Rhode Island ranks sixth nationally in the percentage of elderly residents, with over 14.5% of the population over age 65; and the over 85 age group is the fastest growing portion of the population. Not surprisingly, the demand for healthcare services, including surgical interventions, will increase in the elderly population. Surgical procedures no longer have age restrictions, as the demand for these interventions by the patients, and the success of modern surgical and anesthetic techniques have been demonstrated. Unfortunately, pain associated with acute trauma and operative procedures is often inadequately managed. Several barriers have been identified to effective pain management in the elderly, including an external locus of control in many elderly patients, fear of opioid side effects on the part of patients and healthcare providers, and the difficulty assessing pain in the cognitively impaired patient.

Inadequate postoperative pain control is a concern on several levels. In the current healthcare environment, adequate pain control is regarded as a patient right, not simply a comfort issue. As the healthcare consumer becomes more educated patient satisfaction becomes more of a driving issue, generating greater attention on perioperative pain management concerns. Furthermore, evidence suggests that inadequate analgesia may contribute to prolonged hospitalization in the elderly, increased complications, and poorer patient outcomes. In this review, we will draw attention to some of the difficulties encountered in caring for the elderly patient experiencing acute pain, and offer insights into the evaluation and treatment of this problem.

**PAIN ASSESSMENT IN THE ELDERLY**

A wide variety of validated assessment tools exist for the measurement of pain. While each method has value, it is important to recognize two important issues in applying these tools in the clinical environment.

First, no single assessment tool will be useful in every patient. The best approach is to have several different assessment tools, and to try and determine which one best suits the patient. For example, elderly patients often will do better with a simple word scale, such as none, mild, moderate, and severe, than a numeric rating or a visual analog pain scale. Many cognitively impaired elderly patients have difficulty considering pain as a graded event. Pain is simply problematic, above their threshold, or not a problem, below their threshold. The FACES pain scale might appear to be a useful alternative to the number and word scales, but even this tool has inadequacies. Testing of the FACES scale in the elderly has demonstrated problems with the interpretation of the facial expressions as indicative of affective emotion, rather than pain. Some elders will misinterpret the scale as indicating sadness, rather than pain intensity, and underweight their pain on the scale.

Second, clinical caretakers frequently fail to recognize that the pain rating should act as a trigger for intervention. Pain ratings also serve as a measure of the effectiveness of the prescribed analgesic treatment. The recent emphasis on including pain scores on patient vital sign flow sheets, along with the other vital signs, has not clearly resulted in more effective pain intervention. A recent study at a Veterans Administration Hospital demonstrated the consistent recording of elevated pain scores, without evidence of intervention or improvement. Physicians, nurses, and other healthcare professionals need to recognize that an elevated pain score (>4 on a 10 scale) must trigger some analgesic intervention, then document evidence of improvement, or explain why no intervention or improvement was noted. There is a need to establish clear intervention guidelines for an elevated pain score, and to require appropriate documentation. As emphasized, no single assessment tool works for every patient, thus, several diverse tools should be available, with appropriate standards for intervention established for each.

**ANALGESIC OPTIONS: NON-DEMAND TECHNIQUES**

One of the best approaches to controlling postoperative pain, is to employ techniques that do not require the patient to request treatment. Examples of this approach include the use of selective nerve blocks, continuous delivery epidural or plexus analgesic infusions, and the use of around the clock nonsteroidal anti-inflammatory drugs (NSAIDs) and sustained release opioids. The NSAIDs exhibit a ceiling effect, and do not typically require titration. However, some consideration must be given to coexisting disease states, such as impaired renal function, bleeding concerns, and cardiovascular disease. The cyclooxygenase-2 inhibitors (COX-2 inhibitors) were, and are excellent choices for perioperative analgesia. Their lack of effect on platelet function make them extremely useful during the pre and postoperative phase, provided care is taken to avoid patients at risk for renal failure and those with severe ischemic coronary disease. Unfortunately, the only parenteral NSAID available, ketorolac, has one of the worst track records regarding safety in the elderly. Ketorolac has been reported to produce renal failure in some elderly patients following a single dose, and is associated with an increased risk of gastrointestinal bleeding in patients over the age of 75, particularly when used beyond 5 days. Ketorolac doses should be reduced to 15mg every six hours in patients over age 65, and limited to 3 to 5 days in most elderly patients. Celecoxib remains an excellent choice for many elderly patients.

