

Fighting Surgical Site Infections

Bonnie M. Barnard, MPH, CIC, Mountain Pacific Quality Health Foundation, Helena, MT

Also In This Issue:

Hospital Disinfection2

Cleaning and Surface Disinfection.....2

Virox Update3

Conference & Education Fall Schedule3

Mortality Following S.aureus Bacteraemia....4

Five Common Myths About Changing Behaviour4

John Snow and the Broad Street Pump5

The John Snow Society..6

"The secret of success is constancy of purpose"

Benjamin Disraeli

Postoperative surgical site infections (SSIs) are a major source of morbidity. Among the 27 million people undergoing surgery in the United States annually, approximately 500,000 will acquire a nosocomial SSI, making it the third most commonly reported nosocomial infection at a cost of more than \$3,000 each.

Risk Factors

Preoperative and intraoperative risk factors for SSIs include inappropriate use of antimicrobial prophylaxis, infection at remote site not treated prior to surgery, shaving the site vs. clipping, long duration of surgery, improper skin preparation, improper surgical team hand preparation, environment of the operating room (ventilation, sterilization), surgical attire and drapes, asepsis, and surgical technique (hemostasis, sterile field, foreign bodies).

Appropriate Antimicrobial Agent

The choice of drug has to do with its clinical efficacy and whether it is safe, inexpensive and has a wide spectrum. For elective clean procedures using a foreign body, and in clean contaminated procedures, it is generally recommended that a single dose of cephalosporin (e.g., cefazolin) be administered intravenously by anesthesia personnel in the operative suite just before the incision. It is important that the antibiotic infusion is timed so the optimal concentration is in the serum/tissue at the time of the incision. It is equally important to maintain that therapeutic level in the serum/tissue throughout the operation.

What's On the Horizon?

Administration of supplemental perioperative oxygen may decrease SSI rates. In a randomized controlled trial, double blinded among 500 colorectal surgery patients, those who received 80 percent inspired oxygen during and up to two hours after surgery had a lower incidence of SSI (5.2%) than those patients who received 30 percent inspired oxygen (11.2%).

In a study of 2,231 CABG procedures at a tertiary care center, it was found that implementation of a comprehensive infection control program decreased SSIs, even after adjusting for potential confounding co-variables. The program consisted of: prospective surveillance; quarterly reporting of SSI rates; chlorhexidene showers; discontinuation of shaving; administration of antibiotic prophylaxis in the holding area; elimination of ice baths for cardioplegia solution; limitation of operating room traffic; minimization of flash sterilization and elimination of postoperative tap-water wound bathing for 96 hours.

Three Key Components

The National Nosocomial Infection Study (NNIS) program revealed three key components of a successful prevention effort:

1. Use of a multidisciplinary team to build consensus that a problem existed, disseminate information about the infection and planned interventions to their colleagues, and assist ICPs with investigation and prevention
2. Regular educational sessions to introduce interventions
3. Constant data dissemination to show the impact of the interventions

The NNIS study emphasized the importance of sharing success stories and outlining epidemiologic approaches to understanding and describing best practices. It is the people working at the point-of-care that have the most to contribute to any improvement process. To ensure a SSI prevention program will succeed, it is critical to stay focused on the measurement and improvement of the processes of care that have been shown to directly impact surgical site infections while using outcome measures as "stepping stones."



Hospital Disinfection: Efficacy and Safety Issues

Dr. Markus Dettenkofer, Freiburg University Hospital, Germany

The key question as to whether the use of disinfectants on environmental surfaces, or whether cleaning with detergents only reduces nosocomial infection rates still awaits conclusive studies. New disinfectants, mainly peroxygen compounds, show good sporicidal properties and will probably replace more problematic substances such as chlorine-releasing agents. The safe reprocessing of medical devices requires a well-coordinated approach, starting with proper cleaning. New methods and substances show promising activity for preventing the transmission of prions.

Various different aspects of virus inactivation have been studied, and the transmissibility, e.g. of norovirus, shows the need for sound data on how different disinfectant classes perform. Biofilms or other forms of surface-adherent organisms pose an extraordinary challenge to decontamination. Although resistance to biocides is generally not judged as yet to be as critical as antibiotic resistance, scientific data support the need for proper use, notably including the avoidance of widespread application, especially in low concentrations and in consumer products.

Chemical disinfection of heat-sensitive instruments and targeted disinfection of environmental surfaces are established components of hospital infection control. To avoid danger to staff, patients and the environment, prudent use as well as established safety precautions are required. New technologies and products should be evaluated with sound methods. As emerging resistant pathogens will challenge healthcare facilities in the future even more than at present, there is a need for well-designed studies addressing the role of disinfection in hospital infection control.



