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CHICA-Canada is a national, multidisciplinary association committed to the wellness and safety of Canadians by promoting best practice in infection prevention and control through education, standards, advocacy and consumer awareness.

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FEATURES

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RETURN to Index

Infection prevention and control (IPAC) training for the 'troops' is a daily battle… How CHICA-Canada can help!

Pat Piaskowski, RN, HBScN, CIC
Clinical Editor, *Canadian Journal of Infection Control*

With breaking news of a new coronavirus in Saudi Arabia, which is being described as SARS-like and other news of emerging flu variants, there is a continuing spotlight and emphasis on IPAC. The understanding of how organisms spread and basic infection prevention and control (IPAC) practices is key to preventing transmission. All healthcare workers in Canada need this knowledge to continue to prevent the spread of infections, regardless of the source or type of infection or route of transmission of the organism. Infection control professionals (ICPs) in all healthcare sectors continue to strive to provide this information to workers in their facility or agency. With some provinces increasing ICP staffing, primarily in acute care, there is also a need for more trained ICPs in all healthcare sectors. The rise in the number of CHICA-sector and speciality-based interest groups is an indicator of the scope and breadth of IPAC practice in Canada which requires trained ICPs or access to them.

ICPs need to find new and innovative ways to translate and present IPAC knowledge to workers in their healthcare settings. This is in addition to dealing with outbreaks and clusters, collecting, analyzing and reporting surveillance data, developing policies and procedures and working with others to ensure IPAC processes are audited on a regular basis. Meeting the need for IPAC education can be challenging. In addition, as current ICPs retire or leave the field, new trained ICPs are needed to fill their shoes. This presents a challenge not only for CHICA, but for each province, health region, healthcare facility, or agency.

CHICA Canada has recognized these needs and has made some tremendous strides toward meeting this need in addition to the annual conference and other educational offerings. Our website (*www.chica.org*) lists many ICP and IPAC training opportunities.

> "ICPs need to find new and innovative ways to translate and present IPAC knowledge to workers in their healthcare settings. "

One is the listing of CHICA endorsed ICP training courses. These courses include the Regional Infection Control Networks of Ontario Non-acute Care ICP Training Program (Ontario ICPs only),Centennial College Basic Infection Prevention and Control Program, Queen's University Basic Infection Prevention and Control Program, and the University of British Columbia, Vancouver Basic Infection Control Course.

CHICA has developed criteria for endorsed courses including course content, length, instructors, evaluation and delivery. Each course undergoes a rigorous review before it is endorsed. Following the initial approval the course administrators must present annual course review information and then, after three years, they must reapply. This ensures all endorsed courses are consistent with established criteria and that they present current, accurate and quality IPAC information.

CHICA also sponsors the CHICA-Canada's Online Novice Infection Prevention and Control Course. This popular course runs from September to June each year. Preference is given to novice infection prevention and control practitioners (less than two years' experience) currently working in IPAC or exploring IPAC opportunities.

The CHICA sponsored course along with the endorsed courses are available to new and aspiring ICPs to provide them with a sound knowledge base in IPAC which they can translate into action in their work setting. As ICPs retire or leave the field, recruitment of new trained ICPs relies on these courses. The demand for these types of courses far exceeds the availability of course placements leaving many new ICPs with limited options for training.

Lastly, CHICA in conjunction with Georgian College, has developed an on line course titled Infection Prevention and Control: The Team Approach. This online course is designed to review the key elements of routine practices and the Canadian system of infection prevention and control strategies that are applied by all healthcare workers in all healthcare settings.

Kudos and job well done to the CHICA leaders and volunteer committee members, educational visionaries across the country, and other partners and corporate sponsors who envisioned, created and continue to make these offerings available to Canadian ICPs. The names of those responsible are too numerous to mention but they have collectively left a tremendous legacy in achieving a main element of CHICA Canada's mission by promoting best practice in infection prevention and control through education.

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Acinetobacter meningitis in post neurosurgical patients: epidemiology, antimicrobial resistance, treatment options and risk factors that predict the outcome

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ABSTRACT

Introduction:
Post-operative meningitis caused by *Acinetobacter sp*. though a rare occurrence is a serious complication in neurosurgical ICUs. These are opportunistic organisms implicated in hospital-acquired infections.

Aim:
The aim was to study the epidemiology, the resistance pattern and the risk factors associated with the mortality in patients of post-operative *Acinetobacter* meningitis.

Setting and design:
Tertiary-care hospital and an observational study.

Materials and methods:
All patients with nosocomial post surgical meningitis due to *Acinetobacter sp*. between January 2008 and February 2010 were reviewed.

Statistical analysis:
It was performed by using Statistical Package for Social Sciences for Windows 12.0 Programme.

Results:
During the study period, 286 (8.71%) cases of post-operative meningitis were identified. (Total no. operated cases were 3283). Out of these 31 (10.84%) developed *Acinetobacter baumannii* meningitis. The mortality rates were 51.61% (16 patients). The risk factors which predict fatal outcome were underlying serious neurosurgical condition, presence of EVD and CVC, type and number of neurosurgical procedures, inappropriate antibiotic therapy, resistance to carbapenems, low Glasgow Coma score and inability to achieve sterilization of CSF. Most of the *Acinetobacter* strains were multi-drug resistant.

KEY WORDS:
Acinetobacter meningitis, post-operative, neurosurgery, risk factors.

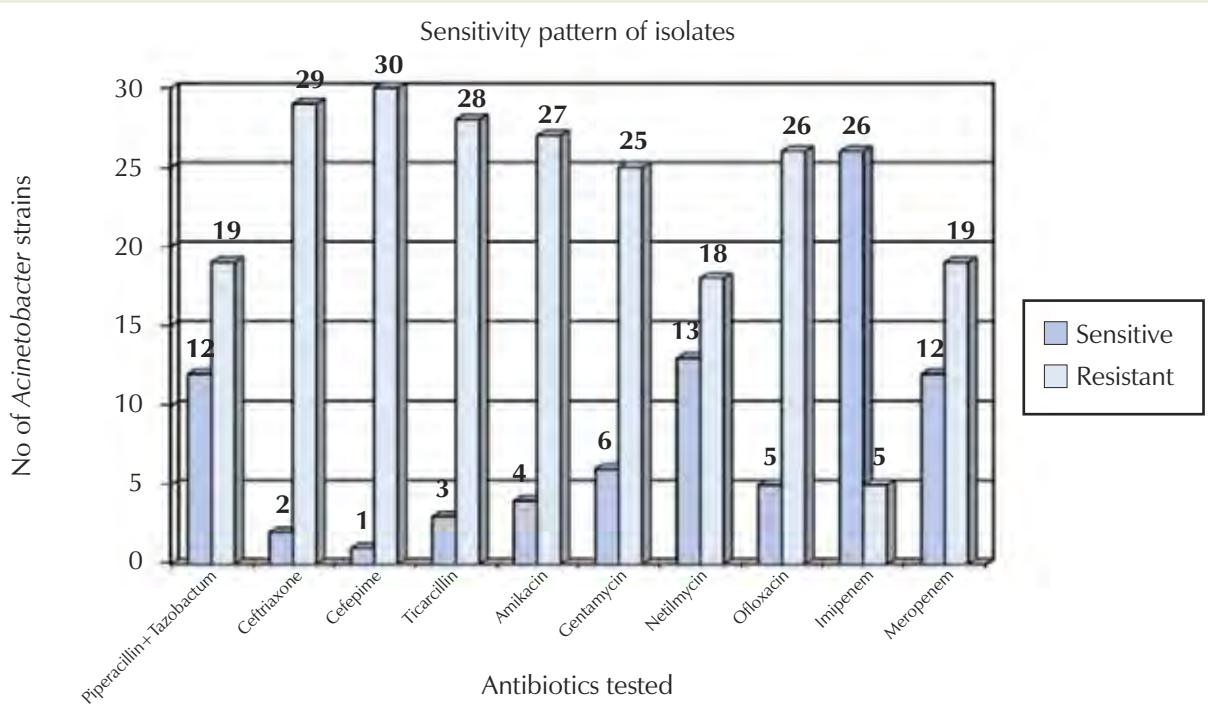
INTRODUCTION

Hospital-acquired infection is more frequently seen in surgical departments than in other departments (1). Post-operative *Acinetobacter* meningitis though rare complication of neurosurgical procedures; is associated with serious outcomes. The ability of *Acinetobacter* to tolerate desiccation coupled with multi drug antibiotic resistance favours their long-term persistence on skin, indwelling devices of hospitalized ICU patients and the hospital environment (2,3,4). Hence, *Acinetobacter* has become a significant pathogen in intensive care units (5,6). Multidrug resistance of *Acinetobacter* isolates especially to majority of commercially available newer antibiotics raises an important therapeutic problem (7,8). The treatment in cases of meningitis is decided not just by the susceptibility profile of the isolate but also by the pharmacokinetics of the antibiotic. The antibiotic should be able to cross the blood brain barrier and achieve adequate bactericidal concentrations in CSF. Therefore, the aim of this study is to describe epidemiological parameters, the laboratory data, the resistance pattern, the treatment options and the risk factors and also to discuss their effects on the outcome in patients who had post-operative meningitis due to *Acinetobacter sp*. in our neurosurgery ICUs.

MATERIALS AND METHODS

The study was performed at G B Pant Hospital, New Delhi, a 600-bed tertiary care centre in North India. All patients who underwent neurosurgical procedures during the period from January 2008

FIGURE 1: Antibiotic sensitivity pattern of *Acinetobacter baumannii.*



to February 2010 and later developed nosocomial *Acinetobacter* meningitis were reviewed.

Inclusion criteria: The patients who developed meningitis within two months after the surgery and during their hospital stay were included in the study if they fulfilled any one of the following criteria: a) Patient has organisms cultured from cerebrospinal fluid with increase in white cells, elevated protein and decreased glucose in CSF; OR b) Patient has at least one of the following signs of symptoms with no other recognized cause: fever (>38°C) (<37°C/apnoea/bradycardia in case of patients <1 year) headache, neck stiffness, meningeal signs, cranial nerve signs or irritability and if diagnosis is made ante mortem physician institutes appropriate antimicrobial therapy and the patient has increases white cells, elevated protein and decreased glucose in CSFand at least one of the following i) organisms seen on gram stain of CSF ii) organisms cultured from blood (CDC Criteria).

Exclusion criteria: A positive CSF culture or gram stain with absence of clinical symptoms or with normal levels of glucose, proteins or cells in the CSF was considered as being contaminated and hence excluded from the study.

Appropriate therapy: Patients who received antibiotics as per the antibiotic sensitivity report were considered as patients who received appropriate treatment for their infection (irrespective of the empirical therapy).

Patients were considered to have a mixed infection if two or more isolates were recovered from the CSF of symptomatic patients with deranged CSF biochemical and cytological parameters.

Cure was defined as no clinical deterioration with disappearance of all signs and symptoms and sterilization of CSF after the patient is put on antibiotics. Failure of treatment is defined as either isolation of the same organism from CSF following completion of treatment or relapse of the infection or treatment termination due to death related to meningitis.

Laboratory parameters

Samples of CSF were obtained either using an intraventricular catheter if present, from the extraventricular drain or by lumbar puncture after obtaining consent. Blood cultures and cultures from other sites were also taken as when needed to rule out other infections. The CSF specimen was subjected to routine Microscopy and India Ink Preparation. Culture was done on Sheep Blood Agar, MacConkey's Agar, Chocolate Agar and Glucose Broth was also inoculated. Microbiological analysis of the growth was done by Gram staining, oxidase and catalase, motility, growth at 37°C, 41°C and 44°C, other biochemicals and also on automated VITEK 2 Compact system using ID and AST- GN25 cards. Antimicrobial susceptibility was also done on a commercial system which gave the MIC values of each strain. Interpretive criteria for tigecycline MICs were defined based on the United States Food and Drug Administration breakpoint criteria for tigecycline when testing Enterobacteriaceae (susceptibility at ≤2 mg/L, intermediate at 4 mg/L and resistance at 8 mg/L). Any strain of *Acinetobacter* was considered as multiresistant if it showed resistance to at least four different families of antibiotics. Biochemical and cytological parameters of the CSF samples were also evaluated as per standard protocol.

Epidemiological parameters

Data was also collected regarding the demographic profile of the patient, Glasgow Coma Scale scores, underlying disease, type and number of various

TABLE 1: *Acinetobacter baumannii* isolates from CSF

Sr. No.	Isolate	Frequency of isolation
1	*Acinetobacter baumannii*	36*

*This includes one sample with mixed infection.

