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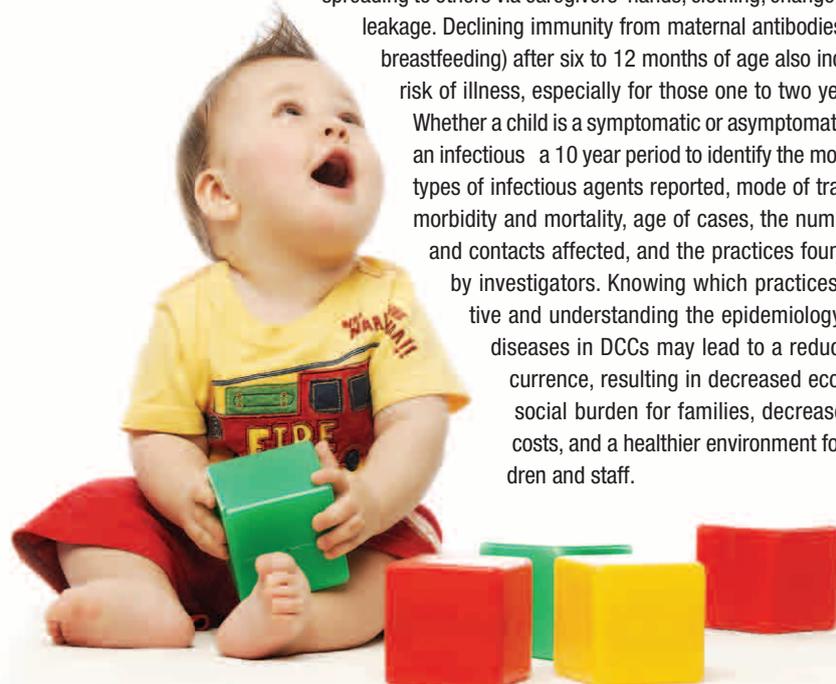
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Enteric Outbreaks in Child Care Centers: Effective Infection Control Recommendations

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Mothers working outside of the home and subsidies for childcare have resulted in an increasing demand for childcare services to the extent that approximately 25% of pre-school children are in communal daycare situations in North America and other developed regions. Enteric (gastrointestinal) illness in daycare centers (DCCs) is not an uncommon event and this article will review discuss the causes of and recommended actions to prevent/resolve outbreaks of enteric disease in these environments.

Enteric illness is facilitated by placing numerous children from diverse backgrounds together in a confined space. The unhygienic nature of children's habits, such as mouthing equipment and toys, touching each other during play, and failing to wash hands after toileting, also aids the transmission of infectious disease agents between children. Diapered children increase the risk of infectious agents spreading to others via caregivers' hands, clothing, change tables, and leakage. Declining immunity from maternal antibodies (i.e., from breastfeeding) after six to 12 months of age also increases the risk of illness, especially for those one to two years of age. Whether a child is a symptomatic or asymptomatic carrier of an infectious a 10 year period to identify the most common types of infectious agents reported, mode of transmission, morbidity and mortality, age of cases, the number of staff and contacts affected, and the practices found effective by investigators. Knowing which practices are effective and understanding the epidemiology of enteric diseases in DCCs may lead to a reduction in occurrence, resulting in decreased economic and social burden for families, decreased medical costs, and a healthier environment for both children and staff.



It's All About the Stories

PAUL WEBBER, WEBBER TRAINING INC.

My most heartfelt thanks to John van Dyke and Virox Technologies Inc for sponsoring my participation at two international conferences in 2010, the IPCAN/IFIC conjoint conference in South Africa, and the NDICN conference in New Zealand. At these 2 conferences I gave 3 lectures, requiring 12 airplane flights, touching 5 countries on 4 continents. By spells it was thoroughly exhausting, but exploration of the countries that I visited and the people therein was spellbinding, and one of the greatest experiences of my life.

