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Extent of Agreement in Gentamicin Concentration between Serum that is Drawn Peripherally and from Central Venous Catheters

Clinical Pharmacy Program Award,
sponsored by Bristol-Myers Squibb Canada
Sabrina Boodhan, RPh, HonBSc, BScPhm, ACPR;
Anne Marie Maloney, RN, MSN, ACNP; L. Lee Dupuis, RPh, MScPhm

Objective: At our institution, patients who receive once-daily dosing of gentamicin have serum concentrations determined 3 and 6 hours after dose administration. Patients with single-lumen central venous catheters (CVCs) have the 3-hour samples drawn peripherally. The objective of this study was to evaluate the extent of agreement between peripheral and CVC serum gentamicin concentrations drawn 3 hours after dose administration.

Methods: In this prospective, observational study, patients provided both a peripheral and a central blood sample for determination of serum gentamicin concentration. The order of sampling (CVC versus peripheral first) was randomized. Agreement was assessed by determination of the intraclass correlation coefficient (ICC) and Bland-Altman analysis. The clinically acceptable targets for the lower limit of the ICC and Bland-Altman limits of agreement were defined a priori as >0.80 and ±6%, respectively. Differences between the theoretical dose adjustments using the CVC versus the peripheral sample result were described.

Results: Forty-five pairs of samples were collected: 42 from single-lumen implantable CVCs (ports) and 3 from peripherally inserted CVCs. The ICC was 0.91. However, the Bland-Altman analysis resulted in a mean percentage difference (CVC versus peripheral) of –0.92% and limits of agreement of –27.9% to 26.0%. The gentamicin dose adjustment based on the CVC sample result would have led to clinically significant dose adjustments in 19 (42%) cases, when compared with the peripheral sample result.

Conclusions: These results indicate a lack of agreement between peripheral and single-lumen CVC samples. In particular, ports are not appropriate sites for monitoring serum gentamicin concentrations.

Key words: gentamicin, therapeutic drug monitoring, reliability, central venous catheters, blood sampling

Pharmacist Medication Assessments in a Surgical Pre-Admission Clinic (SPPACE)

Innovation in Safe Medication Practices Award,
sponsored by Baxter Corporation
Yvonne Kwan[1], Olavo Fernandes[1,2], Jeff Nagge[1,3,4], Gary Wong[1], Jin-Hyeun Huh[1], Deborah Hurn[1], Gregory Pond[1], Jana Bajcar[2];
[1]University Health Network, Toronto, Ontario; [2]Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, Ontario; [3]Centre for Family Medicine, Kitchener, Ontario; [4]School of Pharmacy, University of Waterloo, Waterloo, Ontario

Background: In hospital, post-operative admission is a key vulnerable moment where patients are at increased risk of medication discrepancies.

Objective: To measure the impact of structured pharmacist medication history interviews with assessments in a surgical pre-admission clinic (SPAC) and a post-operative order form on reducing medication discrepancies.

Methods: Patients who had a SPAC appointment were included in the study, but were excluded if they were scheduled for discharge the same day as their surgery. Patients were randomized to the intervention arm (pharmacist medication history interview with assessment and generation of a post-operative medication order form) or standard care. Primary endpoint was the number of patients with at least one post-operative medication discrepancy related to home medications.

Results: From April 19 to June 3, 2005, 463 patients were enrolled in the study. Of the 416 patients who completed the study, 202 and 214 patients were randomized to the intervention and standard care arms respectively. In the intervention arm, 41 (20.3%) patients had at least one post-operative medication discrepancy related to home medications, compared to 86 (40.2%) in the standard care arm (p<0.001).

Conclusions: Pharmacist medication assessments and use of a post-operative order form can reduce medication discrepancies related to home medications.

Key words: medication discrepancies, pharmacists, post-operative period, pre-admission

Medication Assessment of Geriatric Inpatients by Clinical Pharmacists (MAGIC)

Long-Term Health Care Award, sponsored by Pfizer Canada Inc
Kerry Wilbur, BScPharm, ACPR, PharmD; Roger YM Wong BMSc, MD, FACP, FRCPC; Anna Liu, Pharmacy Student

Background: Routine skills-assessment evaluating safe medication management by geriatric patients has been recommended. It has been demonstrated that pharmacists are more likely to discover and address obstacles to self-medication.

Objectives: To identify proportion of geriatric patients demonstrating functional inability to manipulate medication packaging using a pharmacist-administered screening tool and to determine predictive patient characteristics.

Methods: Sixty patients admitted to an Acute Care for Elders unit at a major tertiary care center were enrolled.

