Poster Abstracts

The CSHP is pleased to publish the abstracts for the display posters presented at the 2000 Annual General Meeting (AGM). This year's AGM took place from August 12 to 15, 2000, at the Crown Plaza Hotel, Winnipeg, Manitoba.

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A DRUG USE EVALUATION OF INTRAVENOUS AMIODARONE IN THE INTENSIVE CARE UNIT

Huber, C. B.Sc.(Pharmacy), Newman, P. B.Sc. (Pharmacy), Kingston General Hospital, Kingston, ON

Background: Intravenous (IV) amiodarone is an expensive antiarrhythmic agent. Its use has steadily increased and current criteria for use and dosing guidelines at Kingston General Hospital have not been evaluated since 1995.

Objectives: To develop evidence-based criteria for use of IV amiodarone in the intensive care unit (ICU). To evaluate the current use of IV amiodarone and make recommendations regarding the future use of IV amiodarone in the ICU.

Methods: New evidence-based criteria for use and dosing guidelines were developed. The ICU physicians were not aware of the guidelines prior to the DUE. Thirty adult patients treated with IV amiodarone in the ICU were enrolled between January 1 and April 15, 1999. Data on the use of IV amiodarone were collected and analyzed to determine which aspects of use required modification.

Results: Most patients received IV amiodarone for atrial arrhythmias. In 27 of 30 cases, the pre-determined criteria for use were followed. The average duration of treatment was three days ($1017 per patient). Wastage represented 15% of the amiodarone cost. Compliance with the appropriate loading dose (61%), maintenance dose (38%), bolus dose (10%), and infusion rate (first 24 hours) (52%) was sub-optimal. Seventeen percent of patients were converted to oral amiodarone.

Conclusions: The majority of physicians complied with the newly developed criteria for use. Compliance with recommended dosing could be improved. Duration of use was prolonged with few patients being converted to oral therapy.

COMMUNICATING THE TRANSITION TO CHLOROFLUOROCARBON-FREE METERED DOSE INHALERS

c. Allison, B.Sc.(Pharm), Children's Hospital of Eastern Ontario, Ottawa.

Rationale: Under the 1987 Montreal Protocol, Canada committed to phasing out chlorofluorocarbons (CFCs), which deplete the ozone layer. The use of CFCs in metered dose inhalers (MDIs) continued under a temporary essential-use exemption. However, now that alternatives to CFC MDIs are becoming available, international obligations require that a transition strategy be implemented for the phase-out of CFC-containing MDIs.

Description: Communication of the transition to CFC-free MDIs will occur in three phases. Phase I will provide information to health care professionals and professional associations. Phase II will expand to include MDI consumers. Phase III communications will incorporate the media and general public.

Implementation of change: It is anticipated that a 60% reduction in the use of CFC MDIs can be achieved by 2001. A complete phase out by 2005 is realistic.

Results: CFC propellants are being replaced by hydrofluoroalkanes (HFAs), which do not damage the ozone layer. The transition is occurring on a drug-by-drug basis, and existing CFC MDIs will remain available as long as they are essential for patient care.

Usefulness to Practice: Pharmacists need to be well informed of the pending change and need to be provided with the tools to communicate the changes to their patients. The new MDIs look the same as existing inhalers and are used the same way. However, patients must be prepared for a warmer, softer puff and the taste may be different. The transition to CFC-free MDIs provides an ideal opportunity for pharmacists to review patients' medications and inhalation techniques.

EVALUATION OF WARFARIN NOMOGRAM IN ORTHOPEDIC SURGERY

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Rationale of Study: Due to the risk of hemarthrosis, orthopedic surgeons often aim for a INR value below 2.0 although there is little evidence for this.

Objectives: The purpose of this trial was to assess the use of a warfarin nomogram in patients undergoing major orthopedic surgery.