One of the lectures that I presented was on the magic of storytelling to influence a culture of infection prevention and control, and stories were the overriding theme of the trip. Early on I was invited to participate in an HIV/AIDS rally in Cape Town where mine was one of just 2 white faces in the crowd. A great number of people came to introduce themselves and to find out who I was, and I talked and listened for hours, hearing both tragic and encouraging stories. One HIV educator told of how he uses music to effectively teach miners in South Africa about risky sexual behaviour. In New Zealand an infection control professional shared what it was like to contract H1N1 influenza herself, to be severely ill and in isolation. Her almost physically vivid description of the fear and uncertainty that surrounded her during the time that she was sick was gut wrenching, even a year after full recovery.

Discovering the extraordinarily beautiful sights of South Africa and New Zealand was exhilarating, but the trip was so much more gratifying for the extraordinarily beautiful spirit of the people whom I met along the way. If asked to define a single moral lesson from this trip I would say it is that we in wealthy countries need to stand beside those in developing nations who are just in the early stages of infection prevention and control. As mentors, as funders, or simply as listeners and witness-bearers, we can and we should get involved. We need to hear the stories.

Does Skin Decolonization with Chlorhexidine Pose a Problem for Surface Disinfection?

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Over the last four years, there has been a slow but significant decline in the rate of methicillin-resistant *Staphylococcus aureus* (MRSA) transmission in hospitals worldwide. In the UK, where MRSA surveillance has been a priority since 2001, MRSA bacteremia rates have dropped some 70% to a record low of 0.50 cases per 10,000 bed days. This improvement has resulted from three specific approaches including universal hand hygiene, active surveillance cultures (ASC) and skin decolonization using antimicrobials and antiseptics. Recently, skin decolonization was reviewed by Dr. Jonathan Edgeworth (2010) in the *Journal of Antimicrobial Chemotherapy*. While the majority of this article highlights the successes of skin decolonization in the past and present, one specific problem was addressed that dampened the outlook for the future not only of this bacteria reduction protocol but also potentially for some current surface disinfection practices.

Skin decolonization is a process, by which an antimicrobial or antiseptic is applied to the skin to reduce the levels of microbes. The goal of this technique is not to eliminate bacteria, but to reduce the load to a level that would be considered safe. Agents currently in use include mupirocin, octenidine dihydrochloride, tea tree oil, and chlorhexidine, the latter of which is normally applied either directly using cloths soaked in a 2% solution or indirectly by dilution in bathing water. Edgeworth uses several studies to demonstrate the positive effects of chlorhexidine and suggests that its popularity has grown to the point that some two-thirds of intensive care units in Europe are now using this method.

