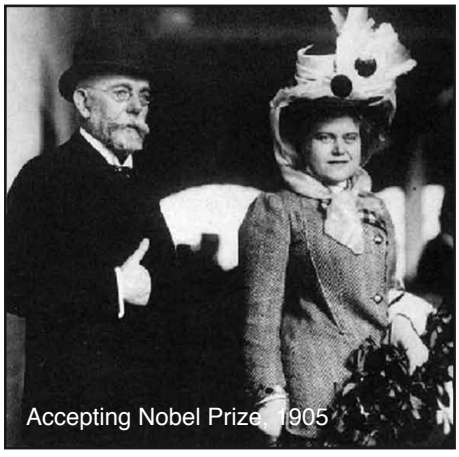
Prevalent theories at the time were that disease was caused either by the wrath of God (sometimes requiring drastic penance including amputation, expulsion, or slaying), or by "bad air". Scientist Louis Pasteur had already begun to publish his discoveries of microbial life and infectious disease that Koch would have studied in Göttingen. But it was during his service in the Franco-Prussian war, and as Medical Officer for Wollstein District (1872 to 1880) that the extent and impact of infectious disease among humans and farm animals became unavoidably evident.

Anthrax

Throughout his time in Wollstein, bovine anthrax was a prevalent disease among farm animals. Although lacking scientific equipment other than the microscope gifted to him as a wedding/graduation present in 1866 by his wife Emmy, and despite being entirely cut off from research libraries and contact with other scientific workers, and in spite of the demands made on him by his busy medical practice, Koch embarked on a study of this disease. His laboratory was, during this entire period, the 4-roomed flat that was his home shared with Emmy and only child, Gertrud.

The anthrax bacillus had already been discovered, and Koch set about proving scientifically that this bacillus was, in fact, the cause of the disease. He inoculated mice, by means of home-made slivers of wood, with anthrax bacilli taken from the spleens of farm animals that had died of anthrax, and found that these mice were all killed by the rod-like bacilli in the blood. Mice inoculated at the same time with blood from the spleens of healthy animals did not suffer from the disease. This confirmed the work of others who had shown that the disease can be transmitted by means of the blood of animals suffering from anthrax.

But Koch also wanted to know whether anthrax bacilli that had never been in contact with any kind of animal could cause the disease. He obtained pure cultures of the bacilli by growing them on the aqueous humour of the ox's eye. By painstakingly studying, drawing and photographing these cultures, Koch recorded the multiplication of the bacilli and noted that, when conditions are unfavourable to them, they produce rounded spores that could resist adverse conditions, especially lack of oxygen and that,



Accepting Nobel Prize, 1905

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Educating Environmental Services Personnel About Infection Control and Prevention

Derived from a study by Jennifer Schraag

The Environmental Services department is possibly the most mobile group of staff in the average hospital. They can be seen daily in every patient room (even those under contact precautions), every washroom, every common area, every lunchroom and cafeteria, every staff lounge, elevator, operating room and laboratory. They are at the bottom of the hierarchical pecking order, and they often work without ongoing infection control education. Herein lies a problem.

An infection control magazine article once proposed that the Environmental Services Department is second in importance only to hand hygiene in the control of hospital acquired infections. In subsequent Letters to the Editor the articles author was resoundingly berated. The corporate scientific community (read drug and research companies) argued that there were so many factors at play that Housekeeping couldn't possibly have such a starring role in the hospital infection control performance. For two reasons, the author of the original article is probably correct.

Firstly, Environmental Services workers go EVERYWHERE. If they don't take proper care, they could easily transport a potential hospital-wide outbreak on their shoes, clothing, hands and cleaning tools. Even practices such as vacuuming carpet or buffing floors can add to the load of infectious organisms in the air and on above-floor surfaces, particularly true of environmental pathogens like Clostridium difficile.

Secondly, Environmental Services plays a huge part in infection prevention. The practice of environmental cleaning is critical to the removal or destruction of disease-causing pathogens. Guidelines from Health Canada and the CDC are clear in the fact that all surfaces (some more so than others) need attention from Environmental Services staff. The simple act of wiping a railing with a damp cloth can reduce the microbial load to below infectious levels, forestalling a potential outbreak.

