



Brief review: Obstetric care and perioperative analgesic management of the addicted patient

Article de synthèse court: Les soins en obstétrique et la prise en charge de l'analgésie périopératoire pour la patiente toxicomane

D. Norman Buckley, MD · Mohamed Ibrahim, BMD/BChD

Received: 3 October 2013 / Accepted: 12 November 2013 / Published online: 13 December 2013
© Canadian Anesthesiologists' Society 2013

Abstract

Purpose Addiction to alcohol and illicit drugs occurs in approximately 10% of the Canadian population and thus likely affects numerous perioperative patients. Provision of perioperative analgesia to these patients is challenging for physiological and behavioural reasons. Seven electronic databases were searched to identify papers addressing the perioperative management of analgesia in addicted patients.

Principal findings There are few controlled trials on addiction care in obstetrical management, and controlled trials are lacking in obstetrical analgesia and addiction and in perioperative analgesia and addiction. The focus of the limited number of publications in the obstetrical population is on addiction management during pregnancy and does not address analgesic requirements. There are principle-based discussions on factors affecting analgesic management in patients receiving chronic opioid therapy and multimodal analgesic therapy. This discourse includes consideration of the physiological and affective factors that

impact perioperative management. A number of empirically derived protocols available for managing alcohol withdrawal are based on response to the physical manifestations of withdrawal. Protocols for management of patients receiving opioid replacement therapy for opioid addiction are also well described. Nevertheless, evaluations of these protocols are lacking in clinical trials, and the impact of addiction on perioperative outcomes is unknown.

Conclusion Perioperative analgesic management of addicted patients remains poorly understood. Most clinical trials specifically exclude addicted patients. Suggestions for management are provided.

Résumé

Objectif La dépendance à l'alcool et aux drogues illicites survient chez environ 10 % de la population canadienne; par conséquent, elle touche probablement de nombreux patients en période périopératoire. La prise en charge de l'analgésie périopératoire pour ces patients est complexe, tant pour des raisons physiologiques que comportementales. Nous avons exploré sept bases de données électroniques pour en tirer les articles traitant de la prise en charge périopératoire de l'analgésie chez les patients toxicomanes.

Constatations principales Il existe peu d'études contrôlées sur les soins aux patientes toxicomanes en matière de prise en charge obstétricale, et les études contrôlées s'intéressant à l'analgésie obstétricale et à la toxicomanie ou à l'analgésie périopératoire et à la toxicomanie font défaut. Le petit nombre de publications chez une population obstétricale porte surtout sur la prise en charge de la toxicomanie pendant la grossesse et ne traite pas des besoins analgésiques. Il existe des discussions de principe sur les facteurs affectant la prise

This manuscript was screened for plagiarism using Plagiarisma.

Author contributions Norm Buckley developed the concept for the paper, reviewed the literature search, and wrote the manuscript. Mohamed Ibrahim carried out the literature search and assisted with designing the paper and writing the manuscript. Norm Buckley and Mohamed Ibrahim reviewed the analysis of the data.

Electronic supplementary material The online version of this article (doi:10.1007/s12630-013-0084-7) contains supplementary material, which is available to authorized users.

D. N. Buckley, MD (✉) · M. Ibrahim, BMD/BChD
Department of Anesthesia, Michael G. DeGroote School of
Medicine, McMaster University, 1280 Main Street West,
HSC-2V11, Hamilton, ON L8S 4K1, Canada
e-mail: buckleyn@mcmaster.ca

en charge de l'analgésie des patientes recevant un traitement chronique aux opioïdes et un traitement analgésique multimodal. Ce discours comprend la prise en compte des facteurs physiologiques et affectifs qui influencent la prise en charge périopératoire. Plusieurs protocoles dérivés de données empiriques sont disponibles pour prendre en charge le sevrage de l'alcool, et ils se fondent sur la réponse aux manifestations physiques du sevrage. Il existe également des protocoles détaillant clairement la prise en charge de patientes recevant des traitements de substitution en raison d'une dépendance aux opioïdes. Ceci étant, les études cliniques ne comportent pas d'évaluations de ces protocoles, et l'impact de la toxicomanie sur le déroulement de la période périopératoire est inconnu.

Conclusion *La prise en charge de l'analgésie des patientes toxicomanes en période périopératoire demeure mal comprise. La plupart des études cliniques excluent spécifiquement les patientes toxicomanes. Nous proposons des pistes de prise en charge.*

The Centre for Addiction and Mental Health (CAMH) reported that, according to Statistics Canada, 10% of Canadians over the age of 15 describe symptoms consistent with addiction to alcohol or illicit drugs.¹ Thus, at least 10% of our surgical patients are likely to present in this condition. The numbers could possibly be higher if other disease comorbidities occur more frequently in the addicted population. Patients addicted to opioids and/or other substances present for surgery both electively and on an urgent/emergent basis. They may present in a state of untreated (actively using) addiction, in recovery while receiving opioid replacement therapy (ORT) for addiction, or in recovery pursuing an abstinence-based treatment program. In addition to presenting for surgery, obstetric patients may also present in one of the aforesaid states, and the newborn is subject to the impact of the maternal physiological experience, which may include chronic use or abuse of opioids. Each setting presents its own issues.