TABLE 2: Distribution of demographic and disease related parameters of patients with *Acinetobacter* meningitis with reference to its outcome

Patient Characteristics		Cure (n=15)	Failure (n=16)	Total (n=31)	*P* value
Age (yrs)	Mean (SD) Median (range)	26.3 (22.5) 13 (9m-66y)	26.96 (23.9) 29 (2m-66y)	26.6 (22.8) 20 (2m-66y)	0.941
Sex	Male Female	10 5	11 5	21 10	0.602
Length of hospitalization (Days) Mean (SD) Median (Range)		28.53 (12.2) 30 (11-52)	32.4 (27.5) 24 (6-83)	30.47 (21.0) 27 (6-83)	0.623
Duration of treatment Mean (SD) Median (Range)		16.6 (9.5) 15 (6-39)	15.07 (11.8) 12 (4-44)	15.83 (10.6) 14 (4-44)	0.699
Underlying neurosurgical condition Head trauma/spinal injury Neoplasm Intracranial bleed Aneurysm Congenital defects Post-meningitic hydrocephalus		 4 7 2 0 1 1	 0 11 1 1 2 1	 4 18 3 1 3 2	 0.043 0.189 0.475 0.516 0.525 0.724
Mechanical ventilation		7	13	20	0.050
Presence of EVD		7	13	20	0.050
Presence of shunt		6	6	12	0.589
Presence of CVC		7	14	21	0.019
No. of neurosurgical procedure One Two Three		 11 4 0	 7 5 4	 18 9 4	 0.422 0.546 0.058
Type of first surgical procedure Insertion/revision of EVD/shunt Excision/debulking of tumour Spinal cord surgery Ventriculostomy/burr hole, etc.		 9 2 3 1	 8 8 0 0	 17 10 3 1	 0.422 0.035 0.101 0.484
Inappropriate therapy		2	11	13	0.003
Susceptibility to Imipenem		16	10	26	0.018
CSF Sterile on culture		16	2	18	0.000
< 10 Glasgow coma scores		2	10	12	0.006
Patients from which *Acinetobacter sp.* was isolated from additional sites		1	1	2	

surgeries, length of hospital stay, duration of surgery, antibiotic treatment prior to isolation of *Acinetobacter sp.*, presence of and external ventricular drain (EVD), presence of mechanical ventilation and central veinous catheter (CVC).

Statistical analysis

Statistical analysis of data was performed using the Statistical Package for Social Sciences (SPSS) for Windows 12.0 program. Results were analyzed using the chi square test. *P* value was calculated. A *P* value of less than 0.05 was considered as statistically significant. The risk factors that affected mortality, which were found significant according to univariate analysis, were evaluated by multivariate analysis model.

RESULTS

Microbiological data

During the study period, 3283 patients were operated in the Neurosurgical OT.

As seen in Table 1, *Acinetobacter baumannii* was isolated in 36 (18.18%) CSF samples. Five patients were excluded from the study according to the exclusion criteria as these patients did not have clinical features of meningitis and the biochemical parameters of their CSF samples did not match with the inclusion criteria. Hence only 31 patients were included in our study of post-operative meningitis due to *Acinetobacter baumannii*.

In one patient *Acinetobacter baumannii* was isolated along with *Pseudomonas aeruginosa*. This patient had a CNS malignancy and both the bacterial strains were sensitive to only Imipenem and Tigecycline. The patient was on ventilator, with an EVD placed in situ. In spite of appropriate treatment with Imipenem, CSF sterilization could not be achieved and the patient succumbed to her primary illness.

Epidemiological data and risk factors

Of these 31 cases of meningitis, 21 (67.74%) occurred in males as observed in Table 2. Average age of the patients was 26.6 years Standard Deviation 22.8 years (range two months to 66 years). The mean period of hospitalization was 30.47 days. The indications for neurosurgery were head or spinal trauma (12.9%), neoplasm of CNS (58.06%), intracranial bleed or sub arachnoid bleed (9.67%), aneurysm or arterioveinous malformations (3.22%), congenital defects (9.67%), and post-meningitic hydrocephalus (6.45%). All the operations were performed as an elective procedure.

The overall mortality rate was 51.61%. 13 out of the 20 patients who had an external ventricular drain (EVD) did not survive (*p* value 0.050) Also 13 patients of the 20 patients having central venous catheter inserted died (*p* value 0.050). These two patient parameters predicted mortality. Mortality also increased as the number of neurosurgical procedures the patient underwent increased. All of the four patients who had three neurosurgical procedures died (*p* value 0.058). Mortality was also dependent upon the type of neurosurgical procedure the patient underwent. Eight of the 10 patients having a surgery for excision or debulking of tumour couldn't survive. This is indirectly related to the disease of the patient. Neoplasms predicted a poor outcome. Presence of mechanical ventilation and insertion of shunt did not alter the outcome of the therapy. No growth was achieved in CSF in 18 patients out of whom 16 patients survived and only two patients died. 83.33% of the patients with Glasgow coma score <10 could not survive (*p value* 0.006). *Acinetobacter baumannii* was also isolated from the pus and wound swab samples of two patients.

Most of the strains are multi-drug resistant (resistant to more than four antibiotics belonging to different groups). Most of the strains were sensitive to Imipenem (83.87%). None of the patients with Imipenem-resistant strains survived. Tigecycline, Netilmycin, Meropenem and Piperacillin- Tazobactum had higher sensitivity rate as compared to other antibiotics.

TABLE 3: Results of antibiotic susceptibility of the *Acinetobacter strains*

Antibiotics	Sensitive		Resistant	
	Cure	Failure	Cure	Failure
Piperacillin + Tazobactum	6	6	9	10
Ceftriaxone	2	0	13	16
Cefepime	1	0	14	16
Ticarcillin	1	2	14	14
Amikacin	1	3	14	13
Gentamycin	3	3	12	13
Netilmycin	7	6	8	10
Ofloxacin	1	4	14	12
Imipenem	15	11	0	5
Meropenem	8	4	7	12
Tigecycline*	12	5	0	2

*Twelve strains of *Acinetobacter baumannii* were intermediate sensitive as per the definitions of United States Food and Drug Administration breakpoint criteria for tigecycline when testing Enterobacteriaceae. Out of these, eight patients could not survive.

Treatment data

Most of the patients were started empirically on a combination therapy of Cephalosporin and Aminoglycoside group of antibiotic. None of the patients were given oral antibiotics considering the seriousness of illness. Carbapenems and Fluoroquinolones were introduced depending upon the sensitivity pattern of the isolate. There was less mortality when the carbapenems were given either empirically or after receiving the antibiotic sensitivity report. Duration of treatment varied depending upon the clinical status of the patient.

DISCUSSION

Most of the nosocomial meningitis cases are neurosurgical post-operative meningitis; as seen in neurosurgical wards and ICUs (9, 10, 11, 12). The infection occurs via direct spread of the organisms during surgery, from post-operative wounds, from colonized prosthetic devices, from shunts or during iatrogenic procedures rather than as a result of bacteraemia (13, 14). These need to be differentiated from post neurosurgical chemical meningitis and also from the underlying disease which also has similar presenting signs and symptoms (15). Hence routine CSF gram staining and culture is imperative in all patients who undergo neurosurgical procedures with low degree fever of unknown origin (16). Inability to pick up these meningitis cases would be associated with bad prognosis.

Post-operative A.*baumannii* meningitis is an infection mostly associated with intraventricular devices, shunts, CSF fistulas and head trauma (16). In the present study 31 (0.94%) patients of postoperative *Acinetobacter* meningitis were diagnosed among the 3283 patients operated in Neurosurgical ICU as per the inclusion criteria. Out of these 31 patients, 20 patients (64.51%) had an EVD and 12 patients (38.70%) had a shunt in situ. EVD provide a potential portal of entry of micro-organisms and have been associated with 4-11% of risk of infection with ventriculostomies and 4.2% risk with lumbar drains (17). In another study 75% of patients had at least one prosthetic device *in situ* or a contaminated post-operative wound before the episode (13). This suggests an initially colonized EVD and subsequent meningitis. Hence removal of all components of such infected devices along with appropriate antibiotics forms the main stay of treatment of such cases.

> "Routine CSF gram staining and culture is imperative in all patients who undergo neurosurgical procedures with low degree fever of unknown origin."

Since the early 1980s, third-generation cephalosporins formed the mainstay of treatment of *Acinetobacter* meningitis (13). But gradually β lactamase producing strains started posing treatment difficulties, especially in inherently multi-drug resistant organisms such as *Acinetobacter sp.* (18). Sulbactum was later introduced as a β lactamase inhibitor in combination with β lactam antibiotics with in vitro activity against *Acinetobacter sp.*, enhanced by its affinity for penicillin binding proteins (19). Even though the penetration of blood brain barrier of intra-venous sulbactum is only 1% it proved to be good alternative treatment as its penetration increased with meningeal inflammation up to 32% (19, 20). Aminoglycosides have variable blood brain barrier penetration and are less effective in the acidic purulent CSF (21). Hence aminoglycosides are used in combination with cephalosporins. Due to poor penetration of most antibiotics into the CSF, intra thecal route of administration has been studied with aminoglycosides and colistin. The results are promising (16, 22, 23, 24, 25). Carbapenems are the drug of choice for MDR strains as they have good CSF penetration, are unaffected by most of the resistance mechanisms, are easily available and are lesser toxic (13). Though rare, Metallo β lactamase producing strains do pose resistance even to carbapenems. In such cases intrathecal polymyxins should be tried.

TABLE 4: Characteristics of main antibiotics used

Antibiotic therapy	No. of Patients	Appropriate Treatment	Duration of T/t (Range in Days)	Mortality
Monotherapy	3	1	(6-10)	2
Combined parenteral therapy				
Ampi/Sulbactum+Aminoglycoside	3	1	(4-20)	2
Cephalosporins+Aminoglycoside	19	11	(4-39)	11
Cephalosporin+Fluoroquinolone	4	4	(8-44)	0
Carbapenems				
As emperical therapy	2	0	15	1
After antibiotic sensitivity report	9	9	(10-39)	2

"Nosocomial meningitis must be suspected in post-operative neurosurgery patients presenting with new onset pyrexia."

The development of a newer class of antimicrobial agents, glycylcyclines, represented by tigecycline, is a significant advancement. There are very few case studies documenting the effectiveness of Tigecycline in cases of *Acinetobacter baumannii* (26).

Most of the strains in our study are multidrug resistant. Greater sensitivity is seen for Carbapenems, Netilmycin and Piperacillin Tazobactum combination. This is in agreement with other studies (13, 16).

As seen in other study, even in our study monotherapy was used only in three patients with less success rates of 33% (16). Mostly combined parenteral therapy was used in combination with aminoglycoside. Least mortality was reported when the patients were treated with carbapenems. All the patients who survived had strains susceptible to imipenem (*p value* 0.018). Hence resistance to Imipenem is a very significant predictor of mortality. This finding is in agreement with other studies (16, 25). Mostly carbapenems were used only after the sensitivity reports were available as these form the second line drugs in our institution. This reluctance is a part of our conservative approach in order to prevent the excessive use of these important agents in absence of any other equally or more effective agent. Colistin, which may be an effective option (16), is rarely used in out set up, though its use both parenterally and intrathecally may be a good treatment option. Use of intra thecal drugs is also very rarely done in our set up. A new glycylcycline introduced in a country, which has been claimed to give very good results against both Gram negative and gram positive MDR strains (except Pseudomonas) does not show very promising results in in vitro studies against our *Acinetobacter* strains. Two resistant strains and 12 intermediate sensitivity strains have been detected. This needs further research. These findings are in agreement with that of other study (27). However, *in vivo* blood brain barrier penetration results and effectiveness in meningitis needs further research.

In our study the duration of treatment varied from four to 44 days. Continuous positive CSF cultures have longer treatment durations. A few authors recommend two to four weeks of treatment duration (28) or 14 days after cultures become negative (29). In our study the duration of treatment varied from four to 44 days. Continuous positive CSF cultures have longer treatment durations. A few authors recommend two to four weeks of treatment duration (28) or 14 days after cultures become negative (29).

The overall mortality rate was 51.61% in this study. Mortality rate ranged from 12-72% in gram negative bacillary meningitis (13, 14, 16, 30, 31, 32, 33, 34, 35). The higher mortality rates in case of *Acinetobacter* meningitis may be due to its inherently multi-drug resistant nature. In our study underlying neurosurgical condition, presence of EVD, presence of CVC, more number of neurosurgical procedures, type of surgical procedure, inappropriate antibiotic therapy, resistance to carbapenems, inability to achieve sterilization of CSF and lower Glasgow Coma scores were proved to be predictors of mortality. In other studies lack of removal of intraventricular catheters, delay in starting therapy (16), type of microorganism causing meningitis, primary brain disease, initial consciousness level, very low CSF glucose levels, presence of bacteremia, inappropriate antibiotic use (4, 30, 36, 37) and presence of concurrent nosocomial infection were reported as important risk factors of mortality.