<table>
<thead>
<tr>
<th>Table 1: Non-Demand Analgesic Options.</th>
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<tr>
<td>Regional Anesthetic Nerve Blocks</td>
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<tr>
<td>Epidural Analgesia</td>
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<tr>
<td>NSAIDS</td>
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<tr>
<td>Acetaminophen</td>
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<tr>
<td>Continuous Wound Irrigation Catheter</td>
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<td>Sustained Release Opioids</td>
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Frederick W Burgess, MD, PhD, and Thomas A. Burgess
Epidural analgesia is an excellent option for pain control following upper abdominal and intrathoracic surgical procedures. Epidural opioid/local anesthetic combinations are very effective analgesics, consistently demonstrating lower pain scores with significantly lower systemic opioid exposure, compared to intravenous opioid administration. Despite the greatly reduced systemic opioid dose, nearly an order of magnitude less than with patient controlled analgesia, epidural analgesia does not appear to offer a significant advantage over intravenous opioids with respect to postoperative central nervous system side effects, including respiratory depression, sedation, and pruritus. Local anesthetics are helpful in reducing the amount of opioid needed, but may introduce a greater risk of hypotension, pressure sores, and peripheral nerve compression injuries. Despite some drawbacks, epidural analgesia can be extremely beneficial in controlling pain and potentially reducing side effects, particularly with surgeries close to the diaphragm. A major advantage of epidural analgesia is that it can provide continuous pain control without disruption. Occasional technical difficulties aside, when epidural analgesia works well, it can provide a near pain free experience.

**Opioids and the Elderly**

In dealing with severe postoperative pain, the opioid analgesic class remains the definitive therapy for most patients. Unlike the NSAID class, there is no clear analgesic ceiling effect for most patients. Opioid dose requirements are primarily determined by individual tolerances, determined in part by genetic variation, and in part by individual experience. Opioid tolerance develops rapidly following administration, even in the acute pain setting; however, in most circumstances, rapid resolution of pain over 3 days following surgery helps to prevent drug tolerance from becoming a significant factor in the postoperative patient. Unlike most drug classes, the minimum effective blood level for an opioid tends to be variable, and may escalate during protracted therapy. Serum opioid levels are not helpful in directing therapy, and are simply a confirmation that the patient is taking the medication. Fortunately, the opioids are fairly well tolerated, from the standpoint of organ toxicity. Even in high doses, virtually no effects are seen on the hepatic, renal, or cardiac systems. Studies from mu-receptor knockout mice, indicate that in the absence of the mu-receptor, mu selective agonists have no detectable effects on these mice. All of the analgesic effect and side effects are eliminated. Side effects, such as nausea, vomiting, sedation, itching, constipation, and respiratory depression, tend to define the limits of clinical therapy. Pain in most patients can be controlled without encountering excessive side effects, but in the occasional patient, side effects may limit satisfactory pain relief. In these patients aggressive management of the side effects becomes an essential component of providing adequate pain control.

All too often, the opioids are underutilized, or even withheld, in the elderly postoperative patient, especially among individuals experiencing cognitive impairment. The more severe the communication deficit, the more likely the patient will have their opioids limited, out of concern that they are contributing, or will contribute to the development of postoperative delirium. Many factors can contribute to postoperative delirium, including advanced age, education, alcohol use, long acting benzodiazepines, and preexisting dementia. Although sedative medications may contribute to delirium, several recent studies suggest that the opioid use for postoperative pain displays an inverse relationship. Elder patients undergoing surgical repair of a hip fracture who received less than 10mg of morphine per 24 hour span, were more likely to develop postoperative delirium. Furthermore, both elevated preoperative and postoperative pain scores appear to be associated with a greater risk of developing postoperative delirium. A recent review on this topic, argues strongly that more aggressive pain treatment is needed, and may contribute to improved patient outcomes. Postoperative delirium nega-
tively impacts on successful rehabilitation, contributes to prolonged hospitalization, and increases the need for extended care facility admission. Additional controlled studies are needed to clarify the relationship between pain and delirium, but current data strongly suggest that better pain control may reduce the incidence of delirium, and at the very least, does not appear to contribute to delirium.