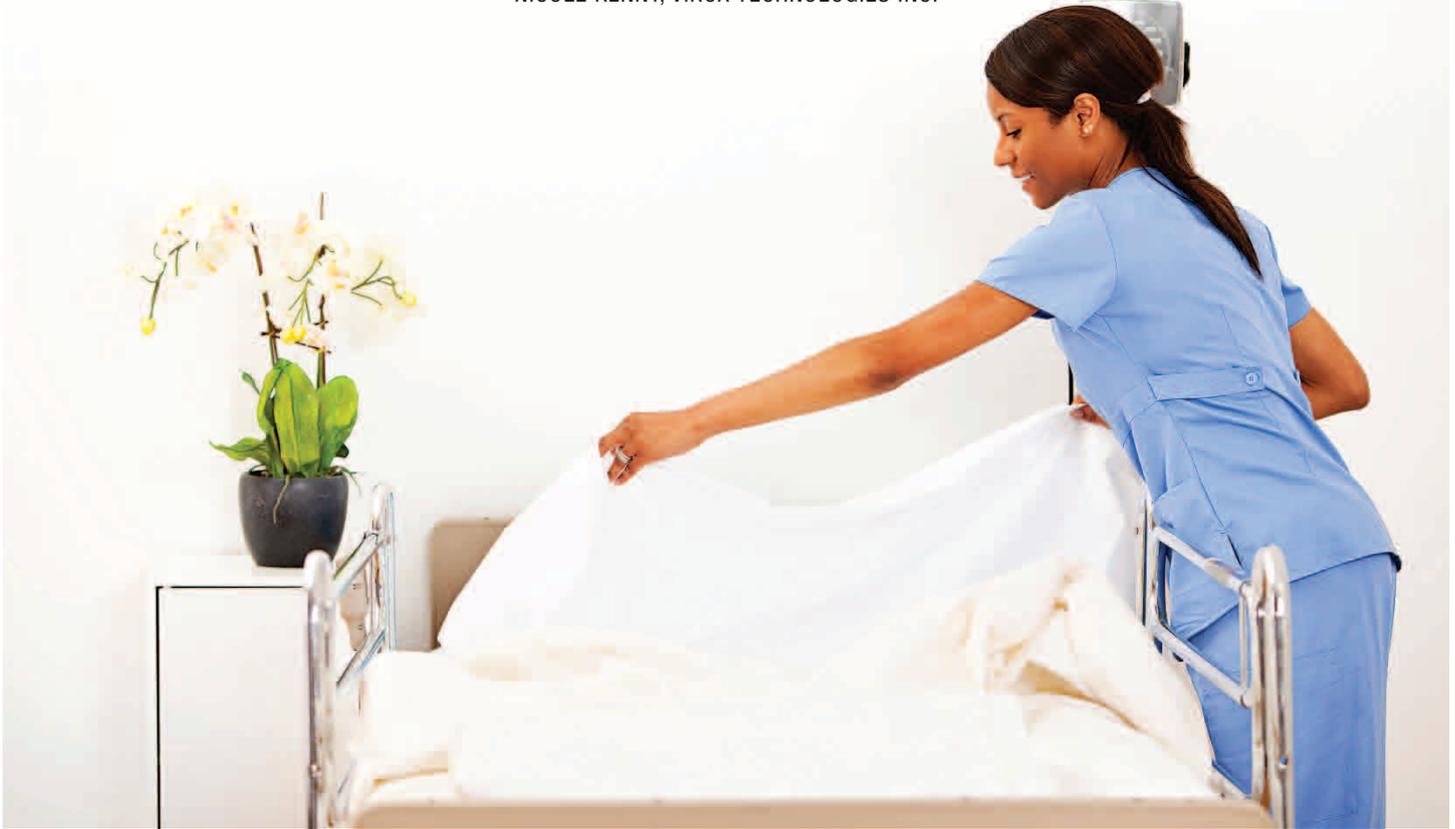
The problems arise, however, when one considers a particular gene locus, called *qacA/B*. These plasmid-based genes produce a multidrug transporter system that pumps antimicrobials out of the bacteria rendering them harmless. This alone may lead to concern, however, the global prevalence of this gene in MRSA suggests that the picture may be significantly worse. While Batra et al. (2010) found that less than 5% of isolated MRSA strains contained these genes in the UK; the levels of this gene in MRSA are significantly higher in other countries. In China and Taiwan, the prevalence of *qacA/B* has been between approximately 23% (Zheng et al. 2009) and 55% (Wang et al. 2008) of MRSA while a study by Miyazaki (2007) suggested that 80% of MRSA in Brazil possess this gene.

The problem for the future of surface disinfection arises from the fact that these pumps are not only effective against chlorhexidine, but also quaternary ammonium compounds (QAC), which are used extensively in health care facilities for surface disinfection. This thus presents a problem. If rates continue to be as high as presented above, or rise over time, then the potential for widespread QAC resistance in MRSA and other bacteria may be apparent. This may, in turn, force a rethinking of chlorhexidine and QAC use in healthcare.

There is one limitation to this postulation. Neither Dr. Edgeworth nor any other authors have stated or even implied that the use of chlorhexidine will eventually lead to increased spread of the genes or a complete failure of these compounds for decolonization and disinfection, respectively. Yet, without further study and understanding of the impact of the widespread use of these compounds, chlorhexidine and QAC may follow the same path as antibiotics and possibly face the same fate.

Variations in Hospital Daily Cleaning Practices

NICOLE KENNY, VIROX TECHNOLOGIES INC.