In conclusion, nosocomial meningitis must be suspected in post-operative neurosurgery patients presenting with new onset pyrexia. Early diagnosis and appropriate treatment forms the main stay of treatment of *Acinetobacter* meningitis. Infection control measures must be strictly enforced to prevent spread of infections in Neurosurgical OTs and ICUs. NSICU staff should use careful aseptic technique in collecting CSF samples from EVDs and all infected drains and their components should be changed as and when needed.

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The hand hygiene knowledge, beliefs, practices and education of healthcare students

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ABSTRACT

Background
Adherence to hand hygiene (HH) guidelines reduces the incidence of hospital-acquired infection, however, little research has been conducted on factors that influence healthcare students' HH practices.

Methods
A questionnaire was administered to 1721 nursing and medical students from 20 universities in Australia, Sweden, Greece and Italy to determine their HH knowledge, beliefs, practices, education and assessment.

Results
The mean score on the HH quiz was 66%. Self-reported HH compliance was 86%. Knowledge scores were significantly influenced by the frequency of HH assessment and the number of methods used to teach HH ($p = .04$). HH practices were significantly influenced by HH beliefs, knowledge, the frequency of assessment, number of teaching methods used, perceptions of the importance of HH as an infection control measure and the importance given to HH in the curriculum ($p < .01$). Hand hygiene beliefs were significantly influenced by HH knowledge, and by students' perceptions of the importance given to HH in the curriculum, by supervisors and facilities, and the importance of HH as an infection control measure ($p < .01$).

Conclusions
There was room for improvement in healthcare students' HH knowledge, particularly in relation to the use of alcohol-based hand rubs.

INTRODUCTION

Healthcare-associated infections (HAIs) cause increased morbidity, mortality and healthcare costs (1). Up to 15% of hospital patients can be affected by HAI (1), the incidence of HAI in intensive care in developed countries is ~20-30% (2-4), and the average cost per HAI is ~US$14,000-15,000 (5,6). Adherence to hand hygiene (HH) guidelines can reduce infection rates and healthcare costs (1). The CDC (7) and WHO (1) HH guidelines encourage healthcare workers (HCWs) to cleanse their hands with alcohol-based hand rubs. As well as greater efficacy in reducing microbial counts, alcohol-based hand rubs do not require sinks, less time is required to perform HH (8), and hand rubs cause less skin irritation than handwashing (9,10).

The HH guidelines recommend that:

- Visibly dirty hands should be washed because hand rubs do not remove soil from the hands.
- HCWs should use hand creams to reduce skin damage, and avoid hot water as it dries the skin.
- Hands should be rubbed together until dry after applying hand rub.
- Hands should be dried with paper towel or single use cloth towel following handwashing.
- If hands are not visibly soiled or contaminated with proteinaceous material, alcohol-based hand rubs should be used before and after direct patient contact and donning and doffing gloves, prior to non-surgical insertion of invasive devices, following contact with bodily excretions and wound dressings, and after contact with inanimate objects in the immediate vicinity of the patient.

TABLE 1: Percentage correct answers on the hand hygiene knowledge questions

Question	Percentage correct
1. Alcohol-based hand rubs should not be used when hands are visibly soiled	69%
2. Alcohol-based hand rubs will still be effective if applied for less than 60 seconds	56%
3. Hand hygiene is required following the removal of gloves after patient contact	87%
4. Single-use cloth towels and paper towels are acceptable for drying hands in patient care areas	75%
5. Hand hygiene must be performed before patient contact, following emptying of a drainage reservoir, and prior to and following venipuncture	92%
6. When using an alcohol-based hand rub to decontaminate hands they should be rubbed together until dry	61%
7. Handling of paperwork is not one of the recommended situations for performing hand hygiene	77%
8. Hand hygiene is required following contact with the bed linen of a patient with MRSA	68%
9. Hand creams and lotions are recommended for health care workers' hands	38%
10. Gloves should not be reused when caring for different patients	92%
11. The average cost of a hospital-acquired infection in developed countries is approximately $10,000*	36%
12. Approximately 20% of intensive care patients develop hospital-acquired infections in developed countries	36%

*Costs were indicated in Euro for Greek students and in Swedish Kroner for Swedish students.

Much research has been done on factors that influence HCW's HH compliance, however, comparatively little attention has been paid to healthcare students' HH knowledge, beliefs and practices, and how they are educated and assessed on HH during their training (11). The knowledge acquired during undergraduate education, and students' perceptions of the importance placed on HH in their discipline practice culture through repeated episodes of education and assessment, and through the behaviour of role models, may influence their practices. For example, mentors' HH practices were the strongest predictors of student nursing assistants' HH compliance (12), 25% of first year medical students felt the lack of good role models was a barrier to HH compliance (13), and nursing students reported that they copied the HH behaviour of senior staff in order to "fit in," and would not challenge non-compliant staff as they feared lack of acceptance (14).

Several studies have examined students' HH compliance. The HH compliance of first (13) and final year (15) British medical students during a clinical examination was 9% and 8.5% without a reminder, and 27% and 18.3% respectively with a reminder, and both medical students' and student nursing assistants' observed HH compliance was substantially lower than their self-reported compliance (12,13). Cole also suggested that nursing students over-estimated their HH compliance, concluding that flawed self-assessment prevented students from seeing the need for improvement, and that an increased emphasis was needed on reflective practice and self-assessment in nursing education (16).

A small sample (n=10) of student nurses reported that heavy workloads, the type of clinical procedure, skin damage, time constraints and use of gloves were barriers to HH adherence (14), however, the study did not examine students' HH knowledge or compliance or the influence of HH education. Van de Mortel et al. (17) surveyed the HH knowledge, beliefs, and practices of 99 Greek healthcare students. Hand hygiene assessment, the methods used to teach HH and their perceived effectiveness were also examined. Nursing students had higher scores on all variables than medical students, however, no details were provided on students' knowledge gaps. The study was also restricted to students from one university in one country.

This study examined the HH knowledge, beliefs, practices and education of healthcare students across four countries, in order to inform HH education in undergraduate curricula. The research questions were:

1. What knowledge do healthcare students have of the HH guidelines and what are their self-reported HH practices and beliefs?
2. How are healthcare students educated about, and assessed on HH, and what are their perceptions about the importance given to HH in their course?
3. What are the relationships between the above variables?

METHODS

A Hand Hygiene Questionnaire (HHQ) was completed by 1721 undergraduate students (970 nursing and 751 medical) from 20 universities in Australia, Sweden, Greece and Italy. The development,

theoretical framework, and validation of the HHQ are described elsewhere (11). The HHQ contained 12 multiple-choice questions on HH. HH practices and beliefs were assessed via five-point Likert scales: the HH Practices Inventory (HHPI) (14 items), the HH Beliefs scale (HBS) (19 items) and the HH Importance scale (HIS). Students were also asked to estimate their percentage HH compliance in the healthcare setting and rate the importance of HH as an infection control measure on a 10-point scale. Additional questions examined the frequency and method of HH assessment, the methods/resources used to teach HH, and their perceived effectiveness. The latter were based partly on questions used to examine nursing students' infection control education (18). The Cronbach's alpha values of the HHPI, HBS and HIS were 0.88, 0.79 and 0.73, which are considered adequate to good (19). The Reynolds (20) short form A of the Marlowe-Crowne social desirability scale was also administered.

The questionnaire was translated into Greek, Swedish, and Italian and back-translated by an independent company to ensure accuracy. Ethics approval was obtained from the relevant Ethics Committees. Potential participants were advised that participation was voluntary, and responses were anonymous. Completion of the questionnaire indicated consent. Statistical analyses were conducted using SPSS 19.0 (21). Descriptive statistics were calculated on the variables. The General Linear Model was used to investigate relationships between a dependent variable and several covariates (22).

RESULTS

Participants were aged 16-60 years ($\bar{x}$ = 25.35 ± 0.17); 75% were female. The percentage of correct answers on the HH knowledge quiz ranged from 0%-100% ($\bar{x}$ = 66%) (Table 1). Healthcare students' mean scores on the HHPI ranged from 0-5 ($\bar{x}$ = 4.47 ± 0.02). Mean scores for individual scale items ranged from 4.14/5 (before patient contact) to 4.86/5 (after contact with blood or body fluids) (Table 2). Students' ratings of their own compliance with HH guidelines ranged from 0% to 100% ($\bar{x}$ = 85.8% ± 0.59). On the statement "[h]and hygiene is considered an important part of the curriculum" the mean score was 4.19/5 (± 0.03). Students' scores on the HIS ranged from 0.5-5/5 ($\bar{x}$ = 3.86 ± 0.03); the average scores on the items "[t]he facilities in which I do clinical practicum emphasise the importance of hand hygiene" and "[t]he importance of hand hygiene is emphasised by my clinical supervisors" were 3.92 (± 0.03) and 3.82 (± 0.03), respectively. Students' ratings of the importance of HH on a scale from 1-10 ranged from 2-10 ($\bar{x}$ = 9.25 ± 0.28). Students' scores on the HBS ranged from 1.53-5.00 ($\bar{x}$ = 3.95 ± 0.01). Mean scores for individual HBS items ranged from 2.61/5 to 4.65/5 (Table 3).

Hand hygiene was assessed 5.08 (± 0.12) times during the students' course: in the clinical and simulated clinical settings (1.66 ± 0.04 each), during oral examinations (0.94 ± 0.3) and in written tests (0.83 ± 0.03). The number of strategies/methods used to teach HH ranged from 0-13 ($\bar{x}$ = 9.30 ± 0.09); 96% of students were taught about HH during clinical practicum, whereas 67% were taught about HH using web-based materials (Table 4). The mean ratings of the effectiveness of the teaching methods ranged from 1.44/5 for computer-based methods, indicating ineffectiveness, to 3.24/5 for teaching in the clinical setting, indicating moderate effectiveness (Table 4). There was a

TABLE 2: Mean scores on items of the Hand Hygiene Practices Inventory

I cleanse my hands:	Item mean (± s.e.m.)
After going to the toilet	4.85 (± 0.01)
Before caring for a wound#	4.48 (± 0.03)
After caring for a wound#	4.57 (± 0.03)
After touching potentially contaminated objects#	4.67 (± 0.02)
After contact with blood or body fluids*	4.86 (± 0.02)
After inserting an invasive device	4.79 (± 0.02)
Before entering an isolation room	4.46 (± 0.03)
After physical contact with a patient	4.22 (± 0.03)
After exiting an isolation room	4.60 (± 0.02)
Before endotracheal suctioning	4.61 (± 0.03)
After contact with a patient's secretions#	4.35 (± 0.04)
Before patient contact	4.14 (± 0.03)
After removing gloves	4.24 (± 0.03)
If they look or feel dirty	4.55 (± 0.03)

Scale: 1=strongly disagree to 5= strongly agree; modified from *27, #30

"Similarly, general university students were more likely to handwash if they perceived that infectious diseases contracted through failing to handwash could have serious health consequences."

small significant relationship between the number of strategies used to teach HH, the frequency of HH assessment and HH knowledge scores (Table 5). Hand hygiene practices were influenced by HH beliefs, frequency of HH assessment, number of teaching strategies used, perceptions of the importance of HH as an infection control measure and the importance of HH in the curriculum, and knowledge score. Hand hygiene knowledge, students' perceptions of the importance given to HH in the curriculum, by supervisors and facilities, and the importance of HH as an infection control measure significantly influenced scores on the HH Beliefs Scale (Table 5).

DISCUSSION

The average mark (66%) on the HH quiz, despite the awareness generated by the H1N1 influenza pandemic, indicated substantial room for improvement in HH knowledge. One-third of students did not know the indications for using hand rubs. Medical students (23) and HCWs in long-term care facilities (24) have also demonstrated a lack of knowledge in relation to hand rubs. Many students thought that hand rubs cause more irritation than soap and water. Just under half thought hand rubs had to be applied for at least 60 seconds to be effective, and two-thirds did not know that hand creams should be used to minimize skin damage. Time constraints and fear of skin damage are common excuses given for HH non-compliance (14), and skin damage also increases the likelihood of transmitting microorganisms (7), thus these misconceptions should be addressed in undergraduate education programs. Students mostly understood the HH indications, although 13% did not know that HH is required after removing gloves. Several authors (25,26) have reported that glove use could reduce HH compliance, indicating that HCWs do not always understand that HH is required following glove removal. Students were also often unclear on the incidence and cost of HAIs.