Cleaning and Surface Disinfection: New Insights and Strategies

Dr. Martin Exner, Institute of Hygiene and Public Health, University of Bonn

Recently, new insights into the persistence of pathogens, their transfer from inanimate surfaces to humans and the risk of contamination and dissemination of pathogens by detergents have been gained. Furthermore, new experimental data on the interruption of chains of infection by disinfectants as well as results of outbreak-control studies are now available. Hence it has become necessary to reassess the potential benefits of using disinfectants to prevent and control nosocomial

infections. Based on the new findings and in view of the increasing incidence of nosocomial infections and antibiotic resistance, the German Robert-Koch-Institute has issued completely revised recommendations on cleaning and surface disinfection. With respect to these recommendations a new test method was developed, which allows comparison of the efficacy of disinfection in reducing the microbial loads and their dissemination with that of cleaning procedures under practical conditions.

In a multi-factor approach, mechanical properties (wet mop technique), utensils (different mop materials) and active agents (disinfectant, detergent) were taken into consideration. We found that under the given conditions, dissemination of the test organism *Staphylococcus aureus* did not take place when using aldehydes and peroxides, it did take place, however, when water, surfactants, and the disinfectant glycol derivatives, quaternary ammonium compounds and alkylamines were used.

Virox Update

2006 CHICA Scholarship Winners

Virox and the Patron Members (JohnsonDiversey, Butchers, Deb and Webber Training) would again like to congratulate the 2006 Scholarship winners. This year's recipients were: Molly Blake, Jen Tomlinson, Dorothy Turpin, Lori Jessome, Mary McNaughton, Paula Price, Penny Ralph, Shelia Richardson, and Donna Ronayne.

The application for the 2007 Scholarship will soon be posted on www.chica.org and www.virox.com. Watch for that application form and be sure not to miss the submission deadline of the end of January!

2006 Virox Speakers Series ... Now in Ottawa!

Virox, in partnership with Webber Training, is pleased to announce that the next Free Speakers Series will be held in Ottawa on Tuesday October 17th. Dr Syed Sattar will be speaking on: "The Emerging Promise of Oxidizers as High-Level Disinfectants"

Space is limited so please contact Nicole Kenny at 1-800-387-7578 x118 or by email at nkenny@virox.com to reserve a spot.



Dr. William Rutala, Dr. Syed Sattar, Navid Omidbakhsh at APIC 2006, Tampa

New High Level Disinfectants

This has been a very exciting year for new product launches. Three (3) new high level disinfectant and chemosterilant products have been launched in the Accel product line. *PREvention* which was formulated for use on plastic devices is a 2% Accelerated Hydrogen Peroxide (AHP) formula that carries a 5-minute high level disinfection claim. *PREvail*, was formulated for use on metal devices is a 2% AHP formula that carries a 10-minute high level disinfection claim. The third product *Accel CS 20* was specifically formulated for use as a rapid chemosterilant and carries a 20-minute sporicidal claim for use on critical medical devices. Product information is available on www.virox.com/medical/default.asp

AHP Indicator Test Strips

Virox in partnership with IBT Inc have developed easy to use dip-and-read test strips that can be used for confirmatory testing of Accelerated Hydrogen Peroxide. These test strips can replace the more technical colourimetric ampoules that were previously available. Three (3) different kits have been developed; a kit for the *Broad-Spectrum No Rinse Sanitizer* commonly used in food processing facilities, a kit for the surface disinfectants used in health care and professional beauty facilities, and a kit for the 2% AHP high level disinfectants. These kits will be available for the distributors where the products are purchased or can be purchased directly from Virox Technologies Inc.

Website Update: www.virox.com MEMBER SECTION! Do you want to be sure you get all the updates on Virox? Are you interested in receiving invitations to all of Virox's FREE education seminars? Go to www.virox.com and click the Member's Sign-Up icon to enrol. Visit the site often - new and useful resources are posted regularly.

There is power in clarity and direction. Be clear, be direct, and take action with integrity.

- Jeff Evans, Ph.D.

Conference & Education Fall Schedule

This fall there are an unbelievable number of events! We try to support as many events as possible. Where we cannot attend in person we have provided sponsorship funding.