If at least basic infection control theory can be taught, and re-taught, and emphasized over and over during regularly scheduled and mandatory inservices, Environmental Services workers will have an understanding of how important their job is, why certain practices are done, and how to make fundamental decisions. Environmental Services supervisors also should make certain to regularly attend their facility's Infection Control meetings. An Environmental Services department head should be a voting member on their facility's Infection Control committee. An infection control manual should be developed with specific application to the Environmental Services department.

The objectives of the two departments also need to be aligned with common objectives. This goes beyond individuals, it speaks about the reporting structures and organizational alignment. The key is to ensure that the objectives are clear coming from the top management in order to achieve a balance between the control of risks and the control of costs, and that at the execution level, bridges are put in place for communication. Those usually translate on a day-to-day basis into the implementation of cross-functional teams.

Time is not on our side.

Hospital cleaning staff members are inadequately trained in infection control practice and theory, cleaning budgets had been steadily cut (as much as 15 to 20 percent annually), yet hospital buildings and equipment are being constantly reshaped and made more complex. The infections increase.

There is no one answer to the nosocomial infection problem – several concurrent battle fronts are necessary. To the extent that, in most cases, all that can be done in the hand hygiene arena is being done, the next place to look is Environmental Services. With thoughtful training and a persistent infection control message, a significant measurable difference can be achieved.

Virox Update

New Product Claims Received

Several new claims for the 0.5% Accelerated Hydrogen Peroxide product sold under the names Virox AHP 5, PerCept and Accel have been received. The additional claims include:

- 30 second Broad-Spectrum Sanitizing claim for:
  ***Escherichia coli* O157:H7 (MEA Isolate)**
  ***Escherichia coli* (ATCC 25404)**
  ***Campylobacter jejuni* (ATCC 33560)**
  ***Listeria monocytogenes* (ATCC 19112)**
- 5 minute virucidal claims for
  Norovirus (Norwalk & Norwalk-like viruses)
  Rhinovirus Type 14 (ATCC VR-1059)
  Rotavirus WA strain (ATCC VR-2018)
  Canine Parvovirus (ATCC VR-2017).

5-Minute High Level Disinfectant Ready to Launch!

We are very excited to announce that after several years of research & development we have received the DIN number for a new 5 Minute High Level Disinfectant with plans to launch the product in January 2006.

To find out more about the product please contact Virox at 1-800-387-7578.

Avian Influenza

In the advent of Avian Influenza resulting in the next Pandemic, Virox has confirmed efficacy of the 0.5% Accelerated Hydrogen Peroxide products against the H3N2 strain of the Avian Influenza Virus (Avian Reassortant) (ATCC VR-2072). Due to concerns of transmission, the H5N1 strain is not available for efficacy testing of disinfectants, however, both the EPA and Health Canada agree that efficacy against one strain of the Avian Influenza virus will allow for a general claim as the product has proven efficacy against the virus itself.

2005 Virox Speakers Series

On November 22nd, 2005 Dr. Dick Zoutman, Medical Director Infection Control Services for Kingston General Hospital will conduct a talk on All Hands on Deck: more hands to help or more hands to harm? The seminar will be held at the Hilton Garden Inn in Oakville in order to provide seating capacity for as many people as possible. To reserve a seat for this event please contact Nicole Kenny at 1-800-387-7578 x118 or by email at nkenny@virox.com.

Virox would like to thank Dr. Gardam for making the June Speaker's Seminar so successful. Over 115 people from disciplines ranging from Public Health, Infection Control, Environmental Services and School Board Facilities attended the talk on Pandemic Influenza. Virox is proud to be able to sponsor educational events such as the Speaker's Seminars. We are delighted with the positive feedback and look forward to being able to continue with these seminars in 2006.

Website Update

virox.com NEW MEMBER SECTION LAUNCHED! Do you want to be sure you get all the updates on Virox? Interested in being included on all of the invitations to all Virox's FREE education seminars?

Log on to www.virox.com and click the Member's Sign-Up icon to enrol!

Virox prides itself on being a resource tool to the infection control community so please check out our website frequently as new links will be posted regularly.