Hand hygiene was more likely to occur following wound care and leaving an isolation room, than before wound care or before entering an isolation room, indicating that compliance is higher in situations where the students feel at risk, than in situations where unclean hands put the patients at risk. Similarly, general university students were more likely to handwash if they perceived that infectious diseases contracted through failing to handwash could have serious health consequences (27). Whitby et al. (28) and Pittett (29) (p. S23) also suggest that HCW's HH behaviour "is largely motivated by self-protection rather than the protection of others." Undergraduate curricula need to emphasise ethical behaviour to encourage students to consider the right of patients to safe care. The WHO also encourages a patient safety approach in their *Clean Care is Safer Care* campaign (1). The mean score on the HHPI (4.47) was similar to scores obtained by nurses in other studies that utilised a similar scale (4.22 [29]; 4.45 [30]), indicating that they "usually" washed their hands in the specified situations, but was higher than that obtained by general university students (3.58) (27), indicating that HH education had some positive influence on healthcare students' HH practices.

The mean self-reported HH compliance was 86%. Recent HH audit data (31) demonstrated that Australian healthcare students' average HH compliance was 50%-68.9%, which indicates that students probably overestimated their compliance in this study. When assessing self-reported practices there are two issues: are participants inflating their answers to gain social approval, and if not, are participants' capable of accurately assessing their own performance? In this case socially desirable responding significantly influenced HH practices and compliance scores although the effect was comparatively small (r=0.13-0.24) (32). Regarding the accuracy of self-assessment, Davis et al. (33) found that there was a positive relationship between physicians' self-assessment and external quantifiable assessments of their competence on only 35% of occasions. The most confident and/or least skilled tended to overestimate their performance. Langendyk (34) also found that low-achieving medical students consistently rated their performance more highly. In future research triangulation may provide a clearer picture of students' capacity to self-assess their HH compliance.

The average score on the HBS (3.95/5) indicated moderate agreement with positive statements about HH. Students agreed most strongly that HH reduces patient mortality, costs, and infection transmission, and is a valuable part of a HCW's role. However, students disliked reminding a HCW to handwash, were ambivalent about whether dirty sinks or lack of an acceptable soap product were reasons for non-compliance, and were unsure about whether they followed the example of senior HCWs in relation to HH. These results illustrate the need to educate students on the ethical imperatives of providing safe care to patients and advocating in the interests of the patient. Role-plays can be used to develop students' skills in managing difficult situations such as reminding colleagues to perform HH as they offer the opportunity to learn skills and communication strategies in a non-threatening way, effectively testing approaches to gain the desired outcome (35). For example, medical students have used role-plays to develop skills in taking a sexual history (36).

Learning about HH in the clinical setting, via lectures, posters and demonstrations were the methods considered most effective by students, while the least effective were computer simulations, the Internet, videos and research articles. Similarly, most of the infection control instructional strategies rated most effective by Sangkard's (18) students involved face-to-face teaching, whereas those rated least effective did not involve personal contact. Students prefer personal interaction rather than remote methods of instruction.

TABLE 3: Mean scores on items of the Hand Hygiene (HH) Beliefs Scale

Statement	Item mean (± s.e.m.)
I have a duty to act as a role model for other healthcare workers	4.34 (± 0.02)
When busy it is more important to complete my tasks than to perform HH ^	3.83 (± 0.03)
Performing HH in the recommended situations can reduce patient mortality	4.48 (± 0.02)
Performing HH in the recommended situations can reduce medical costs associated with hospital-acquired infections (HAIs)	4.65 (± 0.02)
I can't always perform HH in recommended situations because my patient's needs come first ^	3.34 (± 0.03)
Prevention of HAI is a valuable part of a healthcare worker's role	4.65 (± 0.02)
I follow the example of senior healthcare workers when deciding whether to perform HH ^	3.34 (± 0.03)
I believe I have the power to change poor practices in the workplace	3.60 (± 0.03)
Failure to perform HH in the recommended situations can be considered negligence	4.25 (± 0.02)
Hand hygiene is a habit for me in my personal life	4.31 (± 0.02)
I am confident I can effectively apply my knowledge of HH to my clinical practice	4.35 (± 0.02)
It is an effort to remember to perform HH in the recommended situations ^	3.51 (± 0.03)
I would feel uncomfortable reminding a health professional to handwash ^	2.61 (± 0.03)
Performing hand hygiene slows down building immunity to disease* ^	3.57 (± 0.03)
Dirty sinks can be a reason for not washing hands* ^	3.44 (± 0.03)
Lack of an acceptable soap product can be a reason for not cleansing hands* ^	3.26 (± 0.03)
Performing HH after caring for a wound can protect from infections#	4.50 (± 0.02)
Cleansing hands after going to the toilet can reduce transmission of infectious disease*	4.65 (± 0.02)

Scale: 1=strongly disagree to 5= strongly agree; ^ item reverse coded; modified from *27, #30

TABLE 4: Percentage of students taught hand hygiene using a particular method and mean perceived effectiveness

Teaching method	Percentage (mean effectiveness* ± s.e.m)
Lectures	94.3% (2.61 ± 0.03)
Tutorials	89.9% (2.71 ± 0.03)
Clinical setting	96.2% (3.24 ± 0.03)
Demonstration	91.1% (3.10 ± 0.03)
Practical laboratories	88.6% (2.93 ± 0.04)
Videos	79.7% (2.01 ± 0.04)
Textbooks	86.5% (2.01 ± 0.04)
Lecture notes	87.3% (2.07 ± 0.03)
Computer simulations	67.2% (1.44 ± 0.05)
Internet	75.1% (1.65 ± 0.04)
Research articles	81.4% (2.05 ± 0.04)
Published guidelines	90.1% (2.56 ± 0.04)
Posters	93.1% (2.94 ± 0.03)

*1 = ineffective, 4 = highly effective; Modified from 18

TABLE 5: The influence of covariates on health care students' hand hygiene (HH) knowledge, practices and beliefs scores

Source	Type III Sum of Sqs	Df	Mean Square	F	Sig.	Partial Eta Squared
Model 1: HH knowledge						
Corrected model	18.67[a]	2	9.34	3.16	.043	.004 (S)
Times HH assessed	4.39	1	4.39	1.49	.233	.002(S)
No. teaching strategies	6.53	1	6.53	2.21	.138	.001(S)
Model 2: HH practices						
Corrected model	178.50[b]	6	29.75	84.71	.000	.27(L)
Times HH assessed	3.76	1	3.76	10.72	.001	.01(S)
Knowledge score	.09	1	.09	0.25	.62	.000
Importance HH in curriculum	.07	1	.07	0.21	.65	.000
No. teaching strategies	33.48	1	33.48	95.32	.000	.07(M)
Importance HH 1-10	37.75	1	37.75	107.5	.000	.07(M)
HH beliefs	20.28	1	20.28	57.73	.000	.04(M)
Model 3: HH beliefs						
Corrected model	31.75[c]	4	7.94	46.32	.000	.12(L)
Importance HH in curriculum	9.13	1	9.13	53.30	.000	.04(S)
Importance HH 1-10	6.28	1	6.28	36.66	.000	.03(S)
Importance HH scale (HIS)	1.70	1	1.70	9.90	.000	.01(S)
Knowledge score	0.13	1	0.13	0.77	.38	.001(S)

a. R Squared = .004 (Adjusted R Squared = .003); b. R Squared = .27 (Adjusted R Squared = .27); c. R Squared = .12 (Adjusted R Squared = .12); S = small effect size, M = Medium effect size, L = Large effect size.

The average score (4.19/5) indicated agreement with the statement that HH was considered important in their curriculum, however, students were less positive that HH was considered important by their clinical supervisors and healthcare facilities. Students were most frequently assessed on HH in the clinical or simulated clinical settings, and HH was assessed five times during their degree. There is no previous research published on the frequency and ways healthcare students are assessed on HH, however, educational specialists suggest that we get what we assess (37) and should assess what we value (38). An analysis of the relationships between outcome variables and covariates indicated that while HH knowledge was not a big predictor of positive HH beliefs and practices, the frequency of HH assessment made a significant unique contribution to students' HH practices scores, and students perceptions of the importance given to HH in the curriculum and by their supervisors/clinical facilities made a significant unique contribution to HH beliefs. Thus repeated episodes of education and assessment on HH may demonstrate to students the importance placed on HH by faculty. These results also reinforce the need for clinical supervisors and faculty to provide good role models for students in relation to HH.

CONCLUSIONS

Many healthcare students lacked knowledge on the indications, benefits and use of alcohol-based hand rubs, indicating that further effort is needed to properly educate students on effective HH. This study suggests that the keys to improving HH outcomes are teaching methods that involve personal interaction, repeated episodes of education and assessment, improving students' abilities to self-assess, providing students with more education on ethical practice, and developing role-plays that build patient advocacy skills. The level of knowledge students acquire can be influenced by aptitude, education quality, the number of learning opportunities provided, and their perceptions of the importance of the information. Whilst this study provides some evidence of the factors that influence students' HH knowledge, beliefs and practices, causation may be determined with studies that manipulate variables such as HH knowledge and determine the outcomes on HH compliance.

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This study was conducted at the University of Saskatchewan while Dr. A. AlMusawi was a resident in internal medicine and M. Al-Mousawi helped interpret the data and write the manuscript. It has been approved by the department of internal medicine as well as internal medicine residency program at the University of Saskatchewan.

We certify that the manuscript has not been published and is not being considered for publication elsewhere.

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ABSTRACT

Hospital-acquired infections remain a significant hazard for hospitalized patients. Several studies examined the hospital environment as a source of contamination and potential risk for infection. These studies have shown contamination of a variety of environmental sources, including stethoscopes, telephones and healthcare workers uniforms. Other studies aimed to assess the familiarity and compliance of healthcare workers with infection control (IC) protocols.

This study was undertaken to assess the knowledge and compliance of medical students and physicians with IC policies and procedures. A questionnaire was distributed for this purpose. The study group included internists, pediatricians and medical students.

The results confirmed high compliance among physicians and medical students with some of the IC protocols and policies, such as hand hygiene and isolation protocols. However, it has raised concerns about other components such as disinfecting of stethoscopes, cleaning of uniforms and handling of sharps. We recommend having more structured models for teaching and assessment of infection control for medical students and physicians.

INTRODUCTION

Hospital-acquired infections remain a significant hazard for hospitalized patients. Healthcare workers are potential sources of these infections, with many of the pathogens transmitted through hand carriage. Transmission of infection may also occur through contaminated medical devices.

During the last decade, several studies have examined the hospital environment as a source of contamination and potential risk for infection. These studies have shown contamination on a variety of environmental sources, including thermometers, telephones, stethoscopes, uniforms, white coats and ties [1-5].

Unfortunately, there are few published Canadian studies assessing the familiarity and compliance of healthcare workers with infection control (IC) protocols and policies [6-7]. This study was conducted to assess the knowledge and compliance of medical students and physicians with IC policies and procedures.

METHODS

A cross-sectional survey method was used to evaluate medical students and physicians' familiarity and compliance with infection control policies. This was based on their practice within the last two years up to the date of conducting this study. In February 2008 a self-assessment questionnaire was hand-delivered to the participants prior to or after teaching rounds or indirectly in their mailboxes. The studied group included internists, pediatricians and medical students at the University of Saskatchewan in Saskatoon, Canada with a total of 70 participants. A questionnaire was distributed to 45 physicians in internal medicine and pediatric departments, and 25 medical students with response rates of 80% and 88% respectively.

As there was no standard method for assessing infection control compliance, a three-page questionnaire was created which focused on different aspects of infection control. It was broken into six categories: stethoscope disinfecting practices, handwash/hygiene, isolation, white coats, ties and sharps. The questionnaire consisted of a total of 32 questions regarding the IC policy in addition to questions of personal demographics.

The questionnaire took approximately 15 minutes to complete and all

participants were given enough time to complete and return the questionnaire to ensure a realistic response. The postgraduate office in the College of Medicine assisted in distributing the questionnaires to medical students.

RESULTS

The demographics of the 58 respondents are shown in Table 1. The respondents (38% medical students, 48% resident and 14% attending physicians) were divided among age and gender categories.

1. Stethoscope:
Participants were asked how about how frequently they cleaned their stethoscopes, the last time it was cleaned, the preferred agent used (alcohol, soap and water or others) and whether or not they cleaned their stethoscopes after seeing each patient.

Half of the respondents indicated they had last cleaned their stethoscopes within the preceding week. One-third last cleaned their stethoscope within the preceding 2-4 weeks and 2% indicated they had never cleaned their stethoscopes within the last two years *(Figure 1)*. Alcohol (e.g., swab, gel, etc.) was the preferred agent of cleaning. Only 3.5% cleaned their stethoscopes between patients, whereas 96.5% did not *(Figure 2)*. Of the 22% who cleaned their stethoscopes on daily basis, none were attending physicians. The majority of the attending physicians (75%) reported cleaning their stethoscopes once per month.