Virox will be participating in the following functions:

- September 10th – 13th** – CIPHI Ontario Conference in Niagara Falls
- September 18th - 19th** – CSAO in Toronto
- September 21st** – HUPIC Monthly meeting (as educational speaker)
- September 27th** – York Region Public Health Education Day in North York
- October 2nd & 3rd** – CHICA-NL in St. John's
- October 16th – 19th** – US Dental Show in Las Vegas
- October 17th** – Sarnia Public Health Education Day in Sarnia
- October 18th** – Ottawa Public Health Education Day in Ottawa
- November 14th** – APIC Chapter 16 Education Day in Washington
- November 24th** – UHN Infection Control Day in Toronto

Virox has provided sponsorship support to the following events:

- September 21st** – Peel Community Infection Control Day in Mississauga
- September 22nd** – SASKPIC in Regina
- September 22nd** – Ruth Rattan Foot Care Show in Toronto
- September 27th & 28th** – CHICA-Eastern Ontario in Kingston
- October 17th** – Winnipeg Health Sciences Bug Day in Winnipeg
- October 17th** – CKICC Education Day in Chatham
- October 19th** – HUPIC Education Day in Hanover

We are very excited about participating in, and sponsoring so many conferences and education days. Our best wishes are with the organizers and we thank them for their dedication and effort. We look forward to attending and meeting all of the participants.

Mortality Following *Staphylococcus aureus* Bacteraemia

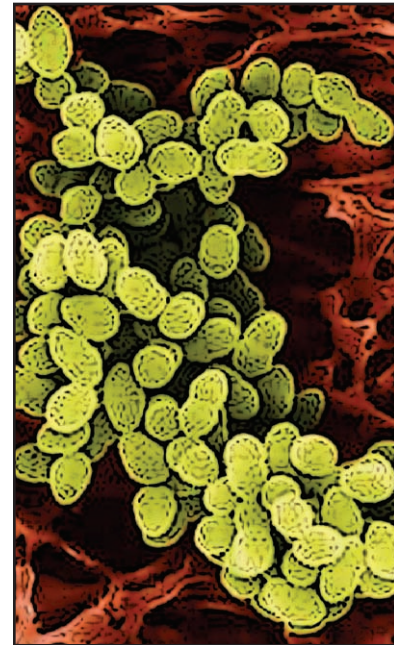
At a glance: the spread of MRSA has greatly increased the overall number of cases of *S. aureus* bacteraemia and has contributed to short term mortality after *S. aureus* bacteraemia.

Rapidly rising rates of infection with methicillin resistant *Staphylococcus aureus* (MRSA) led to the revision of United Kingdom guidelines. In 1998 infection control guidelines changed from an MRSA “search and destroy” method to patient stratification according to risk, with targeted prevention measures. Rates of MRSA bacteraemia have however continued to rise.

Wyllie et al (BMJ 2006 Jun 23) report a study which determined the incidence of methicillin resistant and methicillin sensitive *S. aureus* (MRSA and MSSA) bacteraemia in inpatients, and associated mortality within 30 days after diagnosis. They performed an anonymised record linkage study of data from hospital information systems and microbiology

databases of inpatients aged 18 or over admitted to a teaching hospital between 1 April 1997 and 31 March 2004 and to a district general hospital between 1 April 1999 and 31 March 2004 in Oxfordshire. 216,644 inpatients were included; patients admitted to haematology, nephrology, or oncology services were not included because most were managed as outpatients.

They found that rates of *S. aureus* bacteraemia rose between 1997 and 2003, and MRSA was responsible for this increase. Overall mortality 30 days after bacteraemia was 29%, which is similar to previous studies. The crude odds ratio for death after MRSA bacteraemia compared with MSSA bacteraemia was 1.49 (95% confidence interval 0.99 to 2.26). The authors conclude that the spread of MRSA has greatly increased the overall number of cases of *S. aureus* bacteraemia and has contributed to short term mortality after *S. aureus* bacteraemia.



Five Common Myths About Changing Behaviour

Allen Soden, President, Deb SBS, Stanley, North Carolina

Myth #1 **Crisis is a powerful stimulus for change**

Reality - Nine out of ten patients who have had serious heart surgery drift back into the unhealthy lifestyles that caused their problem in the first place. Consider the near 100% compliance with hand hygiene protocols during SARS, and the post-SARS complacency. “Crisis change” is brief change, and even if the crisis stimulus remains, change will not.

Myth #2 **Change is motivated by fear.**

Reality - Denial is delightful. It's easy for people to ignore the bad things that might happen to them as a result of their current behaviour. A minority of health-care workers will opt to permanently change their hand washing practices out of fear of contracting an infection themselves or of infecting others. Compel-

ling, positive visions of the future are a much stronger inspiration for change.