2006 National Education Conference Scholarship Deadline for applications: January 31, 2006

Application form will be available on November 1, 2005. Applications must be submitted in writing no later than January 31, 2006, prior to the annual National CHICA-Canada Educational Conference. Send applications to:

Secretary/Membership Director of CHICA-Canada
c/o CHICA-Canada
PO Box 46125 RPO Westdale
Winnipeg MB
R3R 3S3

Conference & Education

Fall / Winter Schedule

Virox is honoured to be participating in the following functions:

September 12 – 13 – CSAO in Toronto
September 23 – Ruth Rattan Foot Care Conference in Toronto
September 25 – 28 – CIPHI Annual Conference in Toronto
October 5 – York Region Public Health Education Day in North York
October 14 – SASKPIC Education Day in Saskatoon
October 14 – ICANS in Halifax
October 18 – Middlesex-London Public Health Education Luncheon in London
October 19 – C.K.I.C.C in Chatham
November 1 – 2 – OHA Annual Conference in Toronto
November 18 – SOPIC in London
November 28 – UHN Infection Control Education Day in Toronto
December 15 – 20 – PacifiChem 2005 in Hawaii

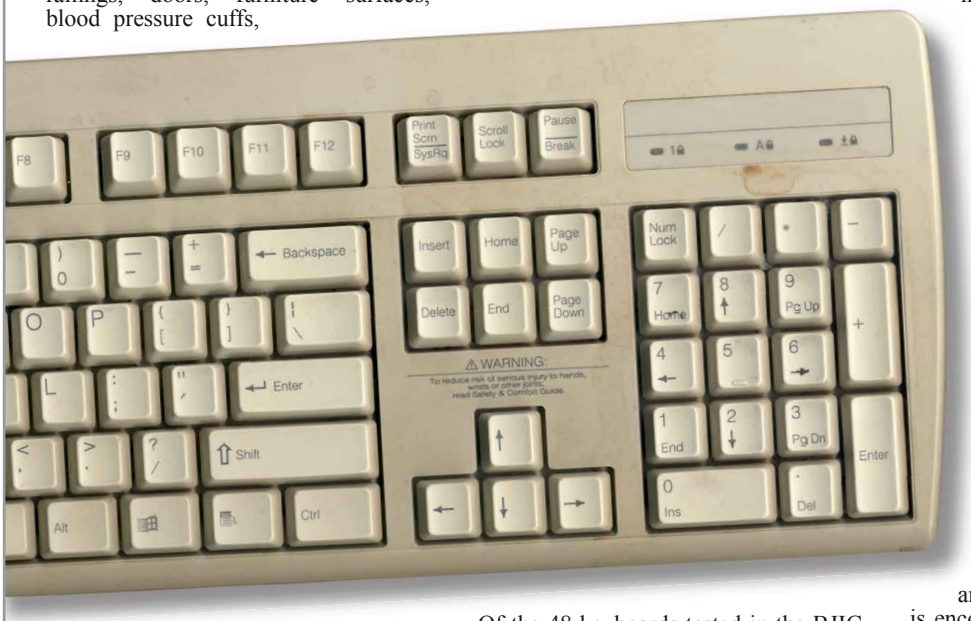
Virox is very excited about participating in so many conferences & education days.We wish the best to all of the various organizers and would like to thank them for their dedication and effort in organizing these very important educational opportunities. We look forward to attending and talking to all of the participants.

Contamination of Computer Keyboards in Clinical Areas: Potential Reservoir for Nosocomial Spread of Organisms

Nicole Kenny, Manager of Technical Services, Virox Technologies

In a recent study published in the British Journal of Infection Control it was revealed that keyboards and the computer mice in acute care facilities tend to be moderately or heavily contaminated with a variety of organisms, and that little if anything was being done to decontaminate them. It was noted that computer keyboards, as with sink taps and door handles act as reservoirs and can contribute to the transmission of MRSA.

The role of the hospital environment as a reservoir of potential pathogens has received increasing attention. There have been several reports demonstrating contamination of a wide variety of environmental sites including bed railings, doors, furniture surfaces, blood pressure cuffs, thermometers, stethoscopes and other medical equipment with the potential to lead to nosocomial spread.



Computers have become more prevalent in the hospital setting including acute clinical areas. They are being used to enter and retrieve data by all types of clinical staff, who then have direct patient contact. As a consequence, the potential exists for hospital computer equipment to act as a reservoir in organism transmission. Very few studies have evaluated the extent of contamination of computer keyboards across a variety of clinical areas in a medical establishment.

he authors of the BJIC study undertook a point prevalence study to assess the degree of contamination of computer keyboards being used in many direct clinical care areas of a busy hospital. Prior to the study, there was no designated cleaning regime for computer equipment. If cleaning was undertaken by users, it occurred in an ad hoc manner and did not follow any formal policy.