Despite the best intentions of most housekeepers, cleaning of environmental surfaces in hospitals and other healthcare facilities has been demonstrated to be generally suboptimal. Improved cleaning and disinfection of healthcare surfaces is widely acknowledged to reduce healthcare-associated transmission of pathogenic microbes, yet few good quantitative studies exist to bear witness to what cleaning practices work best.

In the January issue of *Infection Control and Hospital Epidemiology*, Dr. John Boyce and his colleagues at the Hospital of Saint Raphael (New Haven, Connecticut) used direct observation and an adenosine triphosphate (ATP) bioluminescence assay to “monitor variations in daily cleaning practices by housekeepers and to assess the level of cleanliness of surfaces after daily room cleaning”. Saint Raphael is a 500-bed hospital, associated with Yale University.

In the study, two researchers selected 7 housekeepers who were believed to have good cleaning skills and let them know that they would be observed as they cleaned, and that 5 high-touch surfaces in each room would particularly be assessed for cleanliness. This allowed the researchers to define what a “clean” surface was, using ATP readings. The order in which surfaces were cleaned and the number of disinfectant wipes used were recorded.

The high-touch surfaces included the usual suspects - bedside rails, overbed tables, television remote controls, bathroom grab bars and toilets seats. Among the 7 housekeepers that were followed, the cleaning times were remarkably

different for each surface. For example, the time spent cleaning overbed tables ranged from 10 to 186 seconds. The time taken to clean television remote controls ranged from 1 second to 43 seconds. Also, the number of cloth changes per room varied widely, from as many as 5 disinfectant wipes per room, to as few as 2 wipes for 5 rooms!!

This study revealed substantial variations in the technique used by housekeepers during cleaning of patient rooms, and in the level of cleanliness after it had been visited by a housekeeper. Of greater concern was the wide variation in the time spent cleaning a given type of surface. Factors that may have influenced cleaning times include whether surfaces looked dirty, and housekeeper attitudes regarding which objects are the most likely to be contaminated (eg, toilet seats). The researchers found that smooth surfaces (eg, overbed tables and toilet seats) were cleaned more thoroughly than rough or irregular surfaces.

It was quite a small study, of only a single hospital, and it is difficult to compare the results with those of previous studies because, ironically, there is no standardized definition for classifying a healthcare surface as clean. However the researchers’ findings would indicate that there are a multitude of variables that need to be considered when assessing hospital cleaning practices. Providing housekeepers with continuing education, clear expectations, and feedback is necessary to achieve compliance with recommended daily cleaning practices.

Fall Tradeshow Schedule

Virox representatives will be participating in the following functions during the upcoming months:

September

September 5 to 7, 2010 - IFEH 2010 & CIPHI 76th Annual Education Conference

September 16, 2010 - TPIC Annual LTC Infection Prevention and Control Education Day

September 17, 2010 - CHICA-Southern Alberta Seminar

September 19 to 21, 2010 - CAEM "Doing it Right" Convention and Tradeshow

September 24, 2010 - Ruth Ruttan 14th Annual Footcare Conference

September 26 to 30, 2010 - Ashes 2010 Conference

September 27 to 28, 2010 - CHICA-NL 2010 Annual Education Conference

September 30 to October 1, 2010 - APIC West Virginia

September 30, 2010 - Middlesex London Health Unit Annual Infection Prevention and Control Fall Workshop

October

October 4, 2010 - Extendicare Annual Housekeeping Conference

October 14, 2010 - York Region Annual Education Day

October 14, 2010 - Huron County Public Health's Healthcare Workshop

October 14, 2010 - APIC Virginia

October 28, 2010 - Ottawa Public Health Infection Prevention and Control Education Forum

October 29, 2010 - C-KICC 13th Annual Infection Prevention and Control Conference

November

November 4 to 5, 2010 - CHICA-Nova Scotia

November 9 to 12, 2010 - ISSA/InterClean

We are very excited about participating in each of these 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.