2. Handwash/Hygiene:
The Handwash/Hygiene category in the questionnaire asked how frequently handwashing/hygiene was implemented in specific situations as indicated by hospital protocol. These situations included washing hands between patients, before performing invasive procedures, after contact with bodily fluids, blood, or contaminated items (e.g., bedpans, urinals), after glove removal and after use of toilet. Female participants were asked about wearing artificial nails during patient care. All questions had response options of "always," "often," "sometimes," "rarely," "never," and "not applicable."

One hundred percent of the respondents chose "always/often" for all questions in this category except for "immediately after removing gloves" where 7% chose "sometimes." One female resident chose "rarely" when asked about having artificial nails during patient care, which is against the IC policy. A question was included in the questionnaire to assess the familiarity of the participants with the handwash/hygiene protocol. The question asked "do you clean your hands after scratching your head?" Almost half of the respondents answered "never," which is the correct answer as it is not part of IC policy.

3. Isolation:
In this category participants were asked about IC policy in isolation rooms. They were asked about their perception of the readiness of isolation rooms in terms of personal protective equipment (PPE).

The majority of respondents (96%) wore gowns and used high filtration masks when indicated. However, only 75% found the isolation rooms were well equipped with the required PPE (including high filtration mask in airborne isolation). When asked about taking the patient's chart or nursing notes into the isolation room, 46% indicated that they "never" have. Four percent "often" took charts with them into the isolation rooms.

4. White coat:
Participants were asked how often they wore and washed their white coat as well as the preferred facility for cleaning it. Among the participants, 74% wore a white coat frequently and 16% never wore a white coat within the last two years. Twenty percent washed their white coats on a weekly basis and 60% washed it 1-2 times/month. Interestingly, 8% of those who wore white coats had never washed it in the last two years *(Figure 3)*. Of those who wash their white coats, 90% washed it at home, whereas, 8% used hospital laundry services.

Table 1: Demographics of respondents

Characteristics	N (%)
Gender	
Male	35 (60%)
Female	23 (40%)
Occupation	
Students	22 (38%)
Residents	28 (48%)
Attending physicians	8 (14%)
Age Group	
20-25	16 (28%)
26-30	27 (47%)
31-35	6 (10%)
36-40	2 (3%)
> 40	7 (12%)

Table 2: How often do you wear ties?

Every day/Often	30%
1-2 times per week	15%
1-2 times per month	8%
<10 times per year	17%
Never	30%

5. Ties:
Male participants were asked about wearing ties while on service. Thirty percent had not worn a tie in the last two years (60% of these were pediatricians) *(Table 2)*. All male attending physicians wore ties every day. Only 6 out of 25 (24%) used tie clips or buttoned their coats when wearing ties. Out of the 70% of male respondents who wore ties, 36% had not cleaned their ties within the last two years *(Figure 4)*.

6. Sharps:
This category asked about handling needles/sharp instruments by physicians and medical students. All respondents chose "always" when they were asked about placing needles and sharps in containers. Only 9% reported they did not recap needles, which is the right procedure according to the IC policy used in this institute. Surprisingly 60% indicated that they always/often recapped needles *(Figure 5)*. Ten percent of respondents had accidental sharps injuries within the last two years; all of whom were residents.

DISCUSSION

Infection control (IC) is a topical issue within the clinical practice. The annual report of Infection Prevention and Control of the Saskatoon Health Region in 2010-2011 stated that each *Clostridium difficile* infection case is estimated to result in at least $3700 increased cost per case. The additional cost per case of Methicillin-resistant *Staphylococcus aureus* (MRSA) infection in Canada was estimated at $14,360, however, it can be as high as $100,000 in cases of bacteremia [8].

Many researchers have proven the vital role of compliance with IC protocols. Outbreak of nosocomial infections have been linked to electronic thermometers, blood pressure cuffs and latex gloves [9-11].

Unfortunately, there is very little published literature assessing compliance with infection control procedure in Canada [6-7]. *Yassi A. et al*, conducted a study in British Columbia, Canada, and found that compliance of healthcare workers with IC is significantly affected by organizational and environmental factors but not by their personal beliefs or attitudes. These factors include healthier organizational culture that promotes safety and infection control training.

This study demonstrates that there is high observance with hand hygiene (≥93%) and isolation (96%) protocols, with the exception of, taking the patient's chart into the isolation rooms. The availability of alcohol-based hand rub dispensers in all hospitals, especially at the entrance to all patient rooms could be a major influence on compliance with IC policy for hand hygiene. Comparing this study's result with a study conducted in British Columbia by *Yassi A. et al* (2007), participants in this study showed better compliance with wearing a respirator (N95) mask (71% and 94% respectively) if indicated.

Half of the respondents cleaned their stethoscopes within one week and one-third cleaned theirs within 2-4 weeks. However, two percent had not cleaned their stethoscopes within the last two years. This is comparable with that found in a study of *Jones J et al* (1995) [12]. The necessity of frequent stethoscope disinfection was highlighted in many studies. *Leprat et al* (1998), conclude that the risk of recontamination increases rapidly after examining five patients. The article by *Africa-Purino et al* (2000) proved that disinfecting stethoscopes with alcohol is as efficient as cleaning with soap and water, however, alcohol was the preferred agent in their study as well as our study (100% and 97% respectively).

Both white coats and ties were found to be contaminated with various types of pathogens, most commonly *S. aureus*; specifically, white coat cuffs and pockets and lower half of ties [4-5]. *Ditchurn et al* sampled 40 doctors' ties and found 2.5% carrying MRSA [4]. *Steven Nurkin et al* sampled 42 doctors' ties, and found *P. aeruginosa* and *Klebsiella pneumoniae*. It also found that doctors' ties are eight times more contaminated when compared with security personnel working in the same facility [13]. Sadly, among respondents who wear white coats, only 20% washed their white coats on a weekly basis and 8% had not washed them within the last two years. Of the 70% male respondents who wore ties, more than a third never cleaned their ties during the last two years; and 76% did not use a tie clip or button their coat while examining patients.

FIGURE 1: When did you last clean your stethoscope?

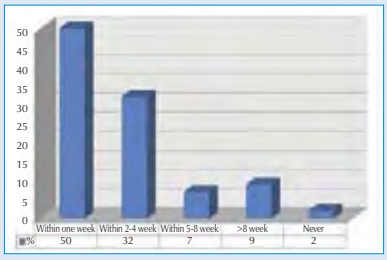


FIGURE 2: Do you clean your stethoscope after interation with each patient?

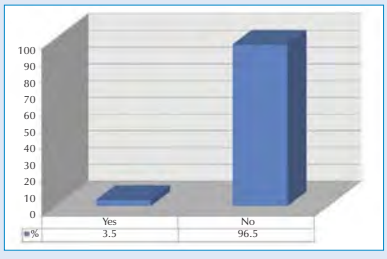


FIGURE 3: How often do you wash your white coat?

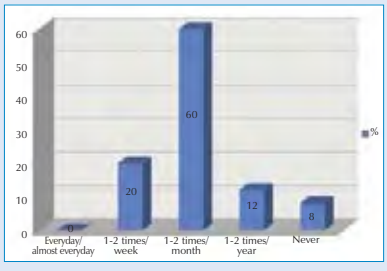


FIGURE 4: When was the last time your tie was cleaned?

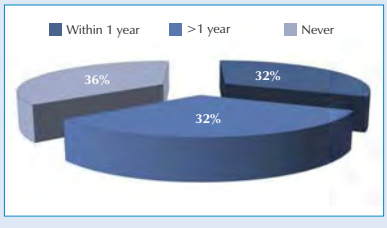
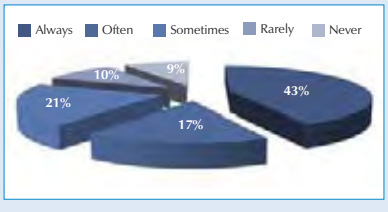


FIGURE 5: Do you recap your needle?



Healthcare workers are at an increased risk of occupational-acquired infections, transmitted by bloodborne pathogens. The risk of transmission following needle stick injuries varies with different pathogens. There is a 0.3% chance risk of transmission for HIV, 3% risk for Hepatitis C and a 30% risk for Hepatitis B [14-15]. It is crucial for healthcare workers to be familiar with the proper procedures for handling needles and sharp instruments. In this study, 10% of respondents had an accidental sharp injury within the last two years; all of them were residents. This relatively low incidence rate of sharps injuries might be due to the fact that this study did not include surgical residents who have a six-fold greater risk of occupational exposure compared with medical residents [16].

LIMITATIONS

This study included medical students and physicians only. Other healthcare workers, such as nurses and physiotherapists, should also be included in future studies as they play an important role in patient care and in the prevention of occupational-related infections. The sample of this study is relatively small with a total of 70 participants and 58 respondents.

The study is a cross sectional and questionnaire-based study. As the researcher is not present, it is difficult to know whether or not a respondent has understood each question properly. There may also be bias due to self-reporting of own behaviour. This could apply specifically to the question about recapping the needle since while conducting this study there were new needles being used that had safety caps (i.e., safety needles).

CONCLUSION AND RECOMMENDATIONS

Although this study confirmed high compliance among physicians and medical students with hand hygiene and isolation protocols, it raised concerns about other components of IC such as disinfecting stethoscope, uniform cleaning and handling sharps. The compliance with IC procedures may depend on the ease of implementing the proposed procedure or protocol [17]. Since frequent cleaning of stethoscopes with alcohol significantly reduces the bacterial load, the authors recommend placing alcohol swabs beside alcohol-based hand rub dispenser in all patients' rooms.

All hospitals involved with training students and residents should consider providing them with freshly laundered white coats. Finally, the authors recommend a more structured teaching model for the teaching and assessment of infection control within medical schools and residency programs as well as refresher training lectures throughout physicians' careers in order to increase compliance.

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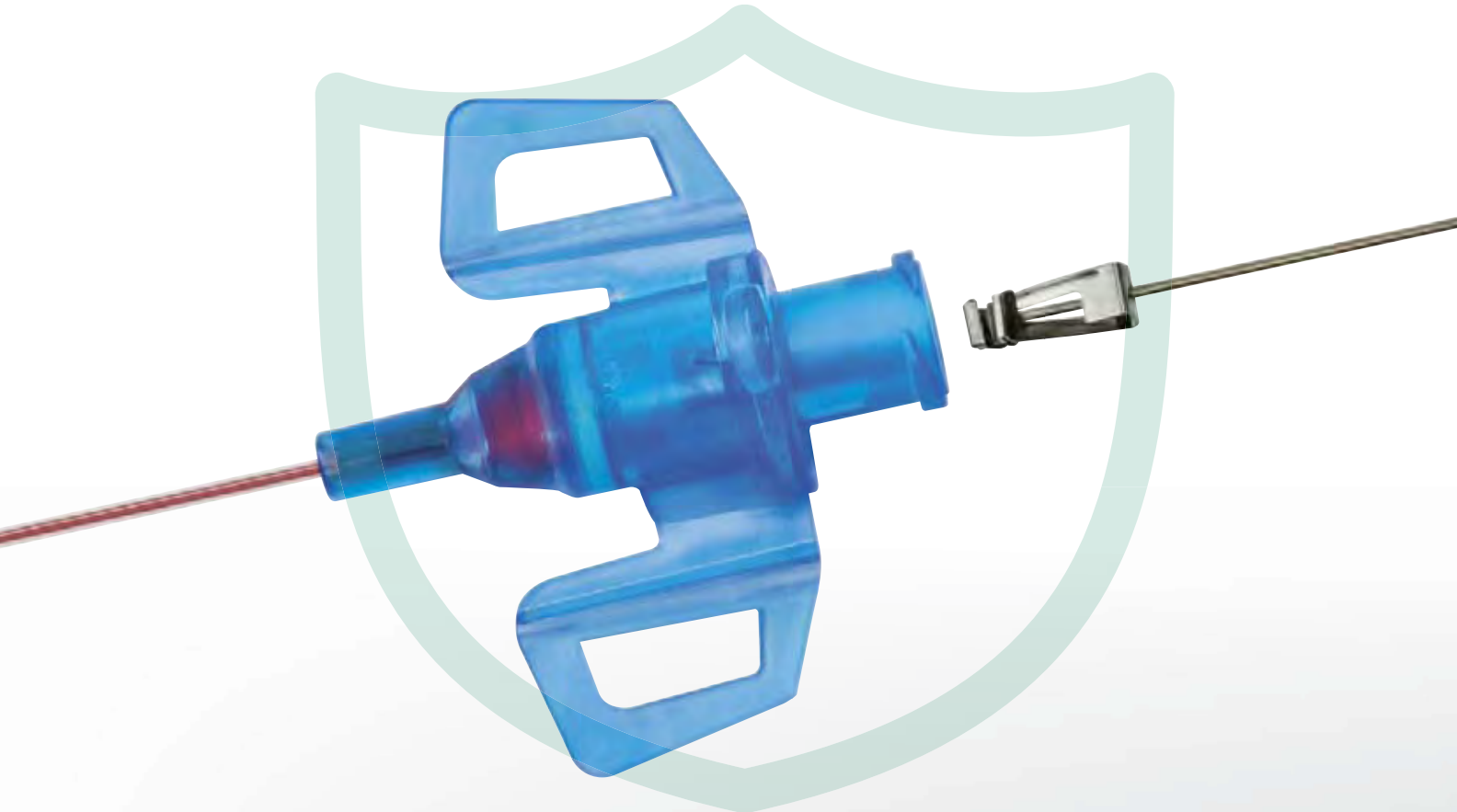

