

The Role of the Pharmacist in Procedural Sedation and Analgesia in the Emergency Department

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INTRODUCTION

In the hospital setting, the role of the clinical pharmacist continues to evolve. The provision of clinical pharmacy services for both inpatients and outpatients has been shown to reduce adverse drug events, patient mortality, length of hospital stay, and health care costs.¹⁻⁷ Over the past 3 decades, various reports of clinical pharmacy services specific to the emergency department have described a variety of pharmacist responsibilities, including identifying drug-related problems, providing patient education, obtaining patient medication histories, providing pharmacokinetic monitoring and toxicology information services, and participating on cardiopulmonary resuscitation teams.⁸⁻¹¹ At present, it is estimated that about half of Canadian hospitals offer outpatient clinical pharmacy services in the emergency department.¹²

In their recent “Call to Action for Hospital Pharmacists”, Idrees and Clements¹³ discussed the report on the future of emergency care in the United States, published by the Institute of Medicine’s Board on Health Care Services.¹⁴⁻¹⁶ Idrees and Clements suggested that, in response to overcrowding, fragmented care, and shortcomings in pediatric emergency care and disaster preparedness—all issues that are also faced by Canadian emergency departments¹⁷—pharmacists should participate in and lead initiatives to improve patient care and optimize collaborations among personnel within the emergency department. Because of the high volume, acuity, rapid turnover, and heterogeneity of patients seen in the emergency department, this environment offers multiple opportunities for pharmacists to expand their scope of practice. At one site in the United States, the addition of clinical pharmacy services in the emergency

department improved patient care, reduced medication errors, and reduced drug expenditures.¹⁸ In at least 32% of hospitals in the United States, rapid response teams, including cardiopulmonary resuscitation teams, have pharmacist representation,¹⁹ but this expanded scope of practice remains a low priority for pharmacy administrators in Canadian hospitals.^{12,18,20,21} According to one US estimate, expanding clinical pharmacy services in the emergency department, including resuscitation services, avoided potential drug costs of US\$1 million dollars over a 4-month period.²² In addition, using the 1992 National Clinical Pharmacy Services database, Bond and Raehl⁶ found that pharmacist participation on cardiopulmonary resuscitation teams was associated with fewer patient deaths.

Procedural sedation and analgesia constitute another area where an expanded scope of practice for clinical pharmacists might be considered. Procedural sedation and analgesia involves the administration of sedatives or dissociative agents with or without analgesics to induce a state in which patients can tolerate painful or frightening procedures without any compromise of cardiorespiratory function.²³ Numerous guidelines are available to guide this type of practice in the emergency department, including recommendations on pre-sedation preparation and patient assessment, staffing, equipment, monitoring, choice of pharmacological agents, and post-sedation care.²³⁻²⁵ In the present article, we explore the role of the clinical pharmacist in procedural sedation and analgesia in the emergency setting and the possible benefits for patients of this expanded scope of practice. We also describe the current practice of clinical pharmacists performing procedural sedation and analgesia in a busy tertiary care emergency department in the lower mainland of British Columbia.



CURRENT PRACTICES FOR PROCEDURAL SEDATION AND ANALGESIA IN THE EMERGENCY DEPARTMENT

Situations where sedation and analgesia might be indicated in the emergency department include procedures for minor trauma, instrumentation, and diagnostic imaging.²³⁻²⁵ The goals include optimizing patient safety; minimizing pain and discomfort; maximizing anxiolysis, sedation, and amnesia during painful diagnostic and therapeutic procedures; and minimizing the adverse psychological responses that can be associated with painful medical interventions.^{24,26}

Before the procedure, the patient and the planned procedure are both evaluated to determine the desired level of sedation and analgesia and the most appropriate medications. The medications used are generally categorized according to the following types: sedative-hypnotics, analgesics, dissociative sedatives, inhalational agents, and antagonists.²⁷ Commonly used medications include ketamine, propofol, fentanyl, and midazolam. Specific medications or combinations of medications are selected on the basis of their pharmacological characteristics such as onset and duration of action, desired pharmacological properties, potential cardiorespiratory adverse effects, and route of administration. Patient-specific factors that are also taken into consideration include age, weight, and comorbid disease states.