Fall 2010 Virox Update

First Bi-Annual Pre-Conference Symposium on Cleaning, Disinfection and Sterilization

Thank you for making the first Bi-Annual Pre-Conference Symposium on Cleaning, Disinfection and Sterilization a success! More than 200 infection prevention and control professionals and public health Inspectors attended the inaugural Disinfectant and Sterilization Symposium at the 2010 CHICA Canada Conference. This biannual event is intended to provide infection control, public health and pre-hospital professionals an opportunity to learn more about cleaning, disinfection and sterilization. All presentations can be downloaded on the www.infectionpreventionresource.com website under Educational Opportunities.

Anivac Provides Accelerated Hydrogen Peroxide Disinfectants for 2010 Alltech FEI World Equestrian Games

The Alltech FEI World Equestrian Games' goal of being environmentally responsible has led to the selection of Anivac Corporation as the official disinfectant company of the games. Anivac is supplying the Accel brand of AHP disinfectants and Anivac equipment to clean and disinfect all stabling areas at the park, as well as the quarantine facilities at the Cincinnati/Northern Kentucky International Airport (prior to each flight of horses). Accel was selected as the disinfectant of choice for its superior environmental profile and broad spectrum efficacy.

The Accel Instrument Cleaning & Disinfection Line Has a Fresh New Look!

The Accel product line has some exciting new changes; the first of which includes a new fresh look and a product name change for Accel PREvention High Level Disinfectant. The name change from Accel PREvention to Accel HLD5 is intended to best describe the intended use of the product: High Level Disinfectant in 5 Minutes (HLD5). This change affects the name only and the product itself remains unaltered. The name change was recently approved by Health Canada and will be available in October 2010. Contact Lee Nesbitt (lnesbitt@virox.com) for further information.



GREEN TEAM UPDATES

It is hard to believe that a full year has flown by since the creation of the Virox Green Team in August 2009, and the introduction of the Green Team Updates in our Solutions Newsletter (volume 20). In the first 12 months of its existence the Green Team has implemented a number of initiatives that support our corporate mandate of providing sustainable solutions in the products that we manufacture and in our corporate culture. The main focus over the past several months has been writing our 2011 Strategic Plan, the primary focus of which will be to implement the 46 projects we need in order to attain LEED Certification (Leadership in Energy and Environmental Design green building rating system).

In the coming months we will host our first Adopt-A-Road event as the Green Team works with the City of Oakville to take over the litter maintenance on Coventry Rd. and we hope to report how much waste we have been able to divert from landfill through our recycling programs.

We will keep you updated on our initiatives in future issues of the Solutions Newsletter!

Role of Hospital Surfaces in the Transmission of Emerging Healthcare-Associated Pathogens

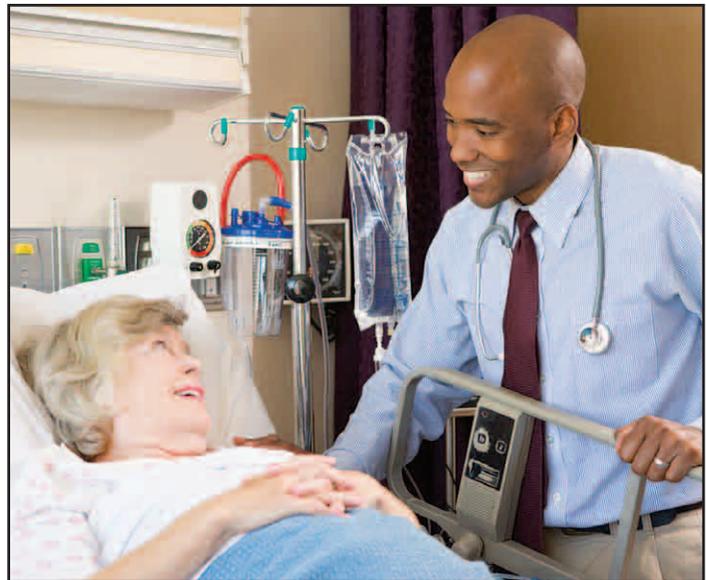
JANE BARNETT, CLINICAL NURSE SPECIALIST- INFECTION PREVENTION AND CONTROL, CHRISTCHURCH WOMEN'S HOSPITAL, NEW ZEALAND