Study Design: A group of patients dosed according to a nomogram (N) were compared with a control group of patients who had received wafarin in the year prior but who did not use a nomogram (C). The primary outcome, the rate of therapeutic days per 10 days, was compared between groups. Secondary outcomes included the number of thromboembolic events (TE), number of bleeding episodes, and need for vitamin K.

Results: Demographics between the groups (91 N, 91 C patients) were similar except for length of stay of 7.2 Å 3.1 days vs 9.0 +/- 2.4 days respectively (p=.002). The rate of therapeutic days per 10 days was smaller in N than in C patients (2.7 +/- 2.4 vs 3.5 Å 3.1 respectively) (p=0.005). None of 91 N and 6 of 91 C patients received vitamin K (p=.014). One patient in N group and 3 in C group experienced a TE.

Conclusion: The warfarin nomogram was not useful in attaining a higher proportion of therapeutic days but failure to achieve this was not associated with an increase risk in TE.

TREATMENT OF CHAGAS DISEASE IN AN IMMUNOCOMPROMISED PATIENT

J. Beales, B.Sc. Pharm., D.M.M. Woloschuk, Pharm. D., Health Sciences Centre, Winnipeg

This poster describes the case of a 37-year-old immunocompromised male, who developed Chagas disease during treatment for a T-cell prolymphocytic leukemia. Chagas disease (American trypanosomiasis) is an infectious disease caused by the protozoa Trypanosoma cruzi. It is unclear whether this patient was infected during a trip to Mexico or from a blood transfusion. Canadian Blood Services is currently investigating donors.

Chagas disease may be asymptomatic, acute, or chronic. Acute Chagas disease is characterized by a rash, periorbital edema, fever, chills, malaise, myalgia, and fatigue. Chronic Chagas disease is characterized by hepatosplenomegaly, myocarditis, an enlarged heart, rhythm changes, complete heart block and brain damage. Chagas disease can be particularly severe in immunocompromised patients. Drug therapies are effective in the acute phase of the disease. They are of no benefit in the late chronic phase.

Nifurtimox and benznidazole are both effective for the treatment of acute Chagas disease. Nifurtimox is available through the CDC in Atlanta. Benznidazole is only available in Latin America. Both drugs require long term treatment and frequently cause severe adverse effects. Allopurinol and itraconzole have also been used with limited success. This patient was receiving allopurinol for prophylaxis of gout when Chagas disease was diagnosed. This poster will review the therapeutic alternatives for the treatment of Chagas disease and the problems encountered when obtaining drugs for the treatment of Chagas disease.

A RETROSPECTIVE ANALYSIS OF RISK FACTORS AND PROGNOSTIC OUTCOMES IN PATIENTS WITH CLOSTRIDIUM DIFFICILE – ASSOCIATED DIARRHEA

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Rationale: Clostridium difficile – associated diarrhea (CDAD) is primarily a nosocomial infection and if not properly managed may become life threatening. The incidence of CDAD at our institution doubled in 1998.

Objectives: To evaluate outcomes of therapy in hospitalized adult patients with CDAD by comparing patients that resolved with patients that relapsed or failed therapy. To identify and quantify risk factors associated with CDAD.

Methods: During a 12 month period, 71 out of a possible 152 patients whose stools tested positive for CD cytotoxin were retrospectively studied.

Results: Sixty-nine patients were included into the study. Two patients did not meet the inclusion/exclusion criteria. The mean age was 68.5 ± 14.9 years old, of which 52.2% were males. Sixty patients received gastrointestinal agents with the majority (n = 46) using acid-suppressive therapy. Sixty-one patients were exposed to multiple antibiotics prior to developing CDAD. Ciprofloxacin, cefazolin, and clindamycin were the most commonly prescribed antibiotics. Cephalexin was used statistically more often in patients that failed therapy compared to patients that resolved. Patients that failed therapy were shown to have significantly more renal dysfunction compared to patients that resolved. Patients that failed therapy were treated with metronidazole and vancomycin more often than those that resolved. There were 66 treated episodes of CDAD and the average duration of antibiotic therapy was 11.7 ± 6.4 days. Complications were observed in 55.1% of patients and death was directly related to CDAD in 2 patients.