Despite case reports regarding use of propofol or other sedative infusions to support rapid detoxification from chronic opioid use and regardless of the perioperative setting presenting a “teachable moment” to begin addressing chronic health issues (for example smoking cessation), it is not the optimal time to institute acute detoxification or treatment for addiction. According to the American Society of Addiction Medicine,² patient engagement in the recovery process is essential to success of addiction treatment. For this reason, a purely physiological approach is unlikely to succeed. Nevertheless, referrals and contacts may be established

for subsequent pursuit. Perioperative goals of treatment should include identifying and managing the acute state, providing optimal post-surgical pain control, and facilitating care and discharge.

The patient who is opioid dependent will present increased workload for healthcare providers, including physicians, nurses, and other caregivers. This is attributable to an increased need for assessment and adjustment of medication delivery as a result of the patient's often increased sensitivity to pain, either due to underlying physiology or triggered by opioid-induced hypersensitivity or withdrawal. The “difficult” or demanding behaviour characteristics of addicted patients, including pseudo-addiction, manipulative behaviour, and/or underlying mood and anxiety disorders, also create challenges.³

This article is based on information from reports identified by the search strategies described below. We targeted articles published after 2000 but subsequently included important articles identified from the pre-2000 period.

Search strategy

Seven electronic libraries were searched. The Ovid electronic database was used to search EMBASETM, MEDLINETM, and PsycINFO[®] using the search strings and terms shown below.

MEDLINE covers the healthcare literature where most of the North American clinical literature is indexed, and EMBASE covers the European and other non-North American literature. Both MEDLINE and EMBASE are considered the major clinical databases. Nursing and allied health are also considered to be stakeholders regarding this topic, thus we decided to search the Cumulated Index to Nursing and Allied Health Literature (CINAHL[®]). We also included the mental health studies through the PsycINFO search engine. Thesis and dissertations about the topic were searched through ProQuest.

The search was limited to human studies in the English language. The time period is indicated in Table 1.

Cochrane reviews were searched using the same keywords “opioid and surgery and perioperative”, and the same time period was used (2000-2013).

The CINAHL was searched using the same keywords “analgesics, opioid and surgery, and perioperative care”. The three terms were exploded, and the same search filters were applied.

ProQuest, Google, and Google Scholar were searched using the keywords “perioperative pain management for opioid dependent patient”.

Results of the search, which ultimately yielded 27 articles, are presented in Table 2 (Appendix 1).

Table 1 Ovid search strings and results

Ovid Technologies, Inc. Email Service

Search for: limit 7 to humans [Limit not valid in PsycINFO; records were retained]

Results: 458

Database: Embase <1996 to 2013 Week 18>, Ovid MEDLINE(R) without Revisions <1996 to April Week 4 2013>, PsycINFO <2002 to April Week 5 2013>

Search Strategy:

- 1 opioids.mp. (35405)
- 2 surgery.mp. (1495710)
- 3 perioperative.mp. (105354)
- 4 1 and 2 and 3 (681)
- 5 limit 4 to abstracts (680)
- 6 limit 5 to english language (555)
- 7 limit 6 to yr = "2000-2013" (512)
- 8 limit 7 to humans [Limit not valid in PsycINFO; records were retained] (458)

Cochrane Reviews were searched using the same keywords, "Opioid and surgery and perioperative". The same time period was used (2000-2013)

Search results indicated no reports of randomized controlled trials evaluating optimal treatment of addicted patients presenting for surgery. There are a few trials comparing methadone with buprenorphine for opioid maintenance therapy during pregnancy which specifically examine reduction in the neonatal abstinence syndrome (NAS).⁴

Several excellent reviews have been published identifying treatment strategies for chronic pain patients on long-term opioid treatment or multimodal therapies who are scheduled for surgery.^{3,5-11} All articles comment similarly on the lack of systematic study of this complex patient population, including the addiction population, and recommendations are based on understanding the relevant physiology, case reports and observations, and informed clinical opinion. The focus of our discussion is specifically on addiction in patients presenting for surgery or obstetrical care who are in one of the abovementioned three states: active addiction, opioid replacement therapy, or abstinence-based treatment.