Myth #3 **The facts will set us free.**

Reality - Our thinking is guided by narratives, not facts. When a fact doesn't fit the metaphors that we use to make sense of our world, we reject it. This is evident in the posters on the walls of our health-care facilities. The signs that yield the most change are those that are created by staff and that involve graphics, particularly photographs of staff or of patients. Change is inspired best by emotional appeals rather than factual statements.

Myth #4 **Small, gradual changes are always easier to make and sustain.**

Reality - Radical, sweeping changes are often easier because they quickly yield benefits. If things are going to be changed anyway, it's best to get it done.

Myth #5 **We can't change because our brains become “hardwired” early in life.**

Reality - Our brains have an extraordinary ability to stretch, meaning that we can continue learning complex new things throughout our lives. If we can learn, we can change. Not including others in planning change can adversely affect the outcome. Communicating can be difficult, as can opening an idea up to criticism and input. Nevertheless, people more readily support changes they develop, and respond more positively to guidance. Bringing people in early and presenting information to them pays off down the road, with fewer delays and problems; they adapt more readily. Make a plan to present the change, lay out the options, and explain the conclusions. Ask those involved to invest in the plan's success and to continue to communicate.

John Snow and the Broad Street Pump

Nicole Kenny, Director Technical Services, Virox Technologies Inc.

During the night of Thursday, August 31, 1854 and the next day, 203 cases of cholera were diagnosed in the Soho district of London, England. Many more cases would occur over the weekend, and soon almost 300 deaths from the disease would be reported. Cholera was not unknown in the city, but a large cluster in such a small neighborhood was cause enough for residents to desert their homes in panic. Dr. John Snow was the man who would provide the solution to this outbreak and in the process, rocket himself into epidemiology superstardom.

John Snow (1813-1858) was educated at a British private school. He was barely a teenager when he was apprenticed to a surgeon in Newcastle-on-Tyne where he thrived. As a colliery surgeon during the London cholera epidemic of 1831/1832 Snow witnessed the awful impact of infectious disease. He studied for two years at the Hunterian School of Medicine after which he was accepted as a member of the Royal College of Surgeons of England, and graduated M.D.



of the University of London in 1844. Described as a creative if unassuming London physician, Snow achieved initial prominence in the mid-nineteenth century as an obstetrician, who was among the first to employ anesthesia in his practice. He published several articles on the benefits and practical uses

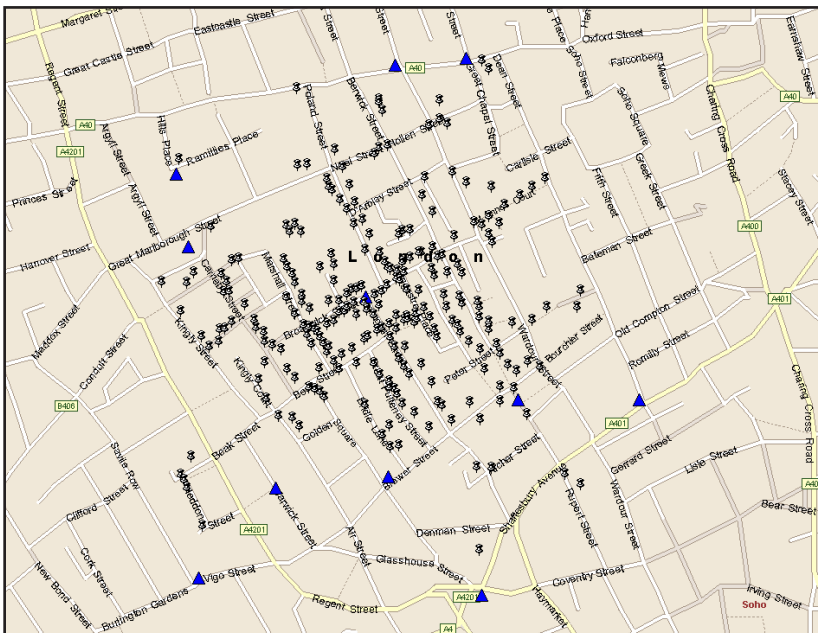
of anesthesiology, becoming a notable thinker in the field. It is his work in epidemiology, however, that earns him his prominence in medical history.

Cholera is an insidious disease. Initially, the patient doesn't feel particularly unwell and may just have a little diarrhoea. Fluid loss soon increases out of interventional control, so much so that the patient's blood appears thickly coagulated. Within 48-60 hours of the onset of symptoms half of the patients will die, primarily of dehydration.