Results: One third of patients demonstrated overall impaired ability to functionally manage medication packaging. Forty-two percent were unable to distinguish different pill colors or remove tablets from a non-child resistant container (28%) or a blister package (12%). Individual risks associated with inability to functionally manage medication packaging could not be identified in this cohort, although those who demonstrated impaired functional ability were somewhat older (85.8 years vs 81.7 years, p= 0.003). The average pharmacist time to conduct the skills assessment tool exceeded one-half hour.

Conclusion: We identified geriatric inpatients exhibiting impaired ability to perform specific functional-related tasks when a pharmacist administered a simple and straightforward screening tool. More study is needed to determine how this and other available assessment tools predict actual medication use at home and if intervention impacts health-related outcomes.

Key words: medication management, geriatric, screening tool, pharmacist

Development of a Meditech® Software-Based Pharmacist Clinical Workload Measurement System

Management Issues in Pharmaceutical Care Award, sponsored by Apotex Inc
Adrienne Lindblad, Alison Alleyne, Jason Howorko; David Thompson Health Region, Red Deer, Alberta

Background: Implementation of a new pharmacy computer system allowed for creation of a pharmacist workload measurement system that focused on pharmacist direct patient-care interventions.

Objective: To describe the workload and outcomes measurement system developed within Meditech® software, and to demonstrate its use in a community hospital.

Methods: A numerical system for recording workload when documenting interventions in the patient's chart was developed. Interventions were categorized according to nature of drug-related problem, proposed patient outcome and acceptance by prescriber. Pharmacists' clinical interventions were quantitatively described over a six-month period.

Results: Fourteen pharmacists tabulated 2645 interventions from January to June 2006. There was a mean of 4.6 (3.4 interventions per pharmacist per clinical shift. A broad range of drug related problems were identified. For every intervention, 1.4 clinical, 0.8 humanistic and 0.1 economic outcomes were recorded. Only 3.2% of recommendations were rejected by prescribers at the time of documentation.

Conclusion: Numerous drug-related problems were identified by pharmacists with various proposed outcomes. Most pharmacist interventions were accepted by prescribers. Our workload measurement system allowed pharmacists to document their clinical activities and incorporate the proposed patient outcomes of their interventions.

Key words: pharmacist, documentation, workload measurement, health outcomes

Implementation of a Self-Administered Questionnaire to Identify Patients at Risk for Medication-Related Problems in a Family Health Center

New Programs in Patient Counselling Award, sponsored by Novopharm Limited
Bradley J. Langford, B.Sc.Phm., ACPR; Derek Jorgenson, Pharm.D.; Debora Kwan, B.Sc.Phm., M.Sc.; Christine Papoushek, Pharm.D.

Background: Methods to systematically identify patients at-risk for medication-related problems (MRPs) are currently lacking in the ambulatory setting.

Objective: This study was conducted to determine if a self-administered questionnaire can more appropriately identify patients at-risk for MRPs compared to usual methods of referral.

Methods: Ambulatory patients ≥ 18 years old, taking ≥ 2 medications were eligible to complete the questionnaire. A pre-validated modified five-item self-administered questionnaire statistically correlated with MRP-risk was used. All patients completed the questionnaire and were subsequently randomized to one of two groups: 1) referral by usual methods or 2) referral according to questionnaire score. Primary outcomes were rate of referral and level of risk of referral in the usual referral group.

Results: Of the 194 patients that completed the questionnaire (89 randomized control group and 105 to intervention group), more patients (20%) were referred by the questionnaire compared to usual methods of referral (6%) (p=0.003). Of the five patients referred by usual methods, one was at-risk for MRPs according to the questionnaire. Of the 84 patients not referred in the control group, 14% were actually at-risk according to the questionnaire, suggesting that there are several at risk patients that are not referred by usual methods that would in-fact benefit from a pharmacist's assessment.

Conclusion: A self-administered medication-risk questionnaire is an effective complement to usual referral practices for the identification and referral of patients at risk for MRPs.

Key words: medication-related problem, MRP, pharmacist review, pharmacist referral, self-administered questionnaire, screening tool

Evaluation of Predictive Formulae for Glomerular Filtration Rate for Carboplatin Dosing in Gynecological Malignancies

Oncology Award, sponsored by Mayne Pharma (Canada) Inc
Mário L. de Lemos,[1] Teresa Hsieh,[2] Linda Hamata,[1] Adeera Levin,[3] Ken Swenerton,[1] Thanh Vu,[4] Francis Hu,[4] James Conklin,[1] Suzanne C. Malfair Taylor[1]; [1]BC Cancer Agency; [2]at the time of the study, pharmacy student, University of British Columbia; [3]BC Provincial Renal Agency; [4]at the time of the study, BC Cancer Agency.