Conclusion: This study indicates that various factors may affect the outcome the CDAD however further studies are required to clearly define which risk factors resulted in relapses and treatment failures at our institution.

POPULATION PHARMACOKINETICS OF FENTANYL IN HEALTHY VOLUNTEERS

R.E. Ariano, PharmD, BCPS, St. Boniface General Hospital; P. Duke, MD; Health Sciences Centre; and D.S. Sitar, Ph.D., Clinical Pharmacology Section, University of Manitoba, Winnipeg, MB.

Earlier investigations had identified great variability in the reporting of average pharmacokinetic (PK) parameters for drugs such as fentanyl. It is quite possible that some of this variability is inherent to the process of reducing all PK parameters from study subjects down to a single point estimate representation of the entire population (eg. mean total body clearance). This is referred to as standard individualized modeling (SIM). Nonparametric expectation maximization (NPEM) is a population PK modeling program, which makes no assumptions about the overall distribution of PK parameters. Our objective was to compare the PK results obtained from NPEM and SIM modeling on data from volunteers receiving fentanyl.

Data from subjects receiving a single i.v. bolus of fentanyl 5 ug/kg were examined using SIM, and NPEM2 (USC*PAK). Data were fit to a two-compartment open model using parameters of Vc, CLp, Vp, and CLd. NPEM identified at least bimodal distribution in fentanyl clearance (ie. CLp modes of 0.6 L/kg/h and 2 L/kg/h), whereas SIM identified an average CLp of 1.8 L/kg/h. Using SIM in the design of drug infusion regimens with bimodal clearance could result in either toxic or subtherapeutic levels upon initial dosing. Since fentanyl is a substrate for CYP3A4, variable activity of this isoform may explain our PK observations.

CHEMICAL STABILITY OF FUROSEMIDE IN MINI-BAGS AND POLYPROPYLENE SYRINGES

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Furosemide is a loop diuretic that has been administered intravenously for years however its chemical stability when diluted has not been determined. This study will evaluate the chemical stability of furosemide when packaged in either mini-bags or polypropylene syringes and stored at 22° or 6°C.

The stability of furosemide mini-bags (60, 120 and 160 mg/50 mL) and syringes (10, 20, 40 and 80 mg/10 mL) diluted with normal saline (NS) and stored at either 22°C and protected from light (PFL) or 6°C and PFL was studied. Samples were collected, in triplicate, on days 0, 3, 7, 14, 28, 56 and 84 and then after exposure to fluorescent lighting (ETL) for an additional 7 days at 22°C. All samples will be analyzed, in duplicate, using a stability-indicating high pressure liquid chromatography (HPLC) assay. Samples will also be monitored for color, clarity and pH changes.

At the time of writing this abstract, only the samples packaged in syringes and stored at 6°C had been analyzed. All analyzed samples were stable for 84 days at 6(C and PFL and an additional 7 days at 22°C and ETL. There was no change in color or clarity and the pH did not change significantly over the course of the study. The remaining test results will be presented at the poster session.

At our institution, we have assigned a 28 day expiry date for furosemide (10, 20, 40 and 80 mg/10 mL) diluted with NS and packaged in polypropylene syringes and stored at 6°C (PFL) and 7 days for syringes stored at 22°C (ETL).

CHEMICAL STABILITY OF HYDROMORPHONE WITH BUPIVACAINE HYDROCHLORIDE IN POLYPROPYLENE SYRINGES

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Narcotics are commonly combined with local anesthetic agents for epidural administration during many surgical procedures. Review of the literature found no chemical stability studies for hydromorphone combined with bupivacaine HCl packaged in polypropylene syringes. A chemical stability study was there undertaken to determine a self-life that would allow batch preparation of this combination without significant wastage.