The Canadian Association of Emergency Physicians' guidelines for procedural sedation and analgesia require that at least 2 qualified health care professionals be present during the procedure: an emergency physician experienced in procedural sedation and analgesia, airway management, and life support and one other health care professional who will be responsible for continuously monitoring the patient (the latter usually being a physician, nurse, or respiratory therapist).²⁴ Throughout the procedure, the patient's level of sedation and analgesia are monitored by observation of his or her appearance and responses to verbal and painful stimuli. Vital signs, including heart rate, blood pressure, respiratory rate, and oxygen saturation, are monitored regularly, and the medications are titrated accordingly. Upon completion of the procedure, the patient is monitored and supported as required.²⁵

Analgesics have been and continue to be underutilized for painful conditions and procedures performed in the emergency department.²⁸⁻³⁰ Possible reasons for this underutilization include fear of over-sedation and adverse effects, underestimation of

patients' needs, misbelief that children do not remember pain, and concern about altering physical findings.^{23,28} In reality, though, many studies have shown that when done properly and carefully, procedural sedation and analgesia can be very safe, can reduce the overall use of hospital resources (including anesthesiology services), and are economically favourable because of the short duration of treatment and rapid postprocedure recovery.³¹⁻³⁴ As a result, rather than being admitted to inpatient units for prolonged observation, patients undergoing procedures such as electrical cardioversion or fracture reduction can be treated in the outpatient setting of the emergency department, with effective management of their pain and anxiety.

Role of the Pharmacist

Procedural sedation and analgesia require a high level of knowledge about the pharmacological agents used. Pharmacists can participate in many aspects of procedural sedation and analgesia to improve the efficacy and safety of the sedation and thus to benefit both patient and physician. The first aspect where a pharmacist can become involved is in patient and family education. Before the procedure, the patient and family members must be informed about the associated risks. The pharmacist can help in providing both written and verbal information about the drugs that will be used and can then address any questions or concerns about the drug therapy that the patient or family may have that are specific to the drug therapy. A clinical pharmacist can use his or her strong knowledge of pharmacology to assist in individualizing drug therapy by helping the physician to select appropriate agents and dosages on the basis of current clinical evidence. The pharmacist can prepare the medications required for procedural sedation and analgesia and also the appropriate antidotes (in anticipation of adverse events) and can participate in monitoring the level of sedation, the patient's respiratory and cardiovascular status, and adverse events. After the procedure, the pharmacist can monitor the patient and assess his or her eligibility for discharge.

At the institutional level, pharmacists can participate in quality control for procedural sedation and analgesia, as they do for many other medication-related aspects of hospital care. Such quality control might include development of institution-specific protocols based on evidence of the efficacy and toxicity of various agents, their costs, their stability, and their accessibility. Pharmacists can also participate in the development, utilization, and evaluation of sedation scales for use in



procedural sedation and analgesia. Although this type of sedation and analgesia is becoming more widely studied, evidence is still lacking for certain agents. Pharmacists can participate in the design and conduct of trials to evaluate new agents.

Several recent reports have focused on overcrowding in the emergency department and shortages of anesthesiologists and skilled emergency staff.^{17,35,36} Given these constraints, reducing the use of hospital resources and improving patient flow through the emergency department are becoming increasingly desirable. With adequate training, pharmacists can participate in procedural sedation and analgesia and thus help to optimize utilization of emergency department resources.