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* *Frequency of outbreak investigations in US hospitals: Results of a national survey of infection preventionists, American Journal of Infection Control, February 2012, Vol. 40, No. 1, Page 2*

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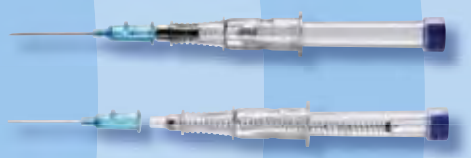

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I'm feeling grumpy … **sort of**

Jim Gauthier, MLT, CIC
President, CHICA-Canada

I have days where I get in a grump. You know the days, nothing seems to go right. You go to the unit/ward and staff give you grief about all the isolated patients. You have housekeepers approach you with concerns that should be going to their managers, but their managers do not seem to listen. You read a patient's chart to find out that antibiotic they received for a very questionable urine dip stick caused a case of *Clostridium difficile*.

Have you had those days? Those days where you wondered why you wanted to grow up to be an infection control professional?

What I have figured out and talked about for a while is that the vast majority of healthcare staff do not really get routine practices. We try to keep it simple, make it common sense, and then someone worries about a fecal spill because "they have *Clostridium difficile*." I ask if there might be feces mixed with that *C. difficile*, and get the weirdest looks. I ask how we clean up the "regular" fecal spill if the patient is unknown to us and the procedure sounds pretty good for most vegetative cells, the procedure is problematic for spores. Hey, I know, let's clean up any fecal spill as though there might be spores present. All *Clostridia* carry spores, as do many other bacteria present in the gut. If we treat all feces as potentially having spores, and clean that way, will that not protect us from the patients who are asymptomatically carrying *C. difficile*? At my facility, we are trying to work out the cost of cleaning all washrooms with a sporicidal agent on discharge, isolation or not. If this prevents a nosocomial case of *C. difficile* infection, it is money well spent.

"What I have figured out and talked about for a while is that the vast majority of healthcare staff do not really get routine practices."

Routine practices: Treat all patients as though they may harbour organisms that can harm others. If they have skin, mucous membranes, or feces, please be careful. But what happens? We screen patients. We swab them, let staff know there was no MRSA or VRE at that moment in time, on that swab. Is that really routine practices? Is the patient safe?

Many of you know my simple routine practices: If they are leaking (or soiling the environment), limit their movement and protect yourself. If it is dirty or you used it, clean it! 24 words. I still have not found a situation that this does not cover, except those pesky spores.

Think of my 24 words the next time you are educating on treating everyone the same. Try to do your education without mentioning MRSA, VRE or CDI (or ESBL, CRE, CPE, etc.). Let's strive to keep it simple, and to keep me less grumpy!

Je me sens plutôt grognon...

Jim Gauthier, MLT, CIC
Président, CHICA-Canada

Certains jours, il m'arrive d'être grognon. Vous savez, ce genre de journée où rien ne semble bien aller. Vous vous rendez à l'unité de soins et le personnel vient se lamenter de tous les patients en isolement. Les préposés à l'entretien vous abordent et vous font part de problèmes qu'ils devraient plutôt exposer à leurs gestionnaires, mais ceux-ci ne semblent pas écouter. En lisant le dossier d'un patient, vous constatez que les antibiotiques qui lui ont été prescrits par suite d'un test d'infection urinaire par bandelette réactive très discutable l'ont amené à contracter le *Clostridium difficile*.

Vous est-il arrivé de vivre ce genre de journée? Le genre de journée qui vous fait demander pourquoi donc vous rêviez de devenir un professionnel du contrôle des infections?

Ce que j'ai compris et que je répète depuis un certain temps, c'est que la vaste majorité du personnel de soins de santé n'applique pas vraiment de procédures systématiques. Nous recherchons la simplicité, nous faisons appel au bon sens, et puis soudain quelqu'un s'inquiète de ce qu'il faut faire pour nettoyer un dégât de matières fécales parce que le patient « est atteint du *Clostridium difficile* ». Je demande s'il est possible que les selles soient mélangées à ce *C. difficile* et on me jette un regard des plus étranges. Je demande comment on procède pour nettoyer les matières fécales « normales » si le patient nous est inconnu et la procédure semble plutôt adéquate pour la plupart des cellules végétatives; toutefois, elle pose problème pour les spores. Eh! J'ai une idée : nettoyons tous les dégâts de matières fécales comme si des spores pouvaient y être présentes. Toutes les infections de la classe des *Clostridia* renferment des spores, tout comme de nombreuses autres bactéries présentes dans les intestins. Si nous traitions toutes les matières fécales en supposant qu'elles peuvent contenir des spores et nettoyions en nous fondant sur cette hypothèse, est-ce que cela n'aurait pas pour effet de nous protéger des patients qui sont des porteurs asymptomatiques du *C. difficile*? Dans l'établissement où je travaille, nous tentons d'évaluer ce qu'il en coûterait de nettoyer toutes les salles de bains à l'aide d'un agent sporicide après le départ des patients, qu'ils soient en isolement ou non. Si cela peut prévenir une infection nosocomiale à *C. difficile*, c'est de l'argent bien investi.

Procédures systématiques : Traitez tous les patients comme s'ils pouvaient être porteurs d'organismes pouvant être nocifs pour autrui. Qu'il s'agisse de peau, de membranes muqueuses ou de selles, soyez prudent. Mais que se passe-t-il dans les faits? Nous trions les patients. Nous faisons des prélèvements et laissons savoir au personnel que la personne n'était pas infectée par le SARM ni l'ERV à ce moment-là, d'après cet échantillon-là. Peut-on vraiment parler de procédure systématique? Le patient est-il à protégé? Bon nombre d'entre vous connaissent mon approche quant aux procédures systématiques : Si des liquides s'écoulent du patient (ou s'il souille l'environnement), limitez ses mouvements et protégez-vous. Si un objet est sale ou que vous l'avez utilisé, nettoyez-le! Voilà, 26 mots. Je n'ai pas encore trouvé de situation où ce principe ne s'applique pas, excepté pour ces sales spores.

Repensez à mes 26 mots la prochaine fois que vous montrerez comment traiter tous les patients de la même façon. Essayez d'enseigner cette méthode sans mentionner d'acronyme : SARM, ERV ni CD-I (ou BLSE, ERC, EPC, etc.). Efforçons-nous de rechercher la simplicité et, par le fait même, je serai moins grincheux!

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Conference planning

Gerry Hansen, BA
Executive Director, CHICA-Canada

Hopefully you are planning and budgeting to attend the CHICA-Canada 2013 National Education Conference. The 2013 conference will be held in Ottawa, Ontario, June 1-5, 2013. This is the pre-eminent infection control conference in Canada. It is an important opportunity for continuing education and networking with your peers, other colleagues, and possible mentors. If you have attended previous conferences, you will notice some changes in CHICA's conference.

The most important change is that we have addressed the length of the conference. There was a time in the past when we had no difficulty attracting attendees for the full five days of conference – from Novice/Advanced Day, through Pre-Conference Day, and then the conference itself. Many times there were Post-Conference sessions as well. Times have changed, and we have to acknowledge the fact that travel and budget restrictions are impacting on the ability of ICPs to attend this wonderful conference. We have chosen to eliminate the Novice/Advanced Practitioner Day. The Education Core Committee is planning a series of webinars to assist the Novice ICP and another series of webinars that will particularly interest the advanced practitioner. Pre-Conference Day will feature in-depth topics of varying interests. The conference itself will take place over Monday, Tuesday and Wednesday, ending at 12:30 p.m. Wednesday after Closing Ceremonies.

> "The insight and advice of our industry partners is invaluable and we strongly encourage attendees to take advantage of one-on-one discussion."

The 2013 conference will be bilingual. All plenary and concurrent sessions will have simultaneous interpretation. Oral and poster sessions will be presented in the language of the author.

Many of the traditions of the conference will remain. Among them is the fairly new feature, the Interactive Lunch, which is held on Sunday. This is an opportunity for both new and experienced ICPs to connect at a luncheon hosted by CHICA's leadership team, including the board of directors, the Scientific Program Committee, chapter presidents and committee chairs. The special event is always appreciated. In 2013 we will give attendees the opportunity of a sightseeing tour of Ottawa (Monday, June 3). The amazing historical exhibits in Canada Hall will be followed by dinner and entertainment in the inspiring Canadian Museum of Civilization (Tuesday, June 4). Our 2013 co-hosts, CHICA Ottawa Region, will offer hospitality during their Meet & Greet (Monday, June 3).

Participating in the Exhibit Hall is an added education and networking event. We expect over 90 exhibiting companies that offer products and services to infection prevention and control professionals. The insight and advice of our industry partners is invaluable and we strongly encourage attendees to take advantage of one-on-one discussion. It is also a very fun event!

When planning to attend the conference, please consider making guest room reservations at the Westin Ottawa, our headquarter hotel. Attached to the Ottawa Convention Centre, the Westin will be the location of interest group meetings on Saturday and Pre-Conference Day events on Sunday. If you book outside the Westin conference block, CHICA may fall short of their commitment to the hotel which means they are still required to pay the hotel the minimum guest room revenue. It is important to us that you support the conference by staying at The Westin. Don't forget – you could win a free stay! See the Preliminary Program for more information.

The Preliminary Program has been distributed and is posted to the CHICA website. The Registration Brochure and online registration will be launched in December 2012.

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2013 Virox Technologies **Scholarship**

Through the financial support of Virox Technologies, 19 CHICA-Canada members were awarded scholarships to attend the 2012 CHICA National Education conference in Saskatoon. CHICA-Canada and its members thank Virox Technologies for their initiative to make the national education conference accessible to those who may not have otherwise been able to attend.

In partnership with CHICA-Canada, Virox Technologies will again provide scholarships to assist CHICA-Canada members with attending the 2013 National Education conference in Ottawa (June 1-5, 2013). The 2013 Virox Technologies Scholarship online application will be launched in November 2012. The deadline for applications is January 31, 2013.

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2013 Champions of Infection Prevention and Control

In collaboration with 3M Canada, CHICA-Canada has developed the prestigious Champions of Infection Prevention and Control Award. The 2012 recipient was Dr. Allan Ronald who received his award at the 2012 conference. Applications are being accepted for the 2013 Champions of Infection Prevention and Control award. This award will acknowledge the extraordinary accomplishments of the frontline Champions of Infection Prevention and Control. The award will recognize CHICA-Canada members who work beyond what is expected as part of their employment, tirelessly, and creatively, to reduce infection, raise awareness, and improve the health of Canadians. Awards will be presented at the 2013 National Education Conference in Ottawa.

Award criteria and nomination form will be posted to *www.chica.org* by November 1, 2012. The deadline for 2013 nominations is March 1, 2013.

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New! Diversey Education **Bursary**

CHICA-Canada and Diversey Inc. are pleased to announce the launch of the Diversey Education Bursary. The objective of the bursary is to provide financial assistance to eligible CHICA-Canada members to attend continuing professional education programs. The amount of $5,000 will be set aside for the bursary annually by Diversey Inc. The maximum amount granted to each recipient per award year would be $1,000. Applicants will not necessarily receive the full amount. The tuition/registration eligible for reimbursement are one of:

a) Registration fees for attendance at the CHICA-Canada national education conference
b) Registration fees for attendance at a CHICA-Canada chapter education day
c) Tuition fees for the CHICA-Canada online basic infection prevention and control course
d) Tuition fees for an online basic infection prevention and control program endorsed by CHICA-Canada

CHICA-Canada President Jim Gauthier notes, "There is an increased need of funding for CHICA-Canada members to attend or participate in these important educational events. The generous sponsorship of this bursary by Diversey Inc. will enhance CHICA-Canada's ability to support its members in attendance at the annual conference, at a chapter educational event, or as a student at one of the distance education courses supported by or endorsed by CHICA-Canada."

