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► **Infection Control**

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mosAIC's Regular Reads aims to give relevant, useful information to Community Care partners for the improvement of their operations. This section features journal articles that highlight latest research findings as well as good, evidence-based and innovative practices. While the articles aim to keep Community Care partners informed of current developments in the sector, the views and opinions expressed or implied do not necessarily reflect those of AIC, its directors or editorial staff.

» **The general status of patients and limited physical activity as risk factors of Methicillin-resistant Staphylococcus aureus occurrence in long-term care facilities residents in Krakow, Poland**

This study investigates the epidemiology and resistance of methicillin-resistant Staphylococcus aureus (MRSA) isolates from long-term care facilities residents. It analyses the potential risk factors for MRSA occurrence such as the general status of patients, limited physical activity, wound infections, ulcers, diabetes, urinary catheterisation, and stool incontinence. It suggests screening for MRSA before transfers to hospitals or rehabilitation centres, especially in a group of residents with limited physical activity. It also recommends the need for contact precautions among patients with high risk of MRSA occurrence.

Romaniszyn, D., et. al. (2014, May 18). The general status of patients and limited physical activity as risk factors of Methicillin-resistant Staphylococcus aureus occurrence in long-term care facilities residents in Krakow, Poland. BMC Infectious Diseases. Retrieved July 4, 2014.

Search for the full-text article at www.biomedcentral.com

» **Cleaning up infection control**

Healthcare associated infections (HAIs) are one of the top ten causes of death in the United States. While Clostridium difficile has got the most attention, other infections such as Methicillin-resistant Staphylococcus aureus (MRSA) and vancomycin-resistant enterococci (VRE) are also closely monitored. The most common HAIs in long-term care (LTC) settings are: urinary tract infection, respiratory tract infection, GI tract infection (norovirus, Clostridium difficile), influenza, skin and soft tissue infection, and bacteremia. The best practice protocols to curb multidrug resistant organisms in LTC's communal settings involve environmental cleaning, clinical caregiver and social aspects. There needs to be a team-based approach to infection control that includes housekeeping, dining services personnel, clinicians, social workers and others.

Tabar, P. (2014, June 5). Cleaning up infection control. Long-Term Living Magazine. Retrieved July 4, 2014.

Search for the full-text article at www.ltlmagazine.com

» **Guide to preventing catheter-associated urinary tract infections**

Urinary tract infections are one of the five most common types of healthcare-associated infections and have been associated with increased morbidity, mortality, hospital cost and length of stay. The Association for Professionals in Infection Control and Epidemiology has thus updated this guide to help healthcare organisations prevent these infections. It provides: new information on catheter-associated urinary tract infections (CAUTI) prevention in special populations, including long-term care residents; updated content on the epidemiology and causes of CAUTI; detailed information on surveillance and reporting; new



content that addresses patient/resident safety, the Comprehensive Unit-based Safety Program and other behavioural models for CAUTI prevention; best practices on CAUTI prevention; and prevention case studies.

Guide to preventing catheter-associated urinary tract infections. (2014, April). Association for Professionals in Infection Control and Epidemiology. Retrieved July 4, 2014.

Search for the full-text article at www.apic.org

» Antimicrobial stewardship in long term care facilities: What is effective?

The intense use of antimicrobial in long-term care facilities promotes the emergence and persistence of antimicrobial resistant organisms leading to adverse effects such as *C. difficile* colitis. This paper reviewed publications describing evaluation of antimicrobial stewardship interventions for long-term care facilities such as education, guidelines development, feedback to practitioners, and infectious disease consultation. It found that comprehensive programmes addressing all infections were seen to improve antimicrobial use for at least some outcomes. Targeted programmes for treatment of pneumonia were minimally effective, while those for urinary infection were effective. There is a need for further evaluation to characterise effective antimicrobial stewardship for long-term care facilities.

Nicolle, L. (2014). Antimicrobial stewardship in long term care facilities: What is effective? *Antimicrobial Resistance & Infection Control*. 3(6). Retrieved 1 April 2015.