Partly supported by the CSHP 2004/5 Research Grant.

Purpose: Carboplatin dosing is usually based on glomerular filtration rate (GFR). The Cockcroft-Gault (CG) and the Modified Diet in Renal Disease (MDRD) Study formulae are based on serum creatinine (SrCr) to estimate GFR (eGFR) when measured GFR (mGFR) is impractical. MDRD formula has been shown to be more accurate in non-cancer patients with chronic renal disease. We compared the accuracy of these formulae for dosing carboplatin in patients with gynecological cancers.

Methods: Patient data were collected retrospectively at the Vancouver Centre of the BC Cancer Agency. eGFR was compared to mGFR. Dose derived from eGFR was compared to dose derived from mGFR. Bias (percentage error) and precision (absolute percentage error) were compared with two-sided paired t-test.

Results: 96 patients were evaluable: median 60 y, 62 kg, height 159 cm, baseline SrCr 71 micromol/L, GFR 91 mL/min. Both formulae had limited precision with a small bias for eGFR and dosing. 85% of patients would have received a significantly different dose if eGFR was used. The MDRD was more precise than the CG formula.

Conclusions: The MDRD seems to be more accurate than the CG formula in this population. However, both have limited precision and mGFR should be preferred for carboplatin dosing.

Key words: antineoplastic agents, carboplatin, glomerular filtration rate, ovarian cancer

Potential Cost-Effectiveness of Annual Influenza Immunization for Infants and Toddlers: Experience from Canada

Pharmacoeconomics Award, sponsored by Novartis Pharma Canada Inc
Danuta M. Skowronski, John C. Woolcott, S. Aleina Tweed, Robert C. Brunham, Fawziah Marra

Background: In 2004, expert groups in North America recommended annual influenza immunization for healthy infants and toddlers aged 6–23 months with a goal of reducing high hospitalization rates.

Objectives: To assess the cost-effectiveness of this program in Canada.

Methods: Analysis was from third-party payer and societal perspectives in preventing hospitalization and other outcomes among 500,000 vaccinated or non-vaccinated infants/toddlers. Base-case assumptions include: 25% attack rate (AR), 1% case hospitalization rate (HR), vaccine effectiveness (VE) of 66%, CDN$15 per dose for vaccine and administration and doses required by 100% (first year) or 33% (subsequent years) immunized. Costs are in Canadian dollars.

Results: After the first year, influenza immunization costs the third-party $9 per day of illness averted, $120 per physician visit averted, $7000 per hospitalization averted, $3million per death averted and $450,000 per life year gained. Corresponding costs from societal perspective are $3, $45, $2500, $1million and $170,000. The program becomes cost-saving from TPP and societal perspectives at AR> 55% and 28%; HR> 4% and 2%, or cost per dose <$6.81 and <$11.90.

Conclusions: In the base case, infant/toddler influenza immunization is not cost-saving but could become more cost-effective in settings of higher AR and lower immunization cost.

Key words: Influenza; Infant; Toddler; Immunization; Cost effectiveness

Feasibility of Antibiotic Short-course Therapy for Ventilator-Associated Pneumonia: FASTVAP

Rational Drug Use Award, sponsored by Merck Frosst Canada Ltd
Lynne-Michelle M. Stewart, BSc(Pharm),ACPR; Sean K. Gorman, BSc(Pharm),ACPR, PharmD; Richard S. Slavik, BSc(Pharm),ACPR, PharmD, FCSHP; Jane de Lemos, B(Pharm), PharmD, MS; Dean Chittock, MD, FRCPC, MS; Vinay Dhingra, MD, FRCPC; Harjinder Parwana, BSc(Pharm), ACPR

Background: Ventilator-associated pneumonia (VAP) is a significant complication of mechanical ventilation in critically-ill patients. Early discontinuation of antibiotics for VAP can reduce the emergence of antimicrobial resistance, adverse drug events and costs. Evidence suggests that discontinuation of antibiotics for VAP by day 3 may be appropriate in patients with a Clinical Pulmonary Infection Score (CPIS) ≤ 6 from baseline to day 3. It is unknown if a CPIS-guided antibiotic discontinuation policy is required to improve antimicrobial prescribing for VAP at Vancouver General Hospital (VGH).

Objectives: To determine the proportion of patients eligible for antibiotic discontinuation at day 3 and day 7 of therapy, and to determine the proportion of eligible patients who had antibiotics discontinued by day 3 or day 7.