"We are pleased to partner with CHICA-Canada to provide this education bursary which advances our joint objective - promoting best practice in infection prevention and control to improve patient and staff safety," said Carolyn Cooke, Vice President, North America Healthcare Sector. "We see continuing education and shared knowledge as cornerstones to improving patient outcomes and program quality, and we are proud to partner with CHICA-Canada to be able to provide an opportunity for increased learning and knowledge sharing."

Applications must be submitted online through *www.chica.org*. The deadline date for applications is January 31, 2013.

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Certification Board of Infection Control

Barbara Russell RN, MPH, CIC

First, let me say I hope all my Canadian colleagues are having a pleasant and beautiful fall. I would like to thank you for the warm reception I received at the CHICA conference in Saskatoon. My only wish is that I could have spent more time exploring the beautiful area. It was a pleasure to represent CBIC and get to know some of you better.

For this article I would like to answer some frequently asked questions regarding certification.

1) How do you determine the content of the exam?

The CBIC content outline is developed from a practice analysis survey which is performed every four to five years. The next analysis is slated to occur in 2014. The results will determine if any additions or revisions are needed. I encourage you to participate in the survey.

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- **Identification of Infectious Disease Processes**
- **Surveillance and Epidemiologic Investigation**
- **Preventing/Controlling the transmission of Infectious Agents**
- **Employee/Occupational Health**
- **Education and Research**
- **Management and Communication (Leadership)**

2) Can you give more details about the questions developed based on the above-mentioned outline?

The following represents a description of the three cognitive levels used in developing the exam questions including an example. All examples are now retired and therefore would not be seen as presented here on any current exam.

Level 1 RECALL

Recall items primarily test the recognition or recall of isolated information. Such items require predominantly an effort of memory. They include the recall of specific facts, generalizations, concepts, principles, processes, procedures, or theories. To simplify, such an item will ordinarily be asking: **"What is X?"**

Example: The psychiatry department wishes to begin a pet therapy program. In advising the department, which of the following animals would MOST likely present a salmonella hazard to patients?

A. Kitten
B. Rabbit
C. X Turtle
D. Hamster

Level 2 APPLICATION

Application items primarily test simple interpretation or application of limited data. Such items require more than simple recall, but less problem solving. They include items that require translation into another form of specific verbal, tabular, or graphic data, and recognition of the elements and relationships among such data. Items at this level will ordinarily be of an "if-then" type, or ask: "Knowing X to be true, what would you expect to be true about Y?"

Example: Culture specimens are transported once a day from a home healthcare agency to an off-site laboratory. Which of the following should be used to ensure the MOST accurate results for urine cultures?

A. Specimen collection should be the first-monitoring sample.
B. Clean specimen containers with airtight lids are used.
C. X Specimens are refrigerated until picked up.
D. Specimens should be transported in a leak-proof container.

Level 3 ANALYSIS

Analysis items primarily test the evaluation of data, problem solving, or the fitting together of a variety of elements into a meaningful whole. **Items at this level will ordinarily require examinees to make value judgments concerning the effectiveness, appropriateness, or best course of action for a particular situation.** Many steps may be required in the candidate's thought process.

Example: A patient who presents with coughing, hemoptysis, night sweats, and fever is admitted for further work-up. Which of the following are appropriate regarding room placement and personal protective equipment (PPE) when entering the room?

Room Type	Staff PPE	Visitor PPE
private room	surgical mask	N95 respirator
x negative-pressure room	N95 respirator	surgical mask
private room	surgical mask	surgical mask
negative-pressure room	N95 respirator	no mask

3) When I take the SARE why can't I get correct answers?

CBIC's Certification program is accredited by the National Commission for Certifying Agencies (NCCA). Although candidates often ask for the correct answers to questions that they got wrong, this

Continued on page 190.

Continued from page 189.

would be a serious red flag to the NCCA. The purpose of the certification exam is to measure current knowledge/skill based on all domains of the exam. It is not intended to be diagnostic based on single questions. If the questions to which answers were given are still actively used on the current exams, giving out the correct answers it would compromise the integrity of the items and exams and hence jeopardize our recognized accreditation.

4) How can I study?

Here are some suggestions;

- Purchase APIC Study Guide.
- Purchase CBIC Practice Exam.
- Form a study group.
- Identify a certified colleague to mentor you.
- Study the references identified in Candidate Handbook.
- When attending a conference look for topics you feel weak in and attend those sessions.

I am sure there are lots more questions out there. You may find answers at the CBIC website at *www.CBIC.org* or contact me directly at *barbarar@cbic.org*. One of the references you will find on the website is the handbook for more details regarding information about the exam. If you are preparing to take your initial exam or one to recertify **"You may never know what results come of your action, but if you do nothing there will be no result." ~ Mahatma Gandhi**

A media release is provided to assist with any National Infection Control Week activities that may require a media release in your area. Add the local contact information at the bottom of the release. Available in both French and English. The template can be found at http://www.chica.org/news_icweek.php

NICW **Media Release**

Spread Knowledge, Not Infection!
National Infection Control Week – October 15-19, 2012

Infection prevention and control programs have been widely recognized to be both clinically effective and cost-effective in preventing and controlling the spread of infections in healthcare settings. Ultimately, the most effective way to prevent the transmission of infection is through hand hygiene and effective environmental cleaning. Everyone can help prevent the spread of infections by being involved, providing input, and initiating change in their own way.

Cleaning your hands is an ordinary procedure and does not take a lot of time and effort. You can use soap and water or alcohol-based hand rub. It takes only 20-30 seconds of your time to clean your hands.

National Infection Control Week will provide infection prevention and control professionals within healthcare facilities and community settings the opportunity to promote the "Spread Knowledge, Not Infection!" theme. Infection prevention and control professionals will be providing multi-modal education and collaborating with other organizations in order to deliver the message that infection prevention and control can be very simple and is most effective when everyone makes the effort.

Keep in mind that National Infection Control Week is just the beginning. This invaluable lesson is one that must continue to be taught so that the impact of infections can be minimized.

CHICA-Canada is a national, multi-disciplinary, voluntary association of infection prevention and control professionals (ICPs) with 22 chapters across the country dedicated to the health of Canadians by promoting excellence in the practice of infection prevention and control

Contact the infection prevention and control professional in your hospital, long-term care facility or community for further information on activities planned for National Infection Control Week. Visit CHICA-Canada's website (*www.chica.org)* for infection prevention and control information. For additional information:

ADD LOCAL CONTACT INFORMATION

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and High risk situations

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point-of-care equipment

[1]CDC. Guidelines for Environmental Infection Control in Healthcare Facilities, June 6, 2003/52 (RR 10): 1-42 II. Cleaning spills of blood and body substances

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3M

FIS/HIS 2012
BT Convention Centre, Liverpool
19-21 November 2012

The 8th International Healthcare Infection Society (HIS) Conference and Federation of Infection Societies (FIS) annual conference

All FIS Members Societies and CHICA members qualify for the special members' rate.

The HIS conference takes place every two years and is the major international conference focusing on infection control attracting leading world experts in healthcare associated infections as speakers and delegates. As well as attracting accreditation from both the ACCME and the Royal College of Pathologists, it will provide a unique opportunity for everyone involved to learn the latest developments in this rapidly expanding and changing field.

The meeting is driven by an excellent scientific programme covering topics such as infection prevention and control, epidemiology and surveillance, decontamination, new technologies, infectious diseases, laboratory microbiology and antimicrobial agents, to name a few. There will also be an opportunity for delegates to exchange views and ideas about the latest developments in nosocomial and hospital-acquired/healthcare-associated infections.

HIS is returning to Liverpool, one of Britain's most vibrant and cosmopolitan cities, after the very successful 2010 HIS International Conference. The 2012 event will again be located in the BT Convention Centre, a purpose-built, state-of-the-art facility situated in the heart of Liverpool along the historic, world heritage waterfront.

Early bird registration rate closes after 10th September 2012
Abstract submission closes 21st September 2012

For more information and to register visit
www.hisconference.org.uk
email: ***HISconference@fitwise.co.uk*** **| Phone: 01506 811077**

Member rate for CHICA members

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REFERENCES: 1. Stone S, et al., Removal of bath basins to reduce catheter-associated urinary tract infections. Poster presented at APIC 2010, New Orleans, LA, July 2010.

Seasonal influenza immunization for healthcare workers

Bowles S, McNeil S, Henry B

Immunize Immunisation Canada
immunize.ca

Influenza and its secondary complications remain a leading cause of respiratory infection and death in Canada. It is estimated that 20,000 hospitalizations related to influenza occur each year and that 4,000 to 8,000 people (mainly seniors) die as a result. It is the leading vaccine-preventable cause of death in Canada, outpacing all other vaccine-preventable diseases combined.

Healthcare workers are at increased risk for contracting influenza and transmitting influenza to others, including high-risk patients. Influenza immunization is a safe and effective way to reduce the spread of influenza. Studies repeatedly demonstrate that influenza immunization of healthcare workers reduces morbidity and mortality in patients and residents and reduces influenza illness in healthcare workers themselves. The benefits of seasonal influenza immunization to healthcare workers, their patients and their families far outweigh the risks associated with vaccination.

Immunize Canada is a coalition of national non-governmental, professional health, consumer, government and private sector organizations that supports seasonal influenza immunization as a preventive measure for good health.

For more information about seasonal influenza immunization visit immunize.ca or contact Immunize Canada by e-mail *at immunize@cpha.ca.*

DECLARE WAR ON HOSPITAL ACQUIRED INFECTIONS

NATIONAL
INFECTION CONTROL
WEEK
October 15-19, 2012

Developing a **strong and collaborative** partnership between Environmental Services and professionals on the Infection Prevention and Control team is **mission critical** to winning the **war** on Hospital Acquired Infections.

ARAMARK Healthcare supports your team in this fight!

Your **strategic partner** in the war on Hospital Acquired Infections:

ARAMARK Healthcare

Moira Walker Memorial Award for International Service

About the International Service Award

This award honors an individual or group that has demonstrated extraordinary efforts to bring about change or improvement related to infection prevention and control in parts of the world that are under developed or under resourced. The annual award is in honour of Moira Walker, RN, CIC, a Past President of CHICA-Canada and Past Honourary Secretary of the International Federation of Infection Control. Moira's life was dedicated to enhancing the physical and spiritual health of her many friends and colleagues.

Nomination guidelines

- Who is eligible
  Preferred: Current CHICA-Canada members in good standing.
  The award may be presented to individuals, prior nominees, or a group of individuals, but not past award recipients, who have demonstrated international cooperation in the field of infection prevention and control or public health. Fundraising efforts alone will not be sufficient criteria for this award.
- Who may nominate
  Any member of CHICA-Canada may submit a nomination. The CHICA-Canada Board of Directors (the Board) also has discretion to name an award winner in the event nominations do not result in a winner of the award. The nomination form is available at *www.chica.org* (Opportunities).
- How to nominate
  A completed nomination form and covering letter outlining the nominee's projects that have resulted in this nomination must be forwarded to the Membership Services Office no later than March 1st of each year.
- Selection process
  The nomination forms and covering letters will be summarized by the Executive Director and forwarded to the Board for review. The Board will select the recipient(s).

Award

A print with a First Nations and Inuit art theme. Award winner(s) will be provided with a complete waived registration (excluding special events) for the national education conference at which the award is presented. In the case of a group award, one representative of the group will be provided a complete waived registration.

NOMINATION DEADLINE:
March 1, 2013

Announcement and presentation

The award winner(s) will be advised by May 1 of each year. The award will be presented at the Opening Ceremonies of the CHICA-Canada National Education Conference.

June 1-5, 2013, Ottawa, ON

2013 National Education Conference

Host Chapter: CHICA Ottawa Region

The Preliminary Program is available at *www.chica.org*. The Registration Brochure will be posted and online registration will be launched in December 2012.

CONFERENCE HEADQUARTER HOTEL

THE WESTIN OTTAWA
Deadline for reservations:
April 26, 2013
Mention Community and Hospital Infection Control Association when making reservations
$222.00 Single/Double Plus 13% HST
Rates to be confirmed November 2012

YOU COULD WIN A FREE STAY!

The Westin Ottawa has been chosen as the headquarter hotel for the CHICA-Canada 2013 National Education Conference. If you register at the hotel before the deadline of April 26, 2013 and complete your stay, you will qualify to win three nights free!