The American Society of Addiction Medicine defines addiction as follows: "... a primary, chronic disease of brain reward, motivation, memory and related circuitry. ... leads to characteristic biological, psychological, social and spiritual manifestations. ... Without treatment or engagement in recovery activities, addiction is progressive and can result in disability or premature death."¹² Such a condition is clearly not amenable to short-term interventions or well-meaning attempts to "deal with" the inappropriate behaviour in the acute care setting. In the acute care setting, there may be some value in a pragmatic

approach: "It is probably preferable to err on the side of overtreating the occasional drug seeker rather than undertreating the patient in pain."¹³

Addiction may result from a variety of substances: central nervous system (CNS) depressants (including alcohol, heroin and other opioids, and benzodiazepines) or CNS stimulants and other drugs (cocaine, amphetamines, and designer drugs, e.g., ecstasy, cannabis, and lysergic acid diethylamide [LSD]). Patients may present in an intoxicated state, during the process of withdrawal from regular substance use, or in a drug-free or abstinent recovery state. Perioperative management, including postoperative analgesia, involves managing the impact of both the physiological and emotional aspects of withdrawal while at the same time providing adequate analgesia using a combination of multimodal and regional techniques.⁹

Management of the addicted parturient presents unique complexities because it is (hopefully) a medical-patient interaction over a period of at least several months, and we must concern ourselves with the effects on both the mother and newborn. The antenatal period also offers opportunity to discuss options with the mother, and there is often access to a range of support and counselling services, both pre and postpartum, which may have an impact on maternal behaviour and thus fetal health and wellbeing.

Obstetrical care in the addicted parturient

In obstetrical care, Pritham has provided an excellent in-depth review of the many issues relevant to the discussion.^A In her doctoral thesis, she addresses the implications of untreated substance abuse, including alcohol and tobacco, as well as the implications of treatment or non-treatment of comorbidities such as depression and anxiety. Alcohol and tobacco abuse as well as use of stimulants such as cocaine are associated with an increased incidence of poor fetal outcomes. On the other hand, treatment for substance abuse is associated with improved fetal outcomes. The thesis itself reports a retrospective cohort comparison between methadone maintenance treatment (MMT) and buprenorphine maintenance treatment (BMT) for opioid dependency during pregnancy. "Monitored substance withdrawal" (i.e., detoxification) is discussed but reported to be associated with both a higher incidence of fetal complications, including premature birth and fetal death, and also a higher incidence of relapse to opioid

^A Pritham U. Pharmacologic treatment of opioid dependency in pregnancy: methadone versus buprenorphine and subsequent neonatal abstinence syndrome Nursing and Education; PhD Thesis, University of Maine; 2009: 1-181.

Table 2 Detailed results per electronic library after the first and second scan

eLibrary	Retrieved Articles	Retrieved Articles (After Duplicates Removal by EPPI-Centre Review ⁴)	1 st Scan Results (on Title & Abstracts)	2 nd Scan Results (On Full Report)	
MEDLINE, EMBASE, PsycINFO (After duplicates removal by Ovid)	458				
CINAHL	268				
ProQuest	5				
Cochrane Review	46				
Google/Google Scholars	11				
Total	788	623	476	35	
1 st Scan: Screen on Title & Abstract		EXCLUDE based on Title & Abstract		147	
				EXCLUDE on Not undergoing surgery	132
				EXCLUDE on Not using Opioids	7
				EXCLUDE on Not reporting perioperative phases	3
				EXCLUDE on Not reporting perioperative management	5
		INCLUDE based on Title & Abstract		476	
2 nd Scan: Screen on Full Report		EXCLUDE based on Full Article		441	
				EXCLUDE on Not undergoing Surgery	0
				EXCLUDE on Not Reporting Opioid Addiction or dependency	195
				EXCLUDE on Not reporting any of perioperative phases	0
				EXCLUDE on Not Including needed data	246
		INCLUDE based on Full Article		35	
		Full Reports Available		27	

CINAHL = Cumulated Index to Nursing and Allied Health Literature; EPPI Centre = The Evidence for Policy and Practice Information and Co-ordinating Centre

dependency. Many of the complications of opioid dependency are related not necessarily to the drugs themselves but to lifestyle factors associated with drug use. Pritham presents a compelling argument for active treatment (with opioid replacement) of dependency based on pharmacologic, physiological, and social factors. Then again, MMT is associated with the phenomenon of NAS and also prenatal alterations in fetal movement and heart rate variability. It takes longer to complete a biophysical profile, and non-stress test results are altered for the patient receiving MMT. Maternal methadone treatment itself is not associated with alterations in neonatal behavioural and neurodevelopmental scores to any greater extent than would be predicted by the social/behavioural factors already operant in the maternal lifestyle. When mothers pursue treatment of opioid dependency during pregnancy, there is improvement in neonatal outcomes, but it is often unclear whether this is a function of the ORT medications or the overall context of treatment, including health education, other education, and support.