As indicated above, assessing pain can be difficult in patients with cognitive impairment. The more severely the patient’s communication skills are impaired, the greater the likelihood that analgesics will be withheld, potentially adding to the risk of delirium, as they are unable to respond regarding their pain status. Exposing the patient to a variety of different pain assessment methods may prove satisfactory, once a usable tool is identified. In the severely impaired elderly, pain scales may be unusable, necessitating the use of a behavioral assessment of pain, much like that employed for nonverbal children. Unfortunately, behavioral assessments of pain frequently underestimate an individual’s suffering, but in the absence of an alternative, it is better than no treatment. In this setting, it becomes essential to plan for a system of non-demand analgesic delivery, and to allow for supplemental doses of opioid, should the patient’s behavior suggest agitation or pain.

Opioids and Falls in the Elderly

An extensive literature has documented that long-acting benzodiazepines, tricyclic antidepressants, serotonin selective antidepressants, and anticonvulsants contribute to the likelihood of falling in the over 65 year old population. (Table 3) Although the opioids are sedatives, the existing literature does not as strongly implicate the opioids as contributing to falls in elders.19,20,21 There is a paucity of data dealing specifically with the inpatient postoperative population, but what evidence that is available suggests there is a modest increase in the risk of falls associated with acute opioid administration. However, much more information is available on the impact of opioid analgesics on falls in the outpatient and institutionalized patient. In these settings, there is conflicting data to suggest a modest increase risk for falls in some populations, and mounting evidence that suggests that the opioid analgesics actually reduce the relative risk of falls among ambulatory and institutionalized elderly. Most of these data arise from uncontrolled survey trials, but it remains highly suggestive of considerable benefit in favor of treating pain. Exactly how opioids might reduce the incidence of falls is unclear. Pain involving the lower extremities has been linked to an increased risk of falls in the elderly. Conceivably, the opioid analgesics help to improve mobility by reducing pain and allowing more comfortable ambulation. By enabling easier movement, elders may remain more active, retain muscle tone, and experience greater social interaction.

...good perioperative pain control may actually reduce postoperative delirium and improve perioperative morbidity

During a period of escalating opioid use, there may be some increased risk of impaired coordination, but this appears to abate fairly rapidly in most patients. Studies examining motor coordination associated with operating a motor vehicle support this notion. Unlike the benzodiazepines, which are associated with persistent impairment of motor coordination, the opioids are much less problematic.22 However, in the acute pain setting, particularly in the opioid naïve patient, caution to prevent falls is wise. Residual anesthetic effects, fluid shifts, and pain related mobility dysfunction are potential contributing factors to falls. Opioids may ultimately be beneficial in improving mobility, particularly after the transition to oral administration, but this is difficult to tease out in the mix of physiologic changes following physical trauma. In one study, the use of oral opioids was associated with a reduced incidence of postoperative delirium, but it is difficult to distinguish if this was related to less invasive operative interventions.18

Pain Treatment Strategies

From the data presented above, several treatment strategies may be suggested to improve perioperative pain management in the older patient. Poorly controlled preoperative pain predicts difficulty with pain control during the postoperative period.23 Efforts to improve preoperative pain control may reduce the need for postoperative opioids, and may contribute to a less stormy postoperative course. The routine practice of withholding NSAIDs for two weeks prior to surgery is an unnecessary practice in most patients, and can increase the likelihood of producing a pain flare in arthritic patients. The NSAIDs are commonly withheld due to fear of contributing to operative bleeding. The majority of NSAIDs have relatively short half-lives, particularly ibuprofen, and will be substantially eliminated within 24 hours. If the patient is taking a long half-life compound, such as piroxicam, a short acting alternative NSAID or a COX-2 inhibitor may be substituted. Alternatively, providing an opioid or acetaminophen combination may be a reasonable alternative.