The winner will be randomly chosen from the hotel guest list of those who have stayed at the Westin for the conference. The winner will be announced at the Closing Ceremonies, June 5, 2013. The winner will have their room and taxes PAID for a maximum of three nights' accommodation. The cost for up to three nights at the conference rate will be credited to the winner's hotel account before departure, or will be reimbursed after checking out.

This prize applies only to the winner's stay at the Westin Ottawa for the duration of the conference and does not apply to any coupon for a future stay at a Westin or other Starwood property. Good Luck!

CALL FOR ABSTRACTS

Abstracts are to be submitted online through *www.chica.org*. Abstract guidelines available in Preliminary Program. Deadline for online submission: February 15, 2013

Ask the microbiology expert

Do you have a microbiology-related question about collection, results, analysis or other aspect?

Submit your pressing microbiology questions for the experts, Drs. Baldwin Toye and Marc Desjardins.

One submission will receive a complimentary registration to the 2014 CHICA-Canada National Education Conference.

Submit questions to *chicacanada@mts.net* no later than May 1 2013.

SPECIAL EVENTS

Opening Ceremonies and Reception
Sunday, June 2
6:00-9:00 p.m.

CHICA Ottawa Region Meet & Greet
Monday, June 3
5:00-7:00 p.m.

Ottawa Sightseeing Tour
Monday, June 3
6:30-8:30 p.m. (to be confirmed)
Fee (to be confirmed)

Canadian Museum of Civilization
Tuesday, June 4
6:00-10:30 p.m. (to be confirmed)
$100 per person plus HST

2013 SCIENTIFIC PROGRAM COMMITTEE

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Stacey Burns, RN, BN, ET, CIC
PEI Department of Health and Wellness
Charlottetown PEI

OTHER SESSION CHAIRS AND VOLUNTEER POSITIONS

Pre-Conference Day – Morning
Healthcare Facility Design and Construction
In collaboration with the CHICA-Canada Healthcare Facility Design and Construction Interest Group
Barbara Shea, MLT, ART, CIC
Public Health Ontario
Central East Infection Control Network
Whitby, Ontario

PreConference Day – Afternoon
Teachable Moments
Silvana Perna, BScN, MSc(A), CIC
Jewish General Hospital
Montreal, Quebec

PreConference Day – Afternoon
Antibiotic Stewardship
Gary Garber, MD, FRCPC, FACP, FIDSA, CCPE
Ottawa Hospital – General Campus
Ottawa, Ontario

Volunteer Coordinator
Jean-Louis Pitre, RN, BScN, ENC(C), CD, Maj (Ret'd), CIC
Public Health Ontario – Champlain Infection Control Network
Ottawa, Ontario

Run/Walk for IFIC Coordinators
Jo-Anne Janigan, BScN
Ottawa Hospital - General Campus, Ottawa, Ontario
Sam MacFarlane, RN, CNeph(C), CIC
Ottawa Hospital - Civic Campus, Ottawa, Ontario

Conference Planning Office
Gerry Hansen, BA, Conference Planner
Kelli Wagner, Conference Assistant

hygie® A SIMPLE IDEA TO FIGHT HOSPITAL-ACQUIRED INFECTIONS

Since the *Clostridium difficile* outbreak began in Quebec hospitals in 2004, infections continue to make headlines and remain a constant concern for patients and healthcare facilities. Hospital-acquired infections have ramifications at all levels—they compromise patient health, monopolize vast amounts of resources, and generate astronomical costs. Prevention practices are the priority of Hygie Canada, a Canadian company founded in 2006 and the manufacturer of the hy21® line of specialty products that limit the spread of germs and reduce the risk of hospital-acquired infections.

INNOVATIVE DESIGN

Hygie's super absorbent pad insert in the hygienic bags, transforms body fluids into a gel, providing a simple and innovative solution to manage human waste(urine, stool and emesis) in both hospital and home-care settings.

The ergonomically designed supports for the bags are manufactured in Québec and are 100% recyclable.

The Hygie method consists in management and containment of all biological fluids around the patient's bedside. The hy21® hygienic oxo biodegradable bags and pads, which can absorb up to 500-600 ml of fluid, may be discarded in the patient's room trash can. The sealed bag and insert impede odor and save valuable healthcare worker time by eliminating transportation outside of the patient care area for processing.

A QUESTION OF PATIENT SAFETY

Of all the steps involved in handling potentially infectious bodily fluids, the transportation of these fluids and soiled supplies from the patient source for processing, represents one of the highest risks for spreading germs.

Discarding bodily fluids into the toilet increases the risk of contamination, as does the flushing the contents in the commode. The transportation of bedpans, urinals, and emesis basins out of the patient room for processing to a soiled utility area is another concern. As potentially infected supplies need to be moved through the hospital corridors to arrive at their destination, environmental contamination may occur during this process.

The goal of the hy21® product line is to improve patient safety practices by reducing the risk of contamination and infection transmission. We stand by the quality of our products, and are convinced they will reduce the risk of contamination, reduce time needed for patient care services and improve patient and staff satisfaction.

Our hy21® product line can also be used in emergency situations, such as overcrowded ERs and water shutdowns. They can also be used during patient transport and in home care.

Hygie Classic® commode chair with Hygie's Hygienic Cover®.

A QUESTION OF SAVINGS

The Ministère de la santé et des Services sociaux is categoric: "Hospital-acquired infections are a heavy burden on healthcare systems, both in Canada and internationally. Their repercussions are far-reaching, not only for patients and their families, but for hospitals and society as a whole. Based on projections made by the Comité sur les infections nosocomiales au Québec (CINQ) in 2004, the Aucoin report states that the extended hospital stays and additional care required to treat hospital acquired infections amount to approximately $180 million per year. Therefore, a 30% reduction in hospital-acquired infections would represent an annual savings of more than $40 million for the Québec healthcare network and free up the equivalent of 360 beds each year, thus helping to relieve emergency room overcrowding, shorten waiting lists and increase hospital efficiency [TRANSLATION]."[1]

[1] Prévention et contrôle nosocomiales-Plan d'action 2010-2015, Ministère de la Santé et des services sociaux du Québec.

hygie® A SIMPLE IDEA TO FIGHT HOSPITAL-ACQUIRED INFECTIONS

Eliminating the risk potential transmission of infections by reducing the potential contamination at the source during patient care with the implementation of the Hygie process is simple. If there are fewer infections, there will be fewer long term hospital stays and fewer costly resources required for these patients. The emotional cost of infections to patients and their families is also traumatic in many cases. Prevention at the source is our priority.

A QUESTION OF DESIGN

Hygie markets and sells a commode chair specially designed to work with its hygienic products. It was designed to meet the highest infection prevention standards, and the materials were selected for their tolerance to harsh disinfectants and ease of cleaning. This is one of the main reasons why many have purchased Hygie's commode chair. It is available in various sizes for different patient needs.

The hy21® product line includes three sets of supports and bags:

- bedpan kit
- urinal kit
- emesis kit

All three kits include a bag containing a super absorbent pad that transforms body fluids into gel.

A QUESTION OF CREATIVITY

Éric Tanguay, President and founder of Hygie, has been working in the medical equipment sector for over 20 years.

After witnessing the devastation caused by the *C. difficile* outbreak in 2004, he began brainstorming about hygienic products that could contain and control the primary source of organic waste contamination at the source- the patient room.

ABOUT HYGIE

Our market presence and mission

Over 500 hospitals across Canada currently use our products. Internationally, we have filed for patents in 38 countries. We hope that these products will assist in advancement of infection prevention practices worldwide.

Our mission

To provide patients and healthcare professionals with a clean, sustainable and innovative process to manage human wastes in simplicity and with dignity, and to promote maximum patient safety and efficiency for best practice at a reasonnable cost.

The hy21® technology is now available for home care. Visit our website to find our retailers and specialized stores.

www.hygie.com

Distance education graduates

CHICA-Canada congratulates the graduates of the 2011-2012 Distance Education Online Novice Infection Prevention and Control Course. The following group of graduates have successfully completed the course. This course also provides CHICA-Canada members with the opportunity to share their expertise in the roles of coordinators, instructors and discussion facilitators. Many thanks go to the faculty of the course and to the families and colleagues of the students for making it all possible for students to strengthen their knowledge and skills. We know that they are ready and eager to apply them to practice.

Congratulations and best wishes to:
Catherine Allison, Kitchener, ON
Joanne Andrew, Mill Bay, BC
Robert Arpin, Thunder Bay, ON
Patricia Bedard, Ottawa, ON
Frances Beswick, Dawson Creek, BC
Rishi Bhardwaj, Calgary, AB
Angela Bisschop, Unionville, ON
Beverley Brown, Gloucester, ON
Paula Burghgraef, Kitchener, ON
Davilyn Cairns, Winnipeg, MB
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Hong Hedy Liang, Toronto, ON
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Janine Moen, Grande Prairie, AB
Safiyya Nazarali, Waterloo, ON
Carla Nixon, Rossland, BC
Cecilia Peralta, Delta, BC
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Tenzin Yankin, Burnaby, BC
Joanna Zippel, London, ON

2011-2012 Faculty

Donna Moralejo, RN, PHD, Course Professor
Karen Dobbin-Williams, RN, BNN, MN, Course Administrator
Heather Candon, BSc, MSc, CIC, Course Coordinator
Jane Van Toen, MLT, BSc, CIC, Course Coordinator
Jill Richmond, BA, RN, BN, CIC, Practicum Coordinator
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Anne Augustin, MLT, CIC, Facilitator
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Meg Miller, RN, BScN, CIC, Facilitator
Jill Richmond, BA, RN, BN, CIC, Facilitator

For more information on upcoming course offerings, see CHICA-Canada Educational Opportunities on the CHICA website.

RETURN to Index

Unprecedented germ kill meets innovative dispensing

The latest skin care science breakthrough from GOJO starts with PURELL® Advanced Hand Rub – delivering unprecedented efficacy in a skin-friendly formulation. PURELL Advanced Hand Rub exceeds Health Canada ASTM E1174 efficacy requirements with just 1.3 mL.[1] Milliliter for milliliter, PURELL Advanced Hand Rub outperforms other leading hand sanitizers.[2] A leading-edge formulation demands superior dispensing solutions. That's why GOJO also introduced the manual ADX™ Dispensing System and our third-generation touch-free, LTX™ system. Both come with the GOJO Lifetime Performance Guarantee and are available in large-capacity and compact sizes.

Innovative solutions for better hand hygiene and fewer infections – we had a hand in that.

Visit GOJOCanada.ca/PURELLAdvanced to learn more.

Purell® BRAND

1. ASTME 1174, Study # 110238-101, April 25, 2011, BioScience Laboratories, Bozeman, MT. 2. ASTME 1174, Study # 100907-101, January 6, 2011, BioScience Laboratories, Bozeman, MT. ASTME 1174, Study # 111209-101, March 8, 2012, BioScience Laboratories, Bozeman, MT. When tested, using the ASTM E 1174 test methodology against other hand sanitizers commonly used in healthcare facilities. | #10017

GOJO®

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Ansell Canada	181	(800) 363-8340		www.AnsellProtects.com
ARAMARK Healthcare Canada	196	(416) 255-1331	Mona_Valladares@aramark.ca	www.aramark.ca
Association for Professionals in Infection Control & Epidemiology, Inc.	193	(202) 789-1890	ncampbell@apic.org	www.apic.org
B. Braun Medical Inc.	173	(800) 227-2862	Jonathan.Braido@bbraun.com	www.introcansafety.bbraunusa.com
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Canadian Standards Association	185	(416) 747-4000	Steve.simkus@csagroup.ca	www.csa.ca
Diversey, Inc.	168	(262) 631-4001	carolyn.cooke@sealedair.com	www.diversey.com
ECOLAB Healthcare	OBC	(800) 352-5326	tara.luther@ecolab.com	www.ecolab.com/healthcare
ergoCentric Seating Systems	181	(866) 438-3746	service@ergocentric.com	www.ergocentric.com
Fraser Health	187	(866) 837-7099	recruitment@fraserhealth.ca	www.fraserhealth.ca/careers
Glo Germ Company	179, 180	(800) 842-6622	moabking@gmail.com	www.glogerm.com
GOJO Canada, Inc.	202, 203	(800) 321-9647	healthcare@GOJO.com	www.GOJOCanada.ca
Hygie Canada Inc.	176, 200-1	(866) 588-2221	ppoitras@hygie.com	www.hygiecanada.com
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Metrex Corp.	160	(714) 817-5410	chris.turner@metrex.com	www.metrex.com
Retractable Technologies, Inc.	178	(888) 703-1010	Rtisales@vanishpoint.com	www.vanishpoint.com
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