In utero exposure to benzodiazepines and selective serotonin reuptake inhibitors in mothers undergoing MMT or BMT is associated with increased length of hospital stay

for the neonate. Although there are few subjects in the reported studies, there is increasing use of buprenorphine in the treatment of opioid dependency, and there are suggestions that it is not only safe but also may be associated with better neonatal outcome, including less NAS and shorter hospital length of stay. Neither BMT nor MMT is associated with delayed neurobehavioural development.^A Other studies have also suggested that buprenorphine is associated with less NAS.^{14,15} The Maternal Opioid Treatment: Human Experimental Research (MOTHER) trial compared BMT with MMT during pregnancy. This is a landmark work that also shows the challenges of studying this population. The findings are similar to those reported by Pritham, but they include the interesting observation that a larger proportion of mothers in the BMT group stopped treatment compared with those in the MMT group (33% vs 17%, respectively).¹⁶ A related editorial describes the challenges and possible solutions inherent in research in this population. The multicentre (eight centres) international (USA, Canada, Austria) trial achieved recruitment of 175 patients over the three-year study period.¹⁷

In summary, the ORT studies offered no specific recommendations either for or against any form of

analgesic management of delivery, whether vaginal or operative. For obstetrical peripartum care of the addicted patient, addiction to alcohol and tobacco has harmful fetal effects and should be addressed if at all possible. Opioid addiction is best managed with fewest fetal effects from ORT, which can be achieved with either BMT or MMT. Buprenorphine maintenance treatment is associated with a shorter duration of NAS but with a higher cessation of ORT. Acute withdrawal from opioids during pregnancy does not promote recovery from addiction and is associated with fetal loss.

Perioperative analgesia in addicted patients

Addiction may involve use of CNS depressants (alcohol, benzodiazepines, opioids) and stimulants (ecstasy, cocaine, amphetamines) as well as drugs such as LSD and cannabis. Patients with a history of addiction may present in a state of recovery, either abstinent or on ORT, or addicted and still using. The patient still using may be acutely intoxicated or in the process of withdrawal. Drug use may be parenteral, inhaled, snorted, or oral. As a result of their addiction, patients may also present with associated illness or disease, including bacterial infection, viral infection (including HIV and hepatitis), or opportunistic infection (such as tuberculosis etc.) attributable to poor general health. This patient population may also have a range of other systemic and behavioural/psychiatric comorbidities. Each of these situations presents specific management issues.

Stimulants

There is limited literature addressing the issues related to addiction and withdrawal from CNS stimulants. In summary, the treatment of stimulant intoxication and or withdrawal is largely focused on symptomatic management of the observed symptoms and the physiological manifestations. Affective symptomatology (anxiety, agitation, psychosis) is identified as requiring symptomatic treatment.⁹ Accessing supportive care on a predictable basis may prove to be a great challenge for many acute care facilities, as these services are recognized as being in short supply. Analgesia itself is managed according to the principles applied for non-addicted patients, with the caveat that there is little or no cross tolerance between the stimulants and analgesic medications; consequently, overdose is a risk, especially when medications (such as benzodiazepines) used to treat the symptoms of stimulant intoxication, withdrawal, or the manifestations of long-term use are combined with opioid analgesics.

Depressants

One of the most common depressants is alcohol. There are a number of protocols for dealing with the physiological impact of alcohol withdrawal. Severe manifestations (“delirium tremens”) can in fact be life threatening and associated with seizures and fatal cardiac arrhythmia. Therapy is typically guided by use of the Clinical Institute Withdrawal Assessment for Alcohol (CIWA-A) scale and involves use of benzodiazepines titrated to ameliorate the symptoms.¹⁸ A sample order form for management of alcohol withdrawal is attached (Appendix 2; available as Electronic Supplementary Material).

A National Health Service (NHS) Scotland Best Practice Statement from 2004 identified the “Key Challenges” to provision of perioperative analgesia for patients with prior exposure to opioids:

1. *Developing and maintaining strong communication links between all those involved in the individual's care.*
2. *Further research is required to strengthen the evidence base on how to manage postoperative pain in patients with a history of opioid exposure.*
3. *Challenging staff in relation to negative attitudes towards patients who have a history of substance abuse.*¹⁹

There are two recurring themes in caring for patients with a history of illicit drug use who are currently in recovery: anxiety about the possibility of relapse occurring with re-exposure to opioids in the perioperative period, and anxiety about experiencing significant pain if inadequate analgesia is delivered (which ironically might in turn trigger drug seeking and relapse into addictive behaviour).⁹

Patients currently receiving ORT will have some degree of tolerance as is described in patients receiving chronic opioid therapy for pain treatment. The phenomenon of tolerance is incompletely understood,⁷ but the impact is that the dosage of analgesics must frequently be titrated to levels which may be significantly higher than usual.

In Table 3 (from Carroll *et al.*),⁷ there is a well-described plan for preoperative assessment and postoperative management of patients who come for surgery in a state of opioid dependence, whether due to addiction or maintenance treatment for chronic pain. The challenge is in establishing an accurate pre-surgical assessment of usage and then translating that into an effective analgesic regimen. Treatment should prevent withdrawal effects and deliver analgesia in situations where patients may be inordinately sensitive to pain from nociception, tolerant to the effects of analgesic medication, or subject to medication interactions which place them at risk of oversedation. In their discussion, Carroll *et al.*⁷ describe the potential utility of regional analgesia

Table 3 Considerations for pain management in patients chronically consuming opioids (Carroll *et al.*)