There is no dispute that healthcare-associated infections (HAI) remain a major cause of patient morbidity and mortality in healthcare facilities, including non-acute facilities. In the United States there are approximately 1.7 million HAI every year, resulting in close to 100,000 deaths. In particular, emerging organisms such as norovirus, *Clostridium difficile*, and *Acinetobacter* spp have caused a great deal of distress for patients, and the healthcare workers who have to battle these bugs. For many years the role of the contamination of surfaces in healthcare facilities was a debatable point. However, these three organisms in particular have shown that the healthcare environment has everything to do with healthy patients, and that it requires greater attention.

A recent article in the American Journal of Infection Control drove this point home quite nicely. David Weber, William Rutala, and colleagues looked specifically at norovirus, *C. difficile*, and *Acinetobacter* and the role that the hospital environment played as a vector of transmission. These three organisms were selected in particular for several reasons, not least of which because they are known to survive for long periods on environmental surfaces (hours to years), they each have a low infective dose (just a few virions in the case of norovirus), and they are the causative agent in a great number of outbreaks every year. The authors explore each organism in turn.

The understanding of norovirus transmission and pathophysiology has been limited by the lack of a culture system for growing the virus, and limited animal models. The sheer number of norovirus outbreaks is astounding. This pathogen is responsible for approximately 50% of all epidemic gastroenteritis, and more than 90% of all non-bacterial gastroenteritis. This virus is responsible for an estimated 267 million infections annually. Transmission is generally fecal-oral (although outbreaks from contaminated food and water are reported), most notably from coming into contact with contaminated surfaces and not subsequently performing adequate hand washing. Norovirus infection is associated with a short incubation period (10-51 hours), although the infected person remains a potential transmitter for several days beyond the point when clinical symptoms have resolved. It is a hardy organism, not substantially affected by alcohol hand rubs, and able to survive for long periods in in-use concentrations of quaternary ammonium disinfectants.

Clostridium difficile is widely known and loathed by infection control professionals. A spore-forming and toxin-producing bacillus, it is carried in the intestinal flora of approximately 3% of healthy adults, and 20-30% of hospitalized adults. Once in the environment it can exist as a vegetative cell or spore form. The vegetative cell survives for only 15 minutes on dry surfaces, although they may remain viable for up to 6 hours on moist surfaces. The spore form, on the other hand, is highly resistant to chemical disinfectants, alcohol hand rubs, heat treatment, and physical removal. It is transmitted by the fecal-oral route. Hands, surfaces, and equipment are easily contaminated, to the extent that as many as 75% of rooms with a symptomatic patient show heavy contamination on surfaces. In recent years an increased incidence of *C. difficile* infection has been reported, along with an increase in related hospitalizations and deaths.



The frequency of drug-resistant *Acinetobacter* spp has been increasing, and multiple outbreaks have been reported. Once these aerobic, gram-negative bacteria are established in an institution, outbreak strains often become endemic. The crude mortality rate ranges as high as 50%, and the attributable mortality can be as high as 43% for intensive care patients. *Acinetobacter* can survive in the healthcare environment for weeks, particularly in areas of high humidity, and up to an hour on fingertips. One study recovered *Acinetobacter* from 28.6% of the hands of healthcare workers tested. The organism is found to be generally susceptible to surface and hand disinfectants.

Hand hygiene is seen as the cornerstone of infection prevention and control, and yet the frequency of positive hand cultures is directly related to surface contamination. In one study with *Clostridium difficile*, hand contamination was 0% when environmental surface contamination was between 0% and 25%. When surface contamination was between 26% and 50%, hand contamination climbed to 8%, and when surface contamination was greater than 50%, more than 36% of hands tested showed contamination.

The authors of this AJIC article point out time and again that these 3 “emerging” organisms are becoming ubiquitous in healthcare environments and conclude that enhanced environmental cleaning/disinfection is recommended as part of a bundle approach to resolve or prevent outbreaks. Complete prevention of environmental contamination is not possible, considering that hospitals and long term care are populated by buggy humans. However, the appropriate deployment of properly educated environmental services workers, equipped with the chemical and mechanical tools that they need, using checklists and validation testing has had demonstrable improvements in the battle to prevent and control hospital-associated infection.