Methods: A 6-month observational study was conducted in a 27-bed medical/surgical tertiary-care intensive-care unit (ICU).

Results: Forty-nine patients with VAP were included for analysis. At day 3, 17 (35%) patients were eligible for early antibiotic discontinuation. However, only 2 (12%) patients had their antibiotics discontinued by day 3. At day 7, 10 (32%) patients were eligible for antibiotic discontinuation. However, only 1 (10%) patient had their antibiotics discontinued by day 7.

Conclusions: A significant opportunity exists at VGH to develop and implement an antibiotic discontinuation policy that utilizes the CPIS to rationalize antibiotic use for VAP.

Key words: ventilator-associated pneumonia, artificial respiration, clinical pulmonary infection score, antibacterial agents

The Safety and Effectiveness of Antiretovirals in Pregnancy

Specialties in Pharmacy Practice Award, sponsored by Hoffmann-La Roche Limited
Dalyce Zuk, BScPharm, ACPR, PharmD student, University of British Columbia; Christine Hughes, BScPharm, PharmD, Associate Professor, Faculty of Pharmacy & Pharmaceutical Sciences, University of Alberta, Clinical Pharmacist, HIV, UAH Site ; Michelle Foisy, BScPharm, PharmD, Clinical Practice Leader, HIV Pharmacist, Northern Alberta Clinic, Royal Alexandra Hospital

Background: Combination antiretroviral therapy significantly reduces the risk of perinatal transmission of human immunodeficiency virus (HIV). Information is limited regarding risk of maternal adverse effects secondary to antiretrovirals and effectiveness of therapy in preventing mother to infant transmission.

Objectives: To identify the frequency and severity of adverse effects experienced by pregnant HIV-infected women receiving antiretroviral therapy. In addition, to evaluate the effectiveness of therapy in preventing mother to infant transmission of HIV.

Methods: A retrospective analysis of HIV-infected women who were pregnant between January 1997 and February 2006. Pregnant women and their infants were identified using the HIV program and Pediatric Infectious Disease clinic databases and chart reviews were performed.

Results: Of 190 identified pregnancies, 133 infants were delivered. Approximately 30% of women experienced adverse reactions, most of which were mild to moderate. Sixty-five percent of women had undetectable viral loads at delivery. There were four infants who were confirmed HIV positive.

Conclusion: In this cohort, HIV-infected pregnant women did not appear to experience more frequent or severe adverse reactions to antiretroviral therapy. Overall, the risk of mother to infant transmission was low, and there were no cases of transmission where optimal intervention was possible.

Key words: HIV, adverse drug reaction, pregnancy, antiretrovirals

Implementation and Evaluation of a Pharmacy-Based Heparin-Induced Thrombocytopenia Safety Improvement Initiative in Cardiac Surgery

Specialty Practice in Cardiology Award, sponsored by sanofi-aventis Canada Inc
Claudia Bucci[1,2], Andrew Sinclair[1], Sherri Tawfik[1], Bill Geerts[3], Mary Pahk[1], Bill Bartle[1,3]; [1]Department of Pharmacy, [2]Division of Cardiology, [3]Department of Thromboembolism, Sunnybrook Health Sciences Centre, Toronto, Ontario

Rationale: Heparin-induced thrombocytopenia (HIT) is a potentially devastating complication of heparin treatment that is most commonly encountered following cardiovascular surgery (CVS). We implemented a program to reduce patient exposure to UFH after CVS and to possibly also reduce the risk of HIT.

Objective: The primary objective of this initiative is to improve patient safety following CVS, including heart valve surgery.

Methods: Several practice changes were implemented to reduce exposures to UFH; including multidisciplinary HIT education, removal of UFH from central venous and peripheral arterial line flushes, removal of UFH from relevant nursing units and creation of new standard orders. UFH was replaced by LMWH for thromboprophylaxis, for therapeutic anticoagulation after CVS and for anticoagulation of heart valve replacement patients. In the heart valve population, we performed a retrospective evaluation of patients managed with UFH or LMWH to assess the effects on efficacy and safety.

Results: This initiative has reduced exposure to UFH in the CVS patients at our institution. In addition, the risk of HIT and associated thrombotic complications appeared to be lower in the heart valve patients who received LMWH compared to UFH.

Conclusion: This initiative has substantially reduced avoidable exposures to UFH and may well reduce the risk of HIT. Furthermore, our pilot study provides support for the use of LMWH after heart valve surgery.

Key words: heparin-induced thrombocytopenia, cardiovascular surgery, heart valve

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