Experience at One Practice Site

The Royal Columbian Hospital is a 380-bed tertiary care hospital in metropolitan Vancouver, British Columbia. The emergency department at this hospital is the second busiest in the province, with 52 stretchers, 3 trauma bays, an isolation room, and more than 65 000 patient encounters annually. The well-integrated multidisciplinary team includes 1 full-time clinical pharmacy specialist (currently A.T.), who supports 27 physicians and more than 90 registered nurses. The clinical pharmacy specialist position requires completion of a hospital residency, and the person holding the position must have a postgraduate Doctor of Pharmacy degree. Furthermore, he or she must have completed the 2-day Advanced Cardiac Life Support certification and may also complete the 1-week Advanced Trauma Life Support certification. The roles of the clinical pharmacy specialist consist primarily of obtaining medication histories, identifying drug-related problems, making recommendations to optimize pharmacotherapy, and participating in patient resuscitation by assisting in the preparation and administration (by infusion) of medications for critically ill patients.

At the Royal Columbian Hospital, the person holding the clinical pharmacy specialist position has participated in SC, IM, and IV administration of medications since 1987. Because of increases in the department's workload and continuing shortages of emergency nurses, the physicians and nursing staff in the emergency department identified a need for additional clinical support during workload surges. The person holding the clinical pharmacy specialist position at the time had been trained in the IV administration of medications during his emergency medicine training in the United States and obtained a "letter of support" signed by both the chief of emergency medicine and the

registrar of the College of Pharmacists of British Columbia. Given that the clinical pharmacy specialist had demonstrated competency in administering medications for rapid-sequence intubation and resuscitation, utilization of the unique skill set of the pharmacist as drug expert was extended to procedural sedation and analgesia. When the current clinical pharmacy specialist (A.T.) took on the position, he obtained requisite training and certification through the in-house home IV therapy nurse and a clinical nurse educator for emergency medicine. Under the supervision of the IV therapy nurse, the clinical pharmacy specialist learned to administer various medications through peripheral and central IV lines in accordance with policies delineated in the institution's *Parenteral Therapy Drug Manual* (all policies for parenteral drug administration pertaining to nursing staff also apply to pharmacists). Final approval for IV, IM, and SC administration of medications was granted by the chief of emergency medicine, and a letter of approval was provided.

At present, the IV administration of medications is not covered by the relevant provincial act or by the bylaws or standards of practice of the College of Pharmacists of British Columbia, but the bylaws do require pharmacy managers at each hospital to work with medical, nursing, and administrative staff to develop sanctioned institutional medication policies.³⁷ On this basis, the college requires any pharmacist participating in procedural sedation and analgesia to have completed the necessary education and training, to be certified to perform IV administration of medications under the authority of an approved medical directive, and to have shown competency to carry out the specified activity. During the actual procedure (in which the pharmacist should be an active participant), certain steps should be followed: ensure that informed consent is obtained from the patient; ensure ready access to drugs, products, aids, or devices used to treat reactions to injectable drugs; observe routine precautions for infection control; ensure adequate monitoring of the patient and respond appropriately to complications of parenteral therapy if they arise; ensure safe disposal of any remaining devices, equipment, and drugs; and document the relevant history in the patient's chart (Alan Samuelson, Quality Outcomes Specialist, College of Pharmacists of British Columbia; personal communication by e-mail, September 24, 2007).

At the Royal Columbian Hospital, when a physician has indicated the need for procedural sedation and analgesia in the emergency department, the clinical