During the intraoperative phase, the use of local anesthetic infiltration and nerve blocks are reasonable options to minimize opioid requirements. Adjuvant analgesics such as dexmedetomidine or gabapentin may be useful in reducing opioid consumption during the perioperative phase. Unfortunately, there is little data available on the response of elderly patients to these agents during the perioperative period. Gabapentin, an anticonvulsant, has been reported to be a useful perioperative analgesic, reducing opioid consumption equivalent to that of the NSAID and coxib classes.24 Further research is needed to determine if gabapentin, particularly when combined with concomitant opioid administration, contributes to an increase risk of sedation, confusion, and falls in the elderly postoperative patient. As a class, anticonvulsants significantly increase the risk of impaired coordination and falls among elders.

Opioids remain the mainstay of pain treatment during the perioperative period. The particular opioid selected does not appear to be of major concern, with one glaring exception. Meperidine has a consistent track record of contributing to
perioperative delirium. Even at fairly low doses, unlikely to be associated with the accumulation of the normeperidine metabolite, meperidine seems to adversely impact mental status. This delirium inducing effect may be related to the anticholinergic activity associated with meperidine, and its rapid transit into the central nervous system. Patients with renal impairment share an even greater risk of complications due to the accumulation of normeperidine, which may elicit seizure activity. As a general rule, meperidine is a poor choice as an analgesic, and is best avoided in the care of the geriatric population, if not most postoperative surgical patients.25

A general rule to follow in prescribing opioids to the elder population is “Start low and go slow!” In the cognitively intact elder, patient-controlled analgesia (PCA) is a useful method, in that it allows for the delivery of small opioid doses at needed intervals. To be effective, an adequate loading dose must be delivered at the initiation of treatment. If aggressive measures are not taken to attain an acceptable level of comfort, the PCA device will not allow the patient to achieve comfort using the PCA mode. As a rule, the elderly appear to require loading doses similar to younger patients; however, the duration of action of most opioids appears to be prolonged due in part to delayed clearance of the drug and to the accumulation of active metabolites. This is particularly true for long half-life opioids such as methadone, but may also occur with morphine and meperidine. Careful monitoring and frequent assessment remain a priority. Confusional states often develop insidiously in elders following surgery, and frequently go undetected without careful assessment. As a result, improper use, rapid onset of action without the need for intravenous access. Advantages of transdermal delivery include the avoidance of venipuncture or injections, continuous delivery, and the ability to bypass the gastrointestinal tract which may reduce the constipating effects of the opioids. This route, relative to oral delivery, also reduces metabolite production, as it avoids the first-pass metabolism by the liver. More clinical experience will be needed with the transdermal PCA device, but it may prove to be a useful technique for both inpatient, and outpatient postoperative pain control.26

CONCLUSION

The Joint Commission for the Accreditation of Healthcare Organizations (JCAHO) recognizes pain treatment as an obligation to all our patients. Fear of harm and side effects frequently hinders the delivery of adequate analgesia to the elderly population. Many of these fears, including the risk of falls and delirium, appear to be unfounded, based on current research. In fact, good perioperative pain control may actually reduce postoperative delirium and improve perioperative morbidity. The keys to providing safe and effective pain treatment include frequent monitoring for side effects, regular assessment of pain scales, and the assessment of analgesic response allowing for adjustments. The application of non-demand analgesic techniques can help to reduce the need for opioids and reduce their associated side effects. Opioid analgesics remain our best analgesic option, and should not be avoided in the elder patient. Remember, start low, go slow, and reevaluate at frequent intervals to guarantee safety and patient satisfaction.

REFERENCES:

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Table 3: Medications and the Risk of Falls in the Elderly.

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<thead>
<tr>
<th>Increase Risk of Falls</th>
<th>Reduce Risk of Falls</th>
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<tr>
<td>Anticonvulsants</td>
<td>Opioids</td>
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<td>Tricyclic Antidepressants</td>
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<td>Selective Serotonin Reuptake Inhibitors</td>
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<td>Benzodiazepines</td>
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