Time Interval	Considerations
Preoperative	<p>Discussion of the following:</p> <ul style="list-style-type: none"> Precise opioid use (dose, opioid type, etc.) Potential for increased postoperative pain Patient's fears and expectations related to pain management Effective management strategies after previous procedures Postoperative management options/appropriate regional techniques for complementing opioid analgesia Postoperative pain management plan <p>Initiation of appropriate preoperative medications:</p> <ul style="list-style-type: none"> Continuation of preoperative opioid regimen on day of surgery (prevent withdrawal, falling behind on opioid requirement) Consideration of acetaminophen 1,000 mg 1 to 2 hr before surgery. Consideration of a COX-2 inhibitor, such as celecoxib, rofecoxib, or valdecoxib 1 to 2 hours before surgery
Intraoperative	<p>Administration of opioids to meet the following requirements:</p> <ul style="list-style-type: none"> Chronic Intraoperative surgical Anticipated postoperative <p>Titration of long-acting opiate to respiratory rate 14 to 16 breaths•min⁻¹ if possible in spontaneously ventilating patient</p> <p>Administration of adjuvant medications:</p> <ul style="list-style-type: none"> Ketamine 0.5 mg•kg⁻¹ <i>iv</i> bolus followed by 4 µg•kg⁻¹•min⁻¹ infusion Ketorolac 30 mg <i>iv</i> (if NSAID or COX-2 not started preoperatively) Acetaminophen 1,000 mg <i>pr</i> if not started preoperatively
Postoperative (acute phase)	<p>Institution of appropriate regional technique:</p> <ul style="list-style-type: none"> Continuous techniques preferable Wound lavage or local infiltration with local anesthetic if other technique not possible <p>Titration of opioids, adjuvant medications, and regional techniques to patient comfort:</p> <ul style="list-style-type: none"> Expect postoperative opiate requirements to be up to 2 to 4 times the dose required in an opioid naive person. Remember that no individual's requirements can be predicted with confidence. Titrate opioids aggressively to achieve adequate pain control in the postoperative care unit. <p>Start opioid PCA:</p> <ul style="list-style-type: none"> If oral route is available, start with 1.5 times the preoperative oral opioid dose and PCA for breakthrough pain. If oral route is unavailable, consider basal rate for PCA.

Table 3 continued

Time Interval	Considerations
Postoperative (transition phase)	<p>In patient is undergoing a regional technique, plan to administer at least half of the preoperative opiate requirement systemically.</p> <p>Continue applicable regional techniques.</p> <p>Consider use of high-potency opioids such as fentanyl/sufentanil in place of morphine for epidural management.</p> <p>Continue acetaminophen 1,000 mg every 6 hr and/or continue acetaminophen, NSAID, or COX-2 inhibitor for several days with attention to renal function and risk of bleeding.</p> <p>Continue ketamine if started in OR, or institute ketamine infusion if pain proves refractory to other measures.</p> <p>Monitoring for oversedation and opioid withdrawal:</p> <p>Chronically opioid-consuming patients are at higher risk for respiratory depression than are opioid naive patients and must be monitored appropriately with regular evaluation of sedation and oxygen saturation.</p> <p>Transition from regional and parenteral techniques to oral opioids/adjuvants: Use the opioid requirements during the first 24 to 48 hr to determine daily oral opioid dose.</p> <p>Deliver half of estimated oral requirement as a long-acting formulation.</p> <p>Allow PRN use of short-acting opioid every 3 hr in sufficient quantity to provide the remaining required opioid dose.</p> <p>Consider continuing acetaminophen, NSAID, or COX-2 inhibitor during transition phase.</p> <p>Plan taper from postoperative opioid doses toward preoperative doses and discuss with patient or care provider. Determine need for specialty follow-up if regimen is particularly complex.</p>

COX = cyclooxygenase; NSAID = non-steroidal anti-inflammatory drug; OR = operating room; PCA = patient-controlled anesthesia; PRN = as circumstances require

techniques, but it is apparent that the studies describing the value of these techniques specifically exclude populations in which addiction is present (or at least recognized), and thus, it is not known whether there is additional value in those populations.

For the patient who is on ORT, the published regimens for perioperative management consistently suggest continuation of the methadone if oral intake is available, as there are no preparations available in Canada for parenteral methadone administration. Alternatively, oral methadone can be converted to a parenteral maintenance dose using morphine until return to oral intake. With increasing use of BMT in ORT, there is controversy

regarding the appropriate treatment of acute pain for those patients due to the partial opioid agonist properties of buprenorphine. In one schema,²⁰ the recommendation for patients on opioid agonist therapy (OAT) is to cease buprenorphine maintenance and switch to methadone maintenance perioperatively for major surgery. Nevertheless, this position has been challenged by other authors. Kornfeld and Manfredi report a case series describing successful perioperative pain management in which buprenorphine treatment is maintained without interference with postoperative analgesia.²¹ In this series, five patients underwent seven surgeries, including total joint replacement, laparotomy for bowel resection, mastectomy, and breast reconstruction. All were receiving suboxone, the buprenorphine-naloxone combination product for ORT, and according to chart review and personal report, all experienced successful analgesic management without alteration of their ORT.