CONTINUED FROM PAGE 1

Seventy-five outbreaks reported between 1996 and 2006 and associated with enteric illness in DCCs were examined in our review. Over 1,800 children under the age of six were affected by these outbreaks, as well as numerous staff and family members. We recognize that this is an underestimate of the number of outbreaks that occurred during this time frame, due to underreporting, unpublished outbreaks, and our English-only criterion. Predominate symptoms caused by viral agents include diarrhea, nausea, and vomiting, while bacterial agents are more likely to cause diarrhea. The age group most likely to become ill from enteric illness in DCCs is newborn to two years of age. The review identified factors peculiar to the DCC setting that promote the spread of bacterial, viral, and parasitic agents. Staff, family members, and the community may become ill from secondary spread; therefore, it is important for DCCs to have infection control procedures in place to prevent outbreaks before they happen.

Transmission of enteric pathogens in a DCC is more likely to be person-to-person due to the close contact necessary in the care of children—particularly in diapering and toileting—and their constant mouthing of fomites. Twenty-nine percent of bacterial outbreaks, however, were associated with food, highlighting the need for safe food preparation. Fewer viral foodborne outbreaks occurred; however, when they did occur the case number was usually large.

It is vital to identify an outbreak as early as possible to implement control measures and screen affected individuals - the presence (or absence) of symptoms can “suggest” etiology before laboratory confirmation. From outbreak reports and control studies it has been noted that several interventions are often implemented before the measurable outcome occurs (fewer cases of diarrhea), clouding the determination of the most effective intervention(s). Nonetheless, in this study the following practices were thought most effective:

- improved general environmental cleaning, especially the diaper changing area;
- management of symptomatic children by exclusion, medical treatment, fecal screening, and cohorting of convalescing children upon return to the center;
- increased frequency of effective hand washing among staff and children, as well as supervision of the process for children;
- safe food handling practices including staff training;
- communication of information to parents concerning enteric pathogens that commonly cause illness in early childhood using personal communication, educational flyers, or classes, including symptoms before and during an outbreak;
- a rudimentary surveillance system to identify sick children;
- a procedure for closure of DCC when an outbreak is serious or large; and
- notification of health unit if an outbreak is suspected.

The suggested practices are neither difficult nor expensive to implement but could have profound effects on families and communities.

Grading Restaurants but Not Hospitals

On August 1, 2010, New York City's 24,000+ restaurants will begin posting a grade from the Health Department (A, B or C) so that the public can learn the results of their sanitary inspections. The city is throwing huge resources into its *Clean Restaurant Campaign*.

So why aren't hospitals held to the same standard?

While it's true that 5,000 people on average die each year in the United States after picking up a food-borne illness, and that half of these deaths are linked to restaurants or prepared-food stores, approximately 10,000 people die (almost 5% of patients) each year from infections contracted in healthcare facilities. And millions more manage to survive their healthcare associated infection but suffer for weeks or months, sometimes undergoing amputations or other life-changing disabilities. Imagine the outcry if we told restaurant-goers that 5% of them would die from a foodborne infection.

Hospital infections are caused largely by unclean hands and poorly cleaned equipment. According to a 2007 study, more than half the surfaces in operating rooms that are supposed to be disinfected are often overlooked, and more than half of surfaces in patients' rooms that are supposed to be cleaned before a new patient enters aren't cleaned.

Does this represent a skewed priority in the allocation of funds to prevent infectious disease? Probably. But it is certainly a better sound bite for the politicians. New York is the nation's hospital capital, employing the most workers and treating the most patients. Perhaps it should also take the lead in hospital cleanliness by instituting a *Clean Hospital Campaign*.

EXCERPTED FROM AN ON-LINE COMMENTARY BY BETSY MCCAUGHEY, FORMER NEW YORK STATE LIEUTENANT GOVERNOR



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