pharmacy specialist, the respiratory therapist, and the emergency nurse work together, to minimize preparation time. The treating physician (e.g., cardiologist, surgeon, emergency physician) obtains consent from the patient or a family member. At the same time, the pharmacist obtains the patient's medical and medication history, including drug allergies, medical conditions, dental prostheses, time of last meal or fluids, and body weight. On the basis of the patient's indications and the information collected, the pharmacist presents recommendations for sedative and analgesic medications to the ordering physician and receives the physician's verbal orders. If the ordering physician is not an emergency physician, the pharmacist gives information about both the patient and the planned procedural sedation and analgesia to the attending emergency physician. The nurse initiates IV access and obtains baseline vital signs. The pharmacist draws up the physician-approved amnestic and analgesic medications and ensures that the appropriate antidotes are available. In the presence of the emergency physician and a respiratory therapist, the pharmacist titrates the medications to the desired effect. If the physician-approved dose is reached but the patient is not adequately sedated, a verbal order for further medication is obtained to allow the physician to complete the procedure. Rate and depth of respiration, oximetry and other vital signs, and the patient's level of sedation are monitored by all of the health care professionals participating in the procedure. All drugs administered are documented on the procedural sedation and analgesia flow chart. Upon completion of the procedure, the nurse and respiratory therapist continue to monitor and support the patient as required. The pharmacist completes drug administration and narcotic records and may discuss the medications' effects and side effects with the patient's family or caregivers. The Fraser Health Authority's standard patient education brochure about postprocedure care following sedation and analgesia is issued to the patient. The emergency clinical pharmacy specialist is available to participate in procedural sedation and analgesia from Monday to Friday, 0900 to 1700; coverage is not available for evenings, weekends, or holidays. When the pharmacist is not available, an emergency physician administers the medications, and nurses collect patient data before the procedure.

The pharmacist's participation in procedural sedation and analgesia has been well received in the emergency department at the Royal Columbian Hospital. Less nursing time is required for patient

assessment, preparation and documentation of medications, and patient counselling. At a time of high staff turnover among nurses and a nursing shortage, an emergency department pharmacist can use his or her skills to optimize medication selection and administration and possibly increase patient throughput in the emergency department.

CONCLUSIONS

Any situation or procedure involving drugs is a tremendous opportunity for the pharmacist to demonstrate pharmacotherapeutic skills by assessing the patient, recommending the most appropriate drugs, preparing and administering drugs, and documenting their effects. These activities can improve job satisfaction and increase the profile of the pharmacist as the drug expert on the health care team. Ideally, this practice will be formally evaluated to assess if it has a positive impact on patient outcomes and health resource utilization.

To increase the chances of successful integration of physician-directed, pharmacist-managed procedural sedation and analgesia, pharmacists should obtain certification in parenteral drug administration from their respective institutions, seek site approval and support from emergency physicians and pharmacy administrators (and possibly provincial or state pharmacist regulatory boards), demonstrate proficiency in administering medications for procedural sedation and analgesia and the corresponding reversal agents by completing an emergency department pharmacy rotation under the supervision of an advanced pharmacy practitioner, and participate in quality assurance audits of procedural sedation and analgesia. At our site, both the former and the current clinical pharmacy specialist in the emergency department have been advanced practice clinical pharmacists with graduate training in clinical pharmacy. Through their clinical and postdoctoral training, they developed physical examination skills complementing their pharmacotherapeutic skills. The development of this type of practice at other sites should ideally involve pharmacists with advanced training or a high level of pharmacotherapeutic competency with sedative and dissociate agents. The pharmacists should have basic physical examination skills, including assessment of sedation and monitoring of vital statistics (e.g., blood pressure, heart rate, and respiratory rate). They should already be well established as members of the emergency department team, with their primary responsibility being to patients in the emergency department.



Although clinical pharmacy services have been well described and evaluated in the literature, to our knowledge there are no previous reports of participation by pharmacists in procedural sedation and analgesia. By discussing the place of clinical pharmacy services in the emergency department and describing an innovative service that clinical pharmacists can provide (namely, procedural sedation and analgesia), we hope to initiate dialogue and spur evaluation of the pharmacist in this novel role. Within the current Canadian health care system, pharmacists have a tremendous opportunity to demonstrate their advanced pharmacotherapy knowledge and patient care skills by participating in patient care services such as procedural sedation and analgesia.