Search for the full-text article at www.ncbi.nlm.nih.gov/pubmed

» Antimicrobial resistance in urinary pathogens among Swedish nursing home residents remains low: A cross-sectional study comparing antimicrobial resistance from 2003 to 2012

There are several risk factors for the colonisation, infection and spreading of antibiotic resistant bacteria among elderly residents of nursing homes such as catheters, decubitus ulcers and other wounds. Sweden has a favourable rate of antimicrobial resistance in urinary pathogens. This study describes antimicrobial resistance rates in uropathogens among Swedish nursing homes in 2012 and compares it with rates from 2003. It analyses whether antibiotic treatment within the previous month or hospitalisation within the previous six months predicted higher resistance rates in uropathogens among residents of nursing homes. It found that the average rate of antimicrobial resistance was low and did not increase between 2003 and 2012 in *E. coli* urinary isolates among Swedish nursing homes. A higher resistance rate was predicted for those who took antibiotic treatment during the previous month and underwent hospitalisation during the previous six months.

Sundvall, P-D., Elm, M., Gunnarsson, R., Molstad, S., Rodhe, N., Jonsson, L., & Ulleryd, P. (2014, March 13). Antimicrobial resistance in urinary pathogens among Swedish nursing home residents remains low: A cross-sectional study comparing antimicrobial resistance from 2003 to 2012. *BMC Geriatrics*. Retrieved 1 April 2015.

Search for the full-text article at www.biomedcentral.com

» Health care collaboration cuts *C. difficile* infections

Clostridium difficile is a germ that can cause diarrhoea, fever, loss of appetite, nausea and belly pain. This article shows how a dozen healthcare facilities in Clark and Cowlitz counties in the United States have formed a task force to reverse the rising trend of *C. difficile* infection. Since the task force was formed in 2012, the infection rate has trended downward. The task force



includes three hospitals, Clark County Public Health, American Medical Response, the Vancouver Fire Department and about a dozen care facilities. The team consisting of 30 to 40 administrators, nurse managers and infection prevention workers, meet monthly to collaborate and communicate on infection spread and ways to prevent it. They push for better hand-washing habits and reinforce the use of best practices for cleaning a patient's room after someone with *C. difficile* leaves and emphasise patient education on infection prevention.

Harshman, M. (2014, March 23). Health care collaboration cuts *C. difficile* infections. *The Columbian*. Retrieved 1 April 2015.

Search for the full-text article at www.columbian.com

» **The impact of inappropriate antibiotics on bacteremia patients in a community hospital in Taiwan: An emphasis on the impact of referral information for cases from a hospital affiliated nursing home**

This study investigates the impact of inappropriate antimicrobial therapy on bacteremia among patients from Taiwan's community hospital's affiliated nursing home who were referred to the hospital. Data from a total of 222 patients with blood stream infections were collected, of whom 104 patients died. It found that bacteremia patients from the hospital-affiliated nursing home had a better prognosis compared to hospital in-patients. This could be due to the adequate referral information. The results highlighted that clinicians should be aware of commonly ignored drug resistant pathogens and there should be no delay in administering appropriate antibiotic therapy.

Yang, C-J., et. al. (2013, October 24). The impact of inappropriate antibiotics on bacteremia patients in a community hospital in Taiwan: An emphasis on the impact of referral information for cases from a hospital affiliated nursing home. *BMC Infectious Diseases*. Retrieved January 2, 2014.

Search for the full-text article at: www.biomedcentral.com

» **Measures for the prevention and control of Clostridium difficile infection: Guidance to the health care sector**

Clostridium difficile infection is a growing problem in inpatient healthcare facilities that can lead to extended hospital stays as well as poor patient outcomes and even death. This document serves as a tool to help care providers to follow best practice, evidence based processes for prevention, surveillance, and diagnosis. The areas covered include: contact precautions such as patient placement and personal protective equipment; the transport of patients; environmental cleaning and disinfection; and laboratory testing.

Measures for the prevention and control of *Clostridium difficile* infection: Guidance to the health care sector. (2013, November). Ministry of Health, New Zealand. Retrieved January 2, 2014.