In the nineteenth century, it was presumed by the public and scientists alike that diseases were transmitted through inhalation of "miasma" – contaminated vapors in the air. Snow wasn't convinced. In 1849 Snow published a small pamphlet, "On the Mode of Communication of Cholera" where he proposed that the "cholera poison" was spread through contaminated food or water and reproduced in the human body. Although highly regarded by his colleagues, Snow had no means to prove his theory.

When in 1854 cholera struck England once again, Snow was able to confirm his theory on the transmission of the disease. He began by plotting the location of deaths related to cholera and found that in one particular location near the intersection of Cambridge Street and Broad Street, almost 500 Cholera deaths occurred within 10 days.

At the time, London's public drinking and wash water was supplied by two companies both of which drew their water out of the River Thames, one upstream of the city centre, the other downstream. A higher concentration of the cholera organism was found in the region of town supplied by the Southwark and Vauxhall Water Company. This company sourced its water downstream of London, where there was more likelihood of it being contaminated by the city's sewage.



Continued on page 6

John Snow and the Broad Street Pump

Continued from page 5

At the edge of Broad Street, near Cambridge Street stood a popular pump from which residents of the crowded Soho neighborhood drew their water. It was known for its particularly sweet and refreshing taste. John Snow examined it on Monday September 3rd 1854, but found only minimal evidence of contamination, insufficient to convince him conclusively that the pump was the source. Conclusive evidence would arise when, using the Register of Deaths, he marked all of the cholera deaths in Soho and surrounding district by drawing small parallel lines on a map (see diagram on page 5). The largest balloon of deaths on his map encircled the Broad Street Pump – statistical evidence at a time when medical statistics was a new science

The two curious cases that arose out of his research and ultimately clinched it for Snow were a death reported in Hampstead, and another in Islington – each at least 5 miles distance from the nearest cluster. Snow visited the Hampstead home where the lady of the house had fallen victim to cholera. He was told that every day a cart took a large bottle of water from the Broad Street pump all the way to Hampstead because the lady of the house liked the taste. A delivery of water had arrived on Thursday, August 31st, and she consumed the water over the next 24 hours. Before dawn on Saturday she was dead. The woman from Islington was a niece who often paid a visit to the Hampstead residence of her aunt and had accepted a fateful drink of the tasty water.

During the evening of September 7th Snow convinced the Board of Guardians of St James's Parish with his evidence and they agreed to remove the handle from the Broad Street pump

thereby preventing its use. Despite a small petition from residents to once again allow them access to their favorite water pump, the handle was never re-installed. The number of new cases of cholera quickly dropped to near zero.

The pump handle has remained a symbol of effective epidemiology and today is proudly displayed in the John Snow Pub, located near the site of the former pump in London. A pink slab of marble marks the exact location of the pump on Broad Street. As tribute and honour to the famed epidemiologist, a John Snow Society has been formed. The only requirement of membership of the society is that one consume an alcoholic beverage at the John Snow Pub while in London.

John Snow's recognition of the power of statistics marked the path for many who would follow. By gathering the stories that might have been considered merely anecdotal, and by meticulously assembling data as evidence, the cumulative effect was conclusive and proved to be the beginning of the end for cholera in Britain.

This is the second in a series of indeterminate length on the creators of modern infection control and epidemiology – Robert Koch, John Snow, Louis Pasteur, Alexander Fleming, Paul Erlich and the like.

“Most of us are about as eager to be changed as we were to be born, and go through changes in a similar state of shock.”

- James Baldwin

The John Snow Society

The John Snow Society aims to promote the life and works of Dr. John Snow, pioneer of epidemiological method and celebrated anaesthetist.

As outlined in the Constitution, the Society has a serious intent - publishing news, collecting facts and dates related to the life and works of John Snow and organizing the annual “Pumphandle Lecture Series.” It also aims to provide a communication network for epidemiologists and those trained in the Snow tradition throughout the world. The Society currently has over 1,000 members worldwide, many of them eminent specialists in their fields.

Membership is open to all who wish to celebrate the memory of John Snow. International membership is encouraged, the only requirement being the hoisting of a glass in tribute to Dr. Snow at the John Snow pub - located near the site of the original pump in London!



2815 Bristol Circle, Unit 4, Oakville, Ontario L6H 6X5
Tel: (905) 813-0110 • Toll Free: 1-800-387-7578 • Fax: (905) 813-0220
E-mail: info@virox.com • Website: www.virox.com