References

- Bond CA, Raehl CL, Franke T. Interrelationships among mortality rates, drug costs, total cost of care, and length of stay in United States hospitals: summary and recommendations for clinical pharmacy services and staffing. *Pharmacotherapy* 2001;21(2):129-141.
- Leape LL, Cullen DJ, Clapp MD, Burdick E, Demonaco HJ, Erickson JI, et al. Pharmacist participation on physician rounds and adverse drug events in the intensive care unit. *JAMA* 1999;282(3):267-270.
- Gattis WA, Hasselblad V, Whellan DJ, O'Connor CM. Reduction in heart failure events by the addition of a clinical pharmacist to the heart failure management team: results of the Pharmacist in Heart Failure Assessment Recommendation and Monitoring (PHARM) Study. *Arch Intern Med* 1999;159(16):1939-1945.
- McMullin ST, Hennenfent JA, Ritchie DJ, Huey WY, Lonergan TP, Schaiff RA, et al. A prospective, randomized trial to assess the cost impact of pharmacist-initiated interventions. *Arch Intern Med* 1999;159(19):2306-2309.
- Roughead EE, Semple SJ, Vitry AI. Pharmaceutical care services: a systematic review of published studies, 1990 to 2003, examining effectiveness in improving patient outcomes. *Int J Pharm Pract* 2005;13(1):53-70.
- Bond CA, Raehl CL. Clinical pharmacy services, pharmacy staffing, and hospital mortality rates. *Pharmacotherapy* 2007;27(4):481-493.
- Bond CA, Raehl CL. Clinical pharmacy services, pharmacy staffing and adverse drug reactions in United States hospitals. *Pharmacotherapy* 2006;26(6):735-747.
- Czajka PA, Skoutakis VA, Wood GC, Autian J. Clinical toxicology consultation by pharmacists. *Am J Hosp Pharm* 1979;36(8):1087-1089.
- Elenbaas RM, Waeckerle JF, McNabney WK. The clinical pharmacist in emergency medicine. *Am J Hosp Pharm* 1977;34(8):843-846.
- Levy DB. Documentation of clinical and cost-saving pharmacy interventions in the emergency room. *Hosp Pharm* 1993; 28(7):624-627, 630-634, 653.
- Powell MF, Solomon DK, McEachen RA. Twenty-four hour emergency pharmaceutical services. *Am J Hosp Pharm* 1985; 42(4):831-835.
- Bussières J. Clinical pharmacy services. In: *2005/06 annual report: hospital pharmacy in Canada*. Toronto (ON): Eli Lilly Canada; 2006 [cited 2007 Aug 17]. p. 11-26. Available from: http://www.lillyhospitalsurvey.ca/HPC2/content/2006_report/2005_06_full2.pdf
- Idrees U, Clements E. The state of U.S. emergency care: a call to action for hospital pharmacists. *Ann Pharmacother* 2006; 40(12):2251-2253.
- Institute of Medicine, Board on Health Care Services, Committee on the Future of Emergency Care in the United States Health System. *Hospital-based emergency care: at the breaking point*. Washington (DC): National Academies Press; 2007.
- Institute of Medicine, Board on Health Care Services, Committee on the Future of Emergency Care in the United States Health System. *Emergency care for children: growing pains*. Washington (DC): National Academies Press; 2007.
- Institute of Medicine, Board on Health Care Services, Committee on the Future of Emergency Care in the United States Health System. *Emergency medical services: at the crossroads*. Washington (DC): National Academies Press; 2007.
- Canadian Association of Emergency Physicians presentation to the Commission on the Future of Health Care in Canada (Romanow commission). Ottawa (ON): Canadian Association of Emergency Physicians; 2002 [cited 2006 Aug 17]. Available from: <http://caep.ca/CMS/%7B63974AD3-0F11-437C-BAEE-591BA3BE93D1%7D.pdf>