Peng *et al.*⁶ describe a plan for postoperative analgesia for patients on MMT. In the case of day surgery with rapid resumption of oral intake, usual methadone maintenance is continued and a supplemental analgesic at a slightly increased dose (in light of the increase in pain sensitivity expected of the addicted patient on ORT) is provided for the expected impact of the surgery. For inpatient surgery with rapid resumption of oral intake, it is suggested to continue usual ORT dosing along with a supplemental analgesic. The latter may include regional analgesia but with recognition that supplemental opioids may also be required. Patient-controlled analgesia (PCA) offers a good avenue for this approach. In the case of inpatient surgery with prolonged interruption of oral intake (e.g., bowel resection), it will be necessary to replace the ORT with a maintenance infusion of opioid as well as to offer analgesia for the procedure itself. This can be achieved by providing a baseline infusion of morphine along with regional analgesia as appropriate but also with access to PCA. The challenge is provision of an appropriate conversion of MMT to intravenous morphine. Conversion of an oral methadone dose to oral morphine has been problematic, but a reasonably conservative calculation is 1 mg methadone equals 4 mg morphine, i.e., 30 mg methadone daily is equivalent to 120 mg morphine daily. Conversion of oral morphine to parenteral morphine (ratio of 3 mg *po* vs 1 mg *iv*) gives 40 mg *iv* morphine daily. This should be provided by infusion at a rate of a 1 mg·hr⁻¹ to account for the possibility that cross tolerance is incomplete and with access to PCA boluses to balance the replacement and analgesic requirements.⁶

Patients in recovery following an abstinence-based treatment program may be treated as any other patient coming for surgery. It is common for these patients to be anxious about the risk of exposure to opioids, triggering a

relapse into addictive behaviours. There is no evidence that this does, in fact, occur.²⁰ It may be more likely that failure to provide adequate analgesia is a greater risk for triggering drug-seeking behaviour in an attempt to control pain. There is likely value in establishing a clear pain treatment plan with the patient in the preoperative period, including weaning from opioid analgesia following surgery, along the lines of a “structured opioid treatment” approach.²⁰

Conclusions

Reported clinical trials are lacking to guide perioperative analgesic management of the patient suffering from addiction. In the case of patients addicted to stimulants, whether experiencing acute intoxication, immediate withdrawal from stimulants, or long-term effects of stimulant use, treatment is guided first by recognition and symptomatic management. Anxiety, agitation, or psychotomimetic symptoms are treated symptomatically. Analgesia is complicated by the fact that there is likely no developed tolerance to analgesic medications, but there may in fact be added risk due to interactions between analgesics and the medications used to treat the physiological and behavioural or affective symptoms of the drug use.

Patients addicted to alcohol may be managed by identification of withdrawal symptoms using the CIWA-A scale; these symptoms can then be empirically treated by titrating benzodiazepines to effect.

In addicted patients presenting for surgery, the actual opioid dose should be identified to the best extent possible, and patient management should include partial substitution of said dose with a maintenance infusion. Access to PCA opioids will permit top up for replacement needs plus meet analgesic needs. This approach may result in patients using large doses of opioids, and as a consequence, caregivers will require support and immediate availability of expert advice.

Patients addicted to opioids in treatment with ORT should continue with their oral replacement, with analgesia managed by either additional opioids or alternate strategies as appropriate. If oral maintenance of ORT is not possible, then parenteral replacement must be used with supplemental analgesia as required.

Patients in an abstinence-based treatment program will require analgesia for their clinical needs and, therefore, may benefit from a structured approach to dose reduction over the postoperative period with supportive therapy as required. Characteristic of the literature in this field, use of multimodal and regional analgesia is neither systematically supported nor rejected, except on a case by case basis, but intuitively, it does seem to be of value.

In conclusion, Mitra and Sinatra speak clearly to our role in the perioperative care of the addicted patient: “*The anesthesiologist plays the key role in maintaining baseline opioid requirements, administering supplemental intraoperative and postoperative opioids, and providing non-opioid analgesics and neural blockade. ... delivering a patient to the PACU who has severe pain is an unacceptable practice and often results in an extremely difficult and time consuming management issue...*”⁵

Key points

- Addiction to alcohol, opioids, or some other substance (not including tobacco) will occur in approximately 10% of the population.
- The perioperative environment may provide a “teachable moment” to initiate discussion about addiction treatment, but the achievable goal of perioperative management is not to “deal with” the addiction but rather to anticipate problems and manage the patient who may need complex care.
- In obstetrical care, acute withdrawal from opioids is not useful for any long-term goal and is associated with fetal loss and withdrawal from treatment programs.
- Even if regional strategies are used to optimize analgesia, the patient who is dependent on opioids will also require replacement of their usual opioid dose.
- Patients who are addicted to stimulants present a particularly difficult management problem because their tolerance to stimulants does not create any cross-tolerance to the sedative effect of the analgesics or anxiolytics which may be required for their care.
- Successful treatment of the addicted patient coming for surgery or obstetrical care will require clinical expertise and the application of additional resources.

Conflicts of interest None declared.