Search for the full-text article at: www.health.govt.nz

» **CLABSI toolkit – Preventing central-line associated bloodstream infections: Useful tools, an international perspective**

This toolkit and its accompanying monograph provides the most current information and guidance on practices and technology as well as the most appropriate tools, resources and educations, to assist healthcare organisations in reducing the current



burden associated with central line-associated bloodstream infections (CLABSIs). It details the different types of central venous catheters and risk factors for pathogenesis of CLABSIs; background information on CLABSIs; prevention strategies, techniques and technologies; patient safety initiatives; CLABSI surveillance, benchmarking and public reporting; and economic aspects of CLABSIs and their prevention.

CLABSI toolkit – Preventing central-line associated bloodstream infections: Useful tools, an international perspective. (2013, December). The Joint Commission. Retrieved January 2, 2014

Search for the full-text article at: www.jointcommission.org

» **Understanding the role of health care facility design in the acquisition and prevention of HAIs**

Healthcare associated infections (HAIs) occur in one in 20 hospital patients. HAIs are associated with increased morbidity and mortality and are responsible for US\$28 to US\$33 billion in preventable healthcare expenditures per annum. This report contains a literature review of the impact of a healthcare facility's design on infection control and prevention, as well as a summary of interviews with those who have a stake in healthcare design and infection control. Based on the literature review, the authors conclude that: outbreaks can occur if the built environment is poorly designed and maintained; despite the contemporary design and maintenance, the built environment contributes to some transmission events within hospitals; novel and best practice technologies, materials, and design strategies may directly decrease the risk of transmission of pathogens by decreasing the burden of microorganisms in the environment; and that the optimal design may indirectly decrease the development of HAIs by influencing human behaviours to decrease person-to-person transmission.

Understanding the role of health care facility design in the acquisition and prevention of HAIs. (2013, September). Agency for Healthcare Research and Quality. Retrieved October 2, 2013

Search for the full-text article at www.ahrq.gov

» **Integrating human factors with infection prevention and control**

The authors discuss the application of human factors principles within infection prevention and control activities. They argue that by embedding human factors principles and methods and tools, infection prevention and control capacity and capability can be strengthened. They suggest that a root and branch review of infection prevention measures from the human factors perspective can enable developing interventions that work safely within the complex socio-technical healthcare system. They explain what this approach entails, such as the inevitability of human errors and how the system ought to be designed to prevent errors from occurring and the mitigation of harm should any unpreventable error occur. They also show how the human factors perspective has been used to discuss in infection prevention thus far.

Storr, J., Wigglesworth, N., & Kilpatrick, C. (2013, May). Integrating human factors with infection prevention and control. The Health Foundation. Retrieved August 22, 2013.

Search for the full-text article at www.health.org.uk



» **Legionnaires' disease case-finding algorithm, attack rates, and risk factors during a residential outbreak among older adults: An environmental and cohort study**

Legionnaires' disease (LD) is a potentially-fatal pneumonia caused by inhalation of water aerosols containing Legionella bacteria. This study conducted an epidemiological and environmental investigation during a LD outbreak to identify prevention recommendations for facilities where elderly residents live independently but have a higher risk of contracting legionellosis. It recommends that managers of elderly-housing facilities and local public health officials develop a Legionella prevention plan. On the detection of Legionella colonisation of potable water, residents at higher risk should be protected. If LD occurs among residents, exposure reduction, heightened awareness and clinical surveillance activities should be coordinated among stakeholders. Clinicians should be able to recognise the increased risk and atypical presentation of LD in older adults for prompt and effective treatment.

Silk., B. J., et. al. (2013, June 27). Legionnaires' disease case-finding algorithm, attack rates, and risk factors during a residential outbreak among older adults: An environmental and cohort study. BMC Infectious Diseases. 13(291). Retrieved August 22, 2013.

Search for the full-text article at www.biomedcentral.com

» **Association between respiratory tract infections and incidence of falls in nursing home residents**

This study assesses the relationship between respiratory tract infections (RTI) and the incidence of falls. It also links the history of falls to functional status in nursing home residents. It studied 255 residents aged 65 years and above at three nursing homes in Poland. It found that residents who had a fracture resulting from a fall had lower waist-to-hip ratio, demonstrated significantly worse functional status of basic and instrumental daily activities, and suffered more infections. The risk of falling and fractures was associated with the occurrence of RTI and preventing infections may probably reduce the number of falls and fractures in older nursing home residents.