Hydromorphone (0.2 and 0.4 mg/mL) was combined with bupivacaine HCl (0.25%), packaged in 3 polypropylene syringes, and stored at either 22°C and exposed to light (ETL) or 6°C and protected from light (PFL). Five mL samples were taken from each syringe on days 0, 7, 14, 28, 56, and 91 and frozen at -72°C. All samples were monitored for color, clarity and pH changes in addition to being analyzed in duplicate using a stability-indicating high pressure liquid chromatography (HPLC) assay.

All stability samples remained colorless and free of precipitate throughout the course of the study. There were no significant changes in pH under any of the storage conditions. Both the hydromorphone (0.2 and 0.4 mg/mL) and bupivacaine HCl (0.25 %) stored at 22°C and 6°C remained stable for 91 days.

Hydromorphone (0.2 and 0.4 mg/mL) and bupivacaine HCl (0.25 %) stored at 22°C (ETL) and 6(C (PFL), packaged in polypropylene syringes, were considered stable for at least 91 days. At our institution, we have implemented a 30 day expiry based on our sterile packaging policy. Facilities wanting to use this chemical stability information should first determine their own institute specific sterile packaging testing.

A RETROSPECTIVE ANALYSIS OF COMMUNITY IV THERAPY CLIENTS TREATED WITH CEFAZOLIN/PROBENECID COMBINATION THERAPY

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Published articles over the last few years have explored the use of probenecid to prolong the half life of penicillin-G, cefazolin, cefuroxime, ceftizoxime and cefoxitin by inhibiting renal tubular secretion. Doses of probenecid used in the studies varied and reports of clinical experience is lacking.

The Community IV Therapy Program (CITP) team developed criteria for the use of cefazolin 2 g intravenously and probenecid 1 g orally once daily for program clients with soft tissue infections. Once daily dosing resulted in lower costs, increased patient convenience and enrollment.

Data was reviewed and analyzed for all clients treated with cefazolin and probenecid on the CITP from May 1, 1999 to January 31, 2000. Treatment duration and outcomes were compared with traditional intravenous therapy for clients accepted for treatment of cellulitis. In patients treated for cellulitis successful outcomes were reported in 99/101 (98%) of patients on traditional therapy and 31/31 (100%) of patients on cefazolin/probenecid. Duration of home intravenous treatment averaged 6.7 days for traditional therapy and 5.5 days for cefazolin/probenecid therapy.

Due to stringent criteria developed for using cefazolin/probenecid, clients with more complicated infections conditions have been steered away from this treatment regimen. Hence the acuity/severity of the cellulitis infections in clients treated with traditional IV antibiotics is possibly greater than those of the cefazolin/probenecid combination.

Based on this analysis we conclude that cefazolin/probenecid is an efficacious option for patients with uncomplicated cellulitis, which can facilitate better use of healthcare resources.

WARD ASSESSMENTS LEAD TO ENHANCED PHARMACIST ROLE IN DIRECT PATIENT CARE

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Inpatient clinical pharmacy services at our 550 bed tertiary care hospital have been well established on Internal Medicine and Critical Care units for many years. Benefits of pharmacist involvement in direct patient care have been reaffirmed by local projects and the pharmacy literature. There is a growing demand from pharmacists for a clinical role in their practice. As a result, we needed to enhance the role of all inpatient pharmacists as well as expand clinical services to a broader number of inpatient units. Automated drug dispensing technology has provided this opportunity.

The process of ward assessments began in the spring of 1999. The purpose was to identify which inpatient units would receive decentralized pharmacy services within existing pharmacist resources. The assessments were conducted by a single experienced clinical pharmacist according to clearly identified goals. Pharmacist training/education needs were simultaneously identified. Patient care unit selection and pharmacist allocation were completed by April 2000. A pharmacist training/education program was developed and implemented.