Of the 48 keyboards tested in the BJIC study, all grew organisms of some kind. Almost 80% of the sampled keyboards grew moderate or heavy numbers of organisms. Notably, five of six keyboards from the operating suite grew heavy numbers of organisms. Nearly all swabs (46 of 48) grew various combinations of skin type bacteria, with 25% also revealing mixed coliforms. More than half of the keyboards grew environmental flora, *Bacillus spp* being a predominant type. One computer was found to be positive for *C. difficile*, and another for MRSA.

This study recommends that regular procedures should be instigated for the maintenance and cleaning of all equipment used in clinical areas, including computers. However, no evidence of a specific cleaning regime for computers or their attachments in the medical literature. Manufacturers' recommendations seem confined to cleaning the keyboards with a "damp cloth".

The use of plastic covers may help in preventing organisms such as spore-forming *Clostridium difficile* from contamination computer keyboards, but this is not the full solution. An outbreak of *A. baumannii* colonization and infection on a burn unit was associated with contamination of computer keyboards, which were already protected by plastic covers (Boyce et al. 1997). Observation revealed that gloved clinical care staff moved back and forth between the patient and keyboard, while ungloved support staff, who had no direct patient contact, then touched the computer keyboards to enter and retrieve data before moving to another patient area.

A daily cleaning regime including the use of wipes, moistened with a fast-acting and non-residual disinfectant agent is encouraged. Proper hand hygiene is essential. More consideration should also be given regarding the ease and method of cleaning before all clinically based equipment is purchased. The manufacturers themselves have a role to play in the development of products that allow easier decontamination.

The references used in this article can be obtained by request. Please contact Nicole Kenny (nkenny@virox.com).

Hospital Indoor Air Quality Observations and Recommendations

Observations:

Poor-quality indoor air can produce health effects in hospital staff ranging from headaches and dry eyes to nausea, dizziness, and fatigue.
Building design flaws, construction activities, heating and ventilation problems, clinical activities, and chemical products that are improperly used, sealed, or stored can contribute emissions and contaminants to the indoor environment. These, in turn, may cause "building-related illness," a diagnosable illness attributable to airborne building contaminants, or "sick-building syndrome," which causes symptoms associated with occupancy of a specific building but no specific illness is identified.

Environmental Services workers experience relatively high injury rates, many of which are due to the toxic chemicals found in cleaning products, particularly floor and carpet maintenance products, disinfectants, and specialty cleaners. These chemicals can cause headaches, asthma, burns, permanent eye damage, major organ damage, and even cancer.
Of particular concern are most disinfectants, which pose health and/or environmental risks. Their active ingredients are among the most toxic chemicals used in cleaning, and include quaternary ammonium compounds (quats), bleach, ethyl and isopropyl alcohol, formaldehyde, and phenolic compounds.

Improved cleaning methods and less toxic products can positively affect indoor air quality and staff health.
In one study, implementation of improved cleaning and preventative techniques, such as focused dust removal from all surfaces, use of large entryway mats, and damp-mopping instead of sweeping, reduced airborne bacteria by 37%, fungi by 62%, and dust by 52%. Another study found that the use of hazardous chemicals could be reduced by 5.4 pounds per housekeeper per year, or 13%, if housekeepers used fewer chemicals, substituted less toxic chemicals, installed mats, and avoided aerosol products.

Recommendations

By cleaning for health first and appearance second, Environmental Services departments can improve indoor air quality while protecting the health of building occupants and workers.
Strategies such as preventing the introduction of dirt and dust into a facility, focusing on dust and airborne contaminant removal, preventing water damage, and using proper cleaning methods can reduce indoor air pollution and the toxicity and volume of products used. While occupants may complain that the lack of a "chemical" or "fragrant" smell indicates that bathrooms have not been adequately cleaned, they can be educated about the elements of effective cleaning and the importance of reducing the use of volatile, odorous products.

By evaluating products and purchasing the least toxic ones available, institutions can reduce the risk to workers and the environment while maintaining high-quality cleaning standards.
To make an informed decision about which products to use and which to avoid, buyers can read the material safety data sheets for all products, ask vendors about their products, and use the information provided by vendors to evaluate a product's environmental attributes. Products without chemicals that contribute to poor indoor air quality are available for most cleaning and disinfection applications.