Pigłowska, M., Kostka, J., & Kostka, T. (2013, April 12). Association between respiratory tract infections and incidence of falls in nursing home residents. Polish Archives of Internal Medicine. Retrieved May 7, 2013.

Search for the full-text article at www.pamw.pl

» **Transmission of methicillin-resistant staphylococcus aureus in the long term care facilities in Hong Kong**

This study examines the transmission of methicillin-resistant Staphylococcus aureus (MRSA) in long-term care facilities (LTCFs) and hospitals in Hong Kong. It conducted a concurrent MRSA screening and spa type analysis in LTCFs and hospitals to estimate the rate of MRSA acquisition among residents during their stay. It used colonisation pressure and MRSA transmission calculations. The study found that MRSA transmission was more serious in LTCFs than in hospitals. To reduce the burden of MRSA carriers in healthcare settings, infection control should be focused on LTCFs.

Cheng, V., et. al. (2013, May 6). Transmission of methicillin-resistant staphylococcus aureus in the long term care facilities in Hong Kong. BMC Infectious Diseases. 13(205). Retrieved May 7, 2013.

Search for the full-text article at www.biomedcentral.com



» Prevalence of urinary colonization by extended spectrum-beta-lactamase Enterobacteriaceae among catheterised inpatients in Italian long term care facilities

Moving between long-term care facilities (LTCF), hospitals and outpatient settings brings new challenges regarding infection control, especially healthcare associated infections. This study examines 23 Italian LTCFs to identify colonisation in patients with urinary catheter. It found the presence of high percentages of ESBL-positive Enterobacteria in the LTCFs and predominance of CTX-M type ESBL in *E. coli*, which can compromise the effectiveness of antibiotic therapy.

Luca, A., et. al. (2013, March 6). Prevalence of urinary colonization by extended spectrum-beta-lactamase Enterobacteriaceae among catheterised inpatients in Italian long term care facilities. *BMC Infectious Diseases*. 13(124). Retrieved March 11, 2013.

Search for the full-text article at www.biomedcentral.com

» Prevention strategies for seasonal influenza in healthcare settings

This report is a guide that emphasises the importance of a comprehensive influenza prevention strategy that can be applied across the entire spectrum of healthcare settings that include long-term care facilities such as nursing homes and skilled nursing facilities. It introduces influenza; details its modes of transmission; lists the fundamental elements to prevent influenza transmission; and provides recommendations such as promoting and administering seasonal influenza vaccine, taking steps to minimise potential exposures, and monitoring and managing ill healthcare personnel, among others.

Prevention strategies for seasonal influenza in healthcare settings. (2013, January 9). Centers for Disease Control and Prevention. Retrieved March 11, 2013.

Search for the full-text article at www.cdc.gov

» Asymptomatic bacteriuria, antibiotic use, and suspected urinary tract infections in four nursing homes

This research investigates factors associated with the use of antibiotics to treat asymptomatic bacteriuria (ASB) among nursing home residents. It involved a cross-sectional study involving a multi-level multivariate analyses of antibiotic prescription data for residents in four nursing homes in central Texas. The most powerful predictor of antibiotic treatment for ASB was the presence of an indwelling urinary catheter. The study concludes that there is frequent use of antibiotics for ASB in nursing homes, especially for residents with urinary catheters. It recommends that efforts to improve antibiotic stewardship in nursing homes must address clinical decision-making solely on the basis of diagnostic testing in the absence of signs or symptoms of a urinary tract infection.

Phillips, C. D. (2012, November 23). Asymptomatic bacteriuria, antibiotic use, and suspected urinary tract infections in four nursing homes. *BMC Geriatrics*. Retrieved January 2, 2013.

Search for the full-text article at www.biomedcentral.com

» Nursing home characteristics associated with methicillin-resistant *Staphylococcus aureus* (MRSA) burden and transmission

This study sought to measure methicillin-resistant *Staphylococcus aureus* (MRSA) burden in a large number of nursing homes and identify facility characteristics associated with high MRSA burden. It performed nasal swabs of residents from 26 nursing



homes to measure MRSA importation and point prevalence, and estimate transmission. Results revealed that MRSA importation was a strong predictor of MRSA prevalence, but MRSA burden and transmission were also associated with nursing homes caring for more residents with chronic illnesses or indwelling devices. Frequent social interaction among residents appeared to be protective of MRSA transmission, suggesting that residents healthy enough to engage in group activities do not incur substantial risks of MRSA from social contact.