In conclusion, automated dispensing technology is facilitating, without increased human resources, the expansion of clinical pharmacy services from 3 sites to 7 sites with an increase from 6 pharmacists to 14 pharmacists having clinical roles.

IMPLEMENTING A PHARMACY-BASED ANTIBIOTIC SENSITIVITY REPORTING PROGRAM FOR NURSING STATION PRACTICE

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Purpose
To determine the antibiotic resistance rates of bacterial isolates for the 32 communities in the Sioux Lookout Zone. To compare and contrast the patterns of bacterial antibiotic resistance across the study region. To compare and contrast the changing antibiotic sensitivities of the bacterial isolates over the 3-year study period.

Methods
All bacterial cultures gathered at the community level are forwarded to the hospital microbiology department, where identification and sensitivity testing procedures are completed according to NCCLS guidelines; additional sensitivities may be completed at the request of the physician or pharmacist. A three year time period (January 1997 through January 2000) was set for conducting a retrospective analysis of all bacterial cultures completed onsite; information was collated using a Lotus Approach® database. The following data was collected: sample collection date, community from which the sample was gathered, patient identification number, sample type, bacteria species isolated, susceptibility to NCCLS recommended antibiotics, susceptibility to other antibiotics as requested by medical staff. Cultures for *Mycobacteria sp.*, *Chlamydia sp.*, and obligate anaerobic organisms are completed offsite and were not considered in the review.

Discussion
Given the worldwide problem that antibiotic resistance presents, there are clear benefits for documenting regional resistance rates and patterns for the purpose of optimizing antibiotic use. The distinctions in the antibiotic resistance patterns observed between the communities in the Sioux Lookout Zone offer direction for improving drug utilization, reducing adverse reaction rates, and decreasing medication costs. This pharmacy-based program provides relevant epidemiological data to medical practitioners and gives the requisite support for implementing community-specific empiric antibiotic guidelines.

THE DEVELOPMENT AND IMPLEMENTATION OF A TECH CHECK TECH PROGRAM AT A TERTIARY CARE HOSPITAL

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Our pharmacy department, in collaboration with the regional pharmacy program and provincial pharmacy regulatory body, developed a Tech Check Tech program. The purpose of the program was to delegate technical functions from pharmacists to technicians, thus enabling more pharmacists to become involved in direct patient care. Following implementation of an automated dispensing system and Tech Check Tech decentralized pharmacists will increase from 3 to 7 sites.

The development of the program involved designating 1 pharmacist to the project full time for approximately 12 months. A committee of 2 pharmacists and 3 technicians developed departmental guidelines, a validation procedure and a quality assurance process.

Criteria was established to determine technician eligibility with the goal of validating all technicians working in the inpatient areas. The validation process consisted of didactic material, practical training, a practical test and a written test. One pharmacist was responsible for all training and testing in order to maintain consistency. All eligible technicians completed the one week program during a 5 month period.

Initially technicians were validated to check strip packaging of oral solids, Centralized Intravenous Admixture (CIVA) doses for the patient wards and CIVA batch compounding. The goal is to expand checking duties to include all IV solutions prepared in the pharmacy department. Timing of this expansion is till to be determined.

PROTON PUMP INHIBITORS IN ACUTE UPPER GASTROINTESTINAL BLEEDING PEPTIC ULCERS: A META-ANALYSIS

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Purpose: To evaluate the efficacy of proton pump inhibitors (PPIs) compared to placebo and histamine receptor antagonists (H2RA) for reducing incidence of rebleeding, surgery and death in acute gastrointestinal bleeding (GIB) associated with peptic ulcer disease.

Data Sources: A systematic search of the English-language literature using MEDLINE, EMBASE, and Pre-MEDLINE databases from 1966 to March 2000 and a manual search of references from retrieved articles were performed.

Study Selection: Prospective, randomized, controlled clinical trials evaluating any PPI for acute GIB in adults were considered. Only studies that evaluated the incidence of rebleeding, surgery or death were included.