To reduce their environmental and health impacts, disinfectants should be used carefully and selected based on their efficacy and purpose.
Most disinfectants are only effective on clean surfaces, so surfaces should be cleaned of visible soiling and organic material before the disinfectant is applied. A broad-spectrum disinfectant is preferable to one effective only against bacteria or enveloped viruses. However, some broad-spectrum disinfectants such as strong dilutions of bleach and water, while effective antimicrobial agents, are unacceptably harsh and contribute substantially to airborne toxicity.

Robert Koch – Beyond Postulates

Continued from page 1

when suitable conditions of life are restored, the spores give rise to bacilli again. Koch grew the bacilli for several generations in these pure cultures and showed that, although they had had no contact with any kind of animal, they could still cause anthrax.

Cholera

The outbreak of cholera in Egypt, and the danger of it finding its way to Europe, inspired Koch to go to Egypt to investigate the disease. Although he was frustrated by the cessation of the epidemic, he was able to study the disease long enough to suspect a particular comma-shaped bacillus. Koch's work in Egypt and later in India, led to the discoveryof the cholera organism (*Vibrio cholera*) and its transmission routes via drinking water, food and clothing. When he returned to Berlin Koch advised regular checks on the water supplies, recommended specific sewage disposal procedures, and organised courses in the recognition of cholera.

Tuberculosis

On March 24, 1882, still a young physician, Robert Koch lectured before the eminent Physiological Society of Berlin, doctors much more senior than he. Koch revealed that he had found a microbe that was the cause of "White Death" (tuberculosis), a disease responsible for one-seventh of all deaths in Europe in the latter part of the century. Of course he was correct, but scientists of the day scoffed, and toward the end of the 19th century public opinion also turned against Koch when the healing power that he had claimed for his tuberculin preparation was greatly exaggerated and hopes raised by it were not fulfilled. It led nevertheless to the discovery of many substances of diagnostic value.

Koch brought a new order to medicine and the study of disease. He invented new methods of cultivating pure cultures of bacteria on solid media such as potato, and on agar kept in the special kind of flat dish invented by his colleague Petri. He also developed new methods of staining bacteria which made them more easily visible and helped to identify them. Koch laid down the conditions, which must be satisfied before it can be accepted that particular bacteria cause particular diseases - known as Koch's Postulates.

Koch wed his second wife, Hedwig Freiberg in 1893, and it was she who nursed him until his death in Baden-Baden on May 27, 1910, just 4 years before his beloved Germany would become embroiled in The Great War. Koch's daughter, Gertrud, would become the wife of Dr. E. Pfuhl, a distinguished medical man in his own right.

Legacy

What was Koch's legacy? By 1900, twenty-one germs that caused diseases had been identified in just 21 years. *"As soon as the right method was found, discoveries came as easily as ripe apples from a tree."* (Koch). It was, of course, Koch who had developed the right methods. He was the living and posthumous recipient of many prizes, medals, honorary doctorates, and honorary memberships of learned societies and academies. He was first medical man to be awarded the German Order of the Red Eagle. In 1905 Koch finally won a Nobel Prize "for his investigation and discoveries in relation to tuberculosis". For microbiologists everywhere, Dr. Robert Koch is a hero of immense stature and importance, far beyond his postulates.

Professor Uwe Frank is the Deputy Director of the Institute of Environmental Medicine and Hospital Epidemiology at the University Hospital in Freiburg, Germany.

Koch's Postulates

Dr. Robert Koch postulated, in 1882 that to prove an organism was the cause of any disease it was necessary to demonstrate each of the following:

1. The microbe must be present in every case of the disease.
2. The microbe must be isolated from the diseased "host" and grown in a pure culture.
3. The disease must be reproduced when a pure culture is introduced to a non diseased susceptible "host."
4. The microbe must be recoverable from an experimentally infected host.

Although some pathogenic entities, notably viruses, had to be accepted without meeting all the conditions, most conditions were able to be fulfilled. The applicability and thinking behind these rigorous postulates, boosted the dogma of specific aetiology - the idea that a disease has a specific causative agent. The implication was that once the agent has been isolated, it will be possible to control the disease.

Postulate [pŏs • chū • lāt]
A thing suggested or assumed as true as the basis for reasoning, discussion or belief

Never mistake knowledge for wisdom. One helps you make a living; the other helps you make a life.

- Sandra Carey

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