Murphy, C. R., et. al. (2012, October 24). Nursing home characteristics associated with methicillin-resistant *Staphylococcus aureus* (MRSA) burden and transmission. *BMC Infectious Diseases*. Retrieved January 2, 2013.

Search for the full text article at www.biomedcentral.com

Read a complete summary of this article in **mosAIC**. (<http://www.aic.sg/mosaic/jun2013/#14>)

» Screening, isolation and decolonisation strategies for Vancomycin-Resistant Enterococci or extended spectrum Beta-Lactamase producing organisms: A systematic review of the clinical evidence and health services impact

This study finds that bacterial resistance to antibiotics is an increasing problem in Canada and worldwide. Vancomycin-resistant enterococci (VRE) and extended spectrum beta-lactamases (ESBL) have the ability to inactivate beta lactam antibiotics such as penicillin, ampicillin and the cephalosporins. The study evaluates the clinical evidence for the effectiveness of screening, isolation and decolonisation strategies for persons colonised or infected with VRE and ESBL producing organisms in acute and long-term care facilities. The health services impact of these strategies are also discussed.

Ho, C., et. al. (2012, September). Screening, isolation and decolonisation strategies for Vancomycin-Resistant Enterococci or extended spectrum Beta-Lactamase producing organisms: A systematic review of the clinical evidence and health services impact. Canadian Agency for Drugs and Technologies in Health. Retrieved November 6, 2012.

Search for the full-text article at www.cadth.ca

» Impact of implementation of evidence-based best practices on nursing home infections

The focus of this study is to identify barriers to implementing infection control best practices in nursing homes. The Pennsylvania Patient Safety Authority used their long-term care best-practice assessment tool to study 10 nursing homes with high healthcare associated infection (HAI) rates and 10 with low HAI rates, to understand barriers at various levels of implementation and patterns of care that could be improved. The nursing homes with high HAI were found to face multidisciplinary implementation barriers at the leadership, physician, clinical and support staff levels.

Bradley, S., Segal, P., & Finley, E. (2012, September). Impact of implementation of evidence-based best practices on nursing home infections. Pennsylvania Patient Safety Authority. Retrieved September 7, 2012.

Search for the full-text article at www.patientsafetyauthority.org

» Sapovirus outbreaks in long-term care facilities, Oregon and Minnesota, USA, 2002–2009

Viral gastroenteritis outbreaks are associated with illness and death when they occur in institutional settings, notably in long-term care facilities (LTCFs) for the elderly. The Oregon and Minnesota state public health departments investigated 2,161



gastroenteritis outbreaks reported during 2002–2009. In this study, the high (66 per cent) proportion of sapovirus outbreaks in LTCFs among 21 outbreaks of previously unknown etiologies is likely to be an artifact of legally mandated outbreak reporting by healthcare facilities rather than the true distribution of sapovirus outbreaks in Oregon and Minnesota. Still, elderly residents of LTCFs are especially vulnerable to the rapid transmission of viral enteric pathogens and serious complications from infection with these agents, and therefore merit the attention of public health authorities.

Lee L. E., et. al. (2012, May). Sapovirus outbreaks in long-term care facilities, Oregon and Minnesota, USA, 2002–2009. *Emerging Infectious Diseases*. 18(5). Retrieved June 25, 2012.

Search for the full-text article at www.cdc.gov

» The audit process: Part II setting the audit criteria

This feature article is about setting up an audit for infection prevention. Successful audits conducted in partnership with infection control professionals and other departments and services have led to an improvement in patient and staff health. This article lists the criteria for conducting an audit – structure criteria, process criteria and outcome criteria. It lists the types of audits and provides insights on designing data collection forms and guidelines to translate the audit process into audit tool elements. It also provides ways by which to validate the audit tool.

Bialachowski, A., Clinker, K., LeBlanc, M., & McDonald, S. (2010). The audit process: Part II setting the audit criteria. *The Canadian Journal of Infection Control*. 25(2): 109-111. Retrieved April 7, 2011.

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