Data Extraction: Each trial was assessed by each author to determine the adequacy of randomization and description of withdrawals. Efficacy data was extracted according to a predefined protocol.

Data Synthesis: 8 trials (for a total of 789 study participants in the PPI group and 800 in the comparative group) were included. The summary of results for the odds of rebleeding indicated a 43% reduction in the PPI-treated group (OR 0.57 [95% CI 0.38-0.85], p=0.007, NNT = 10, [95% CI 6-16], test for heterogeneity p=0.31). The summary of results of the odds of surgery indicated a 52% reduction in the PPI-treated group (OR 0.48 [95% CI, 0.28-0.83], p=0.008, NNT = 17 [95% CI 11-37], test for heterogeneity p=0.63). The summary of results examining mortality indicated a non-significant 38% increase in the odds of death in the PPI-treated group (OR 1.38 [95% CI, 0.79-2.40], p=0.26, test for heterogeneity p=0.44).

Conclusion: This meta-analysis suggests that PPIs are superior to comparative groups in the treatment of acute GIB although they do not reduce mortality associated with this condition.

ASSESSMENT OF THE THERAPEUTIC EFFECT AND ECONOMIC IMPACT OF STANDARDIZED ORDER FORMS ON THE PREVENTION OF POST-OPERATIVE NAUSEA AND VOMITING (PONV)

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Background: Postoperative nausea and vomiting (PONV) is a serious complication of surgery. Gynecological procedures are associated with a 60-75% incidence. Despite a reduction in PONV by 15% through pharmacotherapy, suboptimal prophylaxis occurs.

Objectives: To assess the clinical and economic impact of preprinted orders for PONV prophylaxis in gynecological surgery.

Methods: 1) Clinical effect: a pre/post study design in which 200 randomly selected patients from 6 month periods in each of the pre and post-intervention phases were reviewed. 2) Economic impact: Direct medical resource use and costs were obtained for PONV prophylaxis and management. These values were applied to each event in each phase. Comparisons between groups were made with t-tests and (2 tests.

Results: In the pre-intervention phase, 31% of patients received PONV prophylactic medication compared to 47% in the post-intervention phase (p=0.003). Dolasetron use doubled (5% in pre and 10% in post-intervention phases, p=0.057). PONV occurred in 77% and 68% of patients in the pre -and post-intervention phases respectively (p=0.037). Headache was the most common adverse event and occurred in similar frequency between the two phases. The estimated mean total cost of a PONV episode was $9.56 ($7.87 prior to the implementation of the standard form compared to $8.07 ($8.36 following implementation (p=0.067).

Conclusion: The use of the preprinted orders resulted in an increase in PONV prophylaxis, a reduction in PONV incidence, and a trend towards reduced costs. A standardized approach to PONV prophylaxis appears to be cost-effective and may be warranted in other institutions.

UPCOMING EVENTS / ÉVÉNEMENTS À VENIR

PROFESSIONAL PRACTICE CONFERENCE (PPC)

**February 3 - 7, 2001
Westin Harbour Castle, Toronto, Ontario
** Revised Dates** Conference will commence on the Saturday Feb. 3rd with an opening reception, followed by 4 days of educational sessions Sunday 4th-Wednesday 7th inclusive, exhibits will display Monday 5th and Tuesday 6th.

Annual General Meeting (AGM)
August 11 - 14, 2001, The Westin Nova Scotian, Halifax, Nova Scotia

Annual General Meeting (AGM)
August 10 - 13, 2002, Westin Bayshore Hotel, Vancouver BC

Annual General Meeting, (AGM)
August 2003, St. John's, Newfoundland

Annual General Meeting, (AGM)
August 2004, Edmonton, Alberta

Annual General Meeting, (AGM)
August 2005, Quebec

Annual General Meeting, (AGM)
August 2006, Ontario.