Disclosures No funding was received for this work. Neither author has any commercial affiliations which are relevant to this work. D. Norman Buckley currently holds research funding from the Canadian Anesthesia Research Foundation, Canadian Institutes of Health Research, Heart and Stroke Foundation of Ontario, Johnson and Johnson, and Purdue Pharma.

Clinical trials N/A.

Appendix 1: Search results

Bandstra ES. Maternal Opioid Treatment: Human Experimental Research (MOTHER) Study: maternal,

fetal and neonatal outcomes from secondary analyses. *Addiction* 2012; 107 Suppl 1: 1-4.

Bryson EO, Frost EA. Perioperative Addiction. Clinical Management of the Addicted Patient. New York, NY: Springer New York; 2012.

Carroll IR, Angst MS, Clark JD. Management of perioperative pain in patients chronically consuming opioids. *Reg Anesth Pain Med* 2004; 29: 576-91.

Coyle MG, Salisbury AL, Lester BM, et al. Neonatal neurobehavior effects following buprenorphine versus methadone exposure. *Addiction* 2012; 107 Suppl 1: 63-73.

de Leon-Casasola OA. Cellular mechanisms of opioid tolerance and the clinical approach to the opioid tolerant patient in the post-operative period. *Best Pract Res Clin Anaesthesiol* 2002; 16: 521-5.

Fischer G, Johnson RE, Eder H, et al. Treatment of opioid-dependent pregnant women with buprenorphine. *Addiction* 2000; 95: 239-44.

Gaalema DE, Scott TE, Heil SH, et al. Differences in the profile of neonatal abstinence syndrome signs in methadone- versus buprenorphine-exposed neonates. *Addiction* 2012; 107 Suppl 1: 53-62.

Geary T, Negus A, Anderson BJ, Zernikow B. Perioperative management of the child on long-term opioids. *Paediatr Anaesth* 2012; 22: 189-202.

Hadi I, Morley-Forster PK, Dain S, Horrill K, Moulin DE. Brief review: perioperative management of the patient with chronic non-cancer pain. *Can J Anesth* 2006; 53: 1190-9.

Holbrook AM, Baxter JK, Jones HE, et al. Infections and obstetric outcomes in opioid-dependent pregnant women maintained on methadone or buprenorphine. *Addiction* 2012; 107 Suppl 1: 83-90.

Huxtable CA, Roberts LJ, Somogyi AA, MacIntyre PE. Acute pain management in opioid-tolerant patients: a growing challenge. *Anaesth Intensive Care* 2011; 39: 804-23.

Jage J, Bey T. Postoperative analgesia in patients with substance use disorders: Part II. *Acute Pain* 2000; 3: 172-80.

Jones HE, Fischer G, Heil SH, et al. Maternal Opioid Treatment: Human Experimental Research (MOTHER)—approach, issues and lessons learned. *Addiction* 2012; 107 Suppl 1: 28-35.

Jones HE, Kaltenbach K, Heil SH, et al. Neonatal abstinence syndrome after methadone or buprenorphine exposure. *N Engl J Med* 2010; 363: 2320-31.

Kornfeld H, Manfredi L. Effectiveness of full agonist opioids in patients stabilized on buprenorphine undergoing major surgery: a case series. *Am J Ther* 2010; 17: 523-8.

Lainwala S, Brown ER, Weinschenk NP, Blackwell MT, Hagadorn JI. A retrospective study of length of hospital stay in infants treated for neonatal abstinence syndrome with methadone versus oral morphine preparations. *Adv Neonatal Care* 2005; 5: 265-72.

Marshall S, Jackson M. Acute pain management for opioid tolerant patients. Update in Anaesthesia. London UK: World Federation of Anaesthesiologists (WFSA); 2011: 35-9.

Mitra S, Sinatra RS. Perioperative management of acute pain in the opioid-dependent patient. *Anesthesiology* 2004; 101: 212-27.

Patil SK, Anitescu M. Opioid-free perioperative analgesia for hemicolectomy in a patient with opioid-induced delirium: a case report and review of the analgesic efficacy of the alpha-2 agonist agents. *Pain Pract* 2012; 12: 656-62.

Peng PW, Tumber PS, Gourlay D. Review article: perioperative pain management of patients on methadone therapy. *Can J Anesth* 2005; 52: 513-23.

Pritham U. Pharmacologic treatment of opioid dependency in pregnancy: methadone versus buprenorphine and subsequent neonatal abstinence syndrome Nursing and Education; University of Maine, 2009; PhD Thesis, pp 1-181.

Rapp SE, Ready LB, Nessly ML. Acute pain management in patients with prior opioid consumption: a case-controlled retrospective review. *Pain* 1995; 61: 195-201.

Richebe P, Beaulieu P. Perioperative pain management in the patient treated with opioids: continuing professional development. *Can J Anesth* 2009; 56: 969-81.

Ritchey RM. Optimizing postoperative pain management. *Cleve Clin J Med* 2006; 73: S72-6.