- Fairbanks RJ, Hays DP, Webster DF, Spillane LL. Clinical pharmacy services in an emergency department. *Am J Health Syst Pharm* 2004;61(9):934-937.
- Bond CA, Raehl CL, Patry R. Evidence-based core clinical pharmacy services in United States hospitals in 2020: services and staffing. *Pharmacotherapy* 2004;24(4):427-440.
- Cooper BE. Pharmacist involvement in a rapid-response team at a community hospital. *Am J Health Syst Pharm* 2007;64(7):694, 697-698.
- Schwerman E, Schwartz N, Thompson CO. The pharmacist as a member of cardiopulmonary resuscitation team. *Drug Intell Clin Pharm* 1973 Jul;7:299-309.
- Lada P, Delgado G Jr. Documentation of pharmacists' interventions in an emergency department and associated cost avoidance. *Am J Health Syst Pharm* 2007;64(1):63-68.
- American College of Emergency Physicians. Clinical policy: procedural sedation and analgesia in the emergency department. *Ann Emerg Med* 2005;25(2):177-196.
- Innes G, Murphy M, Nijssen-Jordan C, Ducharme J, Drummond A. Procedural sedation and analgesia in the emergency department. Canadian consensus guidelines. *J Emerg Med* 1999;17(1):145-156.
- American Society of Anesthesiologists Task Force on Sedation and Analgesia by Non-Anesthesiologists. Practice guidelines for sedation and analgesia by non-anesthesiologists. *Anesthesiology* 2002;96(4):1004-1017.
- Bahn EL, Holt KR. Procedural sedation and analgesia: a review and new concepts. *Emerg Med Clin North Am* 2005;23(2):503-517.
- Krauss B, Green SM. Procedural sedation and analgesia in children. *Lancet* 2006;367(9512):766-780.
- Cimpello LB, Khine H, Avner JR. Practice patterns of pediatric versus general emergency physicians for pain management of fractures in pediatric patients. *Pediatr Emerg Care* 2004; 20(4):228-232.
- Selbst SM, Clark M. Analgesic use in the emergency department. *Ann Emerg Med* 1990;19(9):1010-1013.
- Wilson JE, Pendleton JM. Oligoanalgesia in the emergency department. *Am J Emerg Med* 1989;7(6):620-623.
- Pitetti RD, Singh S, Pierce MC. Safe and efficacious use of procedural sedation and analgesia by nonanesthesiologists in a pediatric emergency department. *Arch Pediatr Adolesc Med* 2003;157(11):1090-1096.
- Barbi E, Gerarduzzi T, Marchetti F, Neri E, Verucci E, Bruno I, et al. Deep sedation with propofol by nonanesthesiologists: a prospective pediatric experience. *Arch Pediatr Adolesc Med* 2003;157(11):1097-1103.



33. Bassett KE, Anderson JL, Pribble CG, Guenther E. Propofol for procedural sedation in children in the emergency department. *Ann Emerg Med* 2003;42(6):773-782.
34. Egelhoff JC, Ball WS Jr, Koch BL, Parks TD. Safety and efficacy of sedation in children using a structured sedation program. *AJR Am J Roentgenol* 1997;168(5):1259-1262.
35. Guo B, Harstall C. Strategies to reduce emergency department overcrowding. HTA Rep 38. Edmonton (AB): Alberta Heritage Foundation for Medical Research; 2006 [cited 2007 May 25]. Available from: http://www.ihe.ca/documents/hta/HTA_Report_38.pdf
36. Seal RF, Reid D. Submission to the Romanow commission from CAS/ACUDA. Canadian Anesthesiologists' Society; 2001 [cited 2006 Aug 17]. Available from: <http://www.anesthesia.org/acuda/en/romanow.html>
37. Section 85. Medication administration. In: *Bylaws of the Council of the College of Pharmacists of British Columbia*. Vancouver (BC): College of Pharmacists of British Columbia; 1999 [cited 2006 Aug 17]. Available from: <http://www.bcpharmacists.org/legislation/provincial/bylaws/>

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