Shah PS, Dunn M, Lee SK, Allen AC, Singhal N; Canadian Neonatal Network. Early opioid infusion and neonatal outcomes in preterm neonates ≤ 28 weeks' gestation. *Am J Perinatol* 2011; 28: 361-6.

Tichelkamp HL, Parish TG. Methadone for treatment of pregnant opiate addicted women: is there a safer alternative? A review of literature. *The Internet Journal of Allied Health Sciences and Practice* 2008; 6: 1-8.

Zywiell MG, Stroh DA, Lee SY, Bonutti PM, Mont MA. Chronic opioid use prior to total knee arthroplasty. *J Bone Joint Surg Am* 2011; 93: 1988-93.

References

1. Centre for Addiction and Mental Health. Mental Illness and Addiction Statistics. Available from URL: http://www.camh.ca/en/hospital/about_camh/newsroom/for_reporters/Pages/addiction-mentalhealthstatistics.aspx (accessed October 2013).
2. American Society of Addiction Medicine. Rapid and Ultra Rapid Opioid Detoxification. Adoption date: 2000; Rev.: 2005. Available from URL: <http://www.asam.org/advocacy/find-a-policy-statement/view-policy-statement/public-policy-statements/2011/12/15/rapid-and-ultra-rapid-opioid-detoxification> (accessed October 2013).
3. Marshall S, Jackson M. Acute Pain Management for Opioid Tolerant Patients. Update in Anaesthesia. London UK: World Federation of Societies of Anaesthesiologists (WFSA); 2011: 35-9. Available from URL: <http://update.anaesthesiologists.org/2011/10/28/acute-pain-management-for-opioid-tolerant-patients/> (accessed October 2013).
4. Tichelkamp H, Parish T. Methadone for treatment of pregnant opiate addicted women: is there a safer alternative? A review of literature. *The Internet Journal of Allied Health Sciences and Practice* 2008; 6: 1-8.
5. Mitra S, Sinatra RS. Perioperative management of acute pain in the opioid-dependent patient. *Anesthesiology* 2004; 101: 212-27.
6. Peng PW, Tumber PS, Gourlay D. Review article: perioperative pain management of patients on methadone therapy. *Can J Anesth* 2005; 52: 513-23.
7. Carroll IR, Angst MS, Clark JD. Management of perioperative pain in patients chronically consuming opioids. *Reg Anesth Pain Med* 2004; 29: 576-91.
8. Hadi I, Morley-Forster PK, Dain S, Horrill K, Moulin DE. Brief review: perioperative management of the patient with chronic non-cancer pain. *Can J Anesth* 2006; 53: 1190-9.
9. Jage J, Bey T. Postoperative analgesia in patients with substance use disorders: Part II. *Acute Pain* 2000; 3: 172-80.
10. Richebe P, Beaulieu P. Perioperative pain management in the patient treated with opioids: continuing professional development. *Can J Anesth* 2009; 56: 969-81.
11. Ritchey RM. Optimizing postoperative pain management. *Cleve Clin J Med* 2006; 73: S72-6.
12. American Society of Addiction Medicine. The Voice of Addiction Medicine. Available from URL: <http://www.asam.org/for-the-public> (accessed October 2013).
13. Huxtable CA, Roberts LJ, Somogyi AA, MacIntyre PE. Acute pain management in opioid-tolerant patients: a growing challenge. *Anaesth Intensive Care* 2011; 39: 804-23.
14. Gaalema DE, Scott TL, Heil SH, et al. Differences in the profile of neonatal abstinence syndrome signs in methadone- versus buprenorphine-exposed neonates. *Addiction* 2012; 107(Suppl 1): 53-62.
15. Coyle MG, Salisbury AL, Lester BM, et al. Neonatal neurobehavior effects following buprenorphine versus methadone exposure. *Addiction* 2012; 107(Suppl 1): 63-73.
16. Jones HE, Kaltenbach K, Heil SM, et al. Neonatal abstinence syndrome after methadone or buprenorphine exposure. *N Engl J Med* 2010; 363: 2320-31.

17. Jones HE, Fischer G, Heil SH, et al. Maternal Opioid Treatment: Human Experimental Research (MOTHER)—approach, issues and lessons learned. *Addiction* 2012; 107(Suppl 1): 28-35.
18. Spies CD, Rommelspacher H. Alcohol withdrawal in the surgical patient: prevention and treatment. *Anesth Analg* 1999; 88: 946-54.
19. *Healthcare Improvement Scotland*. Best Practice Statement. Post operative pain management - 2004. Available from URL: http://www.healthcareimprovementscotland.org/previous_resources/best_practice_statement/post-operative_pain_management.aspx (accessed October 2013).
20. Alford DP, Compton P, Samet JH. Acute pain management for patients receiving maintenance methadone or buprenorphine therapy. *Ann Intern Med* 2006; 144: 127-34.
21. Kornfeld H, Manfredi L. Effectiveness of full agonist opioids in patients stabilized on buprenorphine undergoing major surgery: a case series. *Am J Ther* 2010